DATE:
FILE: T:\AREA OFFICE\AREA OFFICE\Design\Projects*Open\In House*-15-080 US287 AT BNSF *SLOPE FAILURE@BNSF SLOPE FAILURE\BNSF SLOPE FAILURE_PLANSET.dgn

COUNTY TARRANT PROJ. NO.C 14-15-80
HWY. NO.US287/81, LETTING DATE:MARCH 2022
DATE ACCEPTED

DESIGN	VANRAJ
GRAPHICS	VANRAJ
CHECKED	,
CHECKED	,

STATE PROJECT NO.			SHEET NO.
C-14-15-80			1
STATE	STATE DIST. NO.	COUNTY	
TEXAS	02	TARRANT	
CONT.	SECT.	JOB	HIGHWAY NO.
0014	15	080	US81

ROADWAY CLASSIFICATION:
PRINCIPAL ARTERIAL

DESIGN SPEED: 70 MPH

CURRENT ADT 2020 = 31016

FUTURE ADT 2040 = 62032

TDLR INSPECTION IS NOT REQUIRED.

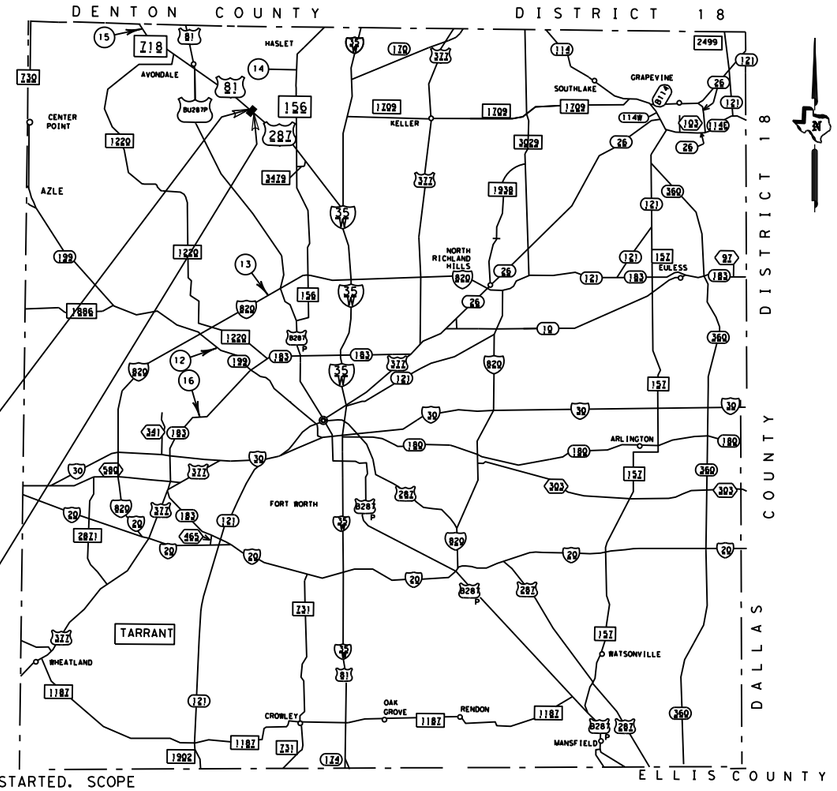
STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

STATE AID PROJECT NUMBER C-14-15-80
HIGHWAY: US81
TARRANT COUNTY
NET LENGTH OF PROJECT= 966.24FT. = 0.183 MI.
LIMITS: BNSF RAIL ROAD-US 81

FOR CONSTRUCTION OF RESTORATION WORK CONSISTING OF EXISTING RIPRAP REMOVAL, INSTALL RIPRAP TEMPORARY SPL SHORING, FLOWABLE BACKFILL AND MISCELLANEOUS BRIDGE REPAIRS AND JOINT REPAIRS

LETTING DATE:	
CONTRACTOR:	
DATE WORK BEGAN:	
DATE WORK COMPLETED:	
DATE WORK ACCEPTED:	
FINAL CONTRACT COST:	



CONVENTIONAL SIGNS

- STATE OR NATIONAL LINE
- CITY OR VILLAGE LINE
- COUNTY LINE
- BASE OR SURVEY LINE
- RIGHT OF WAY LINE
- RIGHT OF WAY MARKERS
- FENCE LINE
- RAILROAD
- TRAVELLED WAY
- CULVERT OR BRIDGE
- POWER LINE
- TELEGRAPH OR TELEPHONE

RR COORDINATION IS REQUIRED AND HAS BEEN STARTED. SCOPE OF WORK SHEET HAS BEEN CREATED AND THE NUMBER OF FLAGGING DAYS HAS BEEN CONFIRMED. BNSF RR UNDER (DOT# 020544C)

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 SPECIAL LABOR PROVISIONS FOR ALL STATE CONSTRUCTION PROJECTS. (SP 000---008)

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROADS: BNSF RAILROAD COMPANY

STATE OF TEXAS
VANRAJSINH MAHIDA
137833
LICENSED PROFESSIONAL ENGINEER
Vanrajsinh Mahida
12/14/21

Texas Department of Transportation

SUBMITTED FOR LETTING: 12/14/2021
DocuSigned by:
788[illegible]
AREA ENGINEER

APPROVED FOR LETTING: 12/15/2021
DocuSigned by:
[signature]
78795[illegible]
DISTRICT DIRECTOR OF TRANSPORTATION
PLANNING AND DEVELOPMENT

RECOMMENDED FOR LETTING: 12/16/2021
DocuSigned by:
Carl L. Johnson, PE
2FE36139F0614C3...
DISTRICT ENGINEER

CK:
DW:
CK:
DN:

GENERAL

	1	TITLE SHEET
	2	INDEX OF SHEETS
	3	SUMMARY OF BRIDGE
	4	TYPICAL SECTIONS
	5, 5A-5G	GENERAL NOTES
	6,6A	ESTIMATE & QUANTITY
	7	QUANTITY SUMMARY
	8	SEQUENCE OF THE WORK
	9-11	TRAFFIC CONTROL TYPICAL SECTIONS
	12	TRAFFIC CONTROL PLAN- US81/287 NB RAMP DETOUR
	13-15	TRAFFIC CONTROL PLAN- LAYOUTS
	16	ROADWAY DETAILS (OMITTED)

TRAFFIC CONTROL PLAN STANDARDS

#	17-28	BC (1)-21 THRU BC (12)-21
#	29	TCP(1-5)-18
#	30	TCP(2-6)-18
#	31	TCP(3-2)-13
#	32	TCP(5-1)-18
#	33	TCP(6-1)-12
#	34	TCP(6-2)-12
#	35	TCP(6-3)-12
#	36	TCP(6-4)-12
#	37	WZ(STPM)-13
#	38	WZ(RS)-16

BRIDGES

	39-40	SURVEY PLAN
	41	SLOPE REPAIR PLAN VIEW
	42	RIPRAP REPAIR LIMITS
	43-44	SLOPE REPAIR CROSS SECTION
	45-46	TEMPORARY SPECIAL SHORING LAYOUTS
	47	BORING LOG
	48-55	MISCELLANEOUS BRIDGE REPAIRS
	56	ARMOR JOINT DETAILS
	57	RELIEF JOINT DETAILS
	58	CONSTRUCTION JOINT DETAILS
	59	CONCRETE STRUCTURAL REPAIRS
##	60	CONCRETE CURB AND CURB GUTTER- CCCG-21
##	61	CONCRETE RIPRAP AND SHOULDER DRAINS EMBANKMENTS AT BRIDGE ENDS - CRR(MOD)

RAILROAD DETAILS

#	62	RAILROAD SCOPE OF WORK
#	63-65	RAILROAD REQUIREMENTS FOR BRIDGE CONSTRUCTION PROJECT

TRAFFIC ITEMS

#	66	PM(1)-20
#	67	PM(2)-20
#	68	FPM(1)-12
#	69	FPM(2)-12
#	70	FPM(3)-12
#	71	FPM(4)-12
#	72	FPM(5)-19

UTILITY ISSUES

	73	EXISTING UTILITY LAYOUTS

ENVIRONMENTAL ISSUES

	74	SW3P LAYOUTS
#	75-76	STORM WATER POLLUTION PREVENTION PLAN (SW3P)
#	77	ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS
#	78	EC (1)-16
#	79	EC (2)-16
#	80	EC (3)-16

STATE OF TEXAS
VANRAJSINH MAHIDA
137833
LICENSED
PROFESSIONAL ENGINEER

Vanrajsinh Mahida
12/20/2021

"#" THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

STATE OF TEXAS
CHUN HO LEE
124680
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Chun Ho Lee
B9992263A27414...
12/20/2021

"# #" THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

DATE:
FILE:

INDEX OF SHEETS

US 81/287

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	15	080	US 287/81
DIST	COUNTY		SHEET NO.
FTW	TARRANT		02

SUMMARY OF BRIDGE

New PSN	Layout Sheet No	Description	Station Begin	Station End	Length	0104-6009 Removing Conc (Riprap)	0110-6003 Excavation (Special)	0132-6006 Embankment (Final) (Dens Cont) (Ty C) Fill	[1] Prefab Soil Drainage Mat	0401-6001 Flowable Backfill	0403-6001 Temporary Special Shoring	0420-6007 CL "A" Conc (Flume)	0428-6001 Penetrating Concrete Surface Treatment	0429-6001 Conc Struct Repair (Clean & Coat with Epoxy)	[2] 0429-6007 Conc Struct Repair (Vertical & Overhead)	0429-6009 Conc Struct Repair (Standard)	0432-6009 Riprap (Conc) (Cl B) (4 in)	0438-6004 Cleaning & Sealing Exist Joints (Class 7)	0454-6008 Header Type Expansion Joint
						SY	CY	CY	SY	CY	SF	CY	SY	SF	SF	SF	CY	LF	CF
		US 81/287 NB OVERPASS @ BNSF RR - MISCELLANEOUS REPAIRS	289+08.00	292+08.00	300.00	~	~	~	~	5	~	~	393	100	28	34	~	333	24
		US 81/287 NB OVERPASS @ BNSF RR - SLOPE REPAIR	9+60.00	11+20.00	160.00	1250	2541	2541	248	77	2115	9	~	~	~	~	161	~	~
TOTALS						1250	2541	2541	248	82	2115	9	393	100	28	34	161	333	24

[1] For Contractor's information only. Prefabricated soil drainage mat is subsidiary to Item 132.

[2] For additional information and details, see "Concrete Structure Repair (Vertical & Overhead)" details sheet.

SUMMARY OF BRIDGE CON'T.

Description	0454-6009 Joint Sealant	0529-6026 Conc Curb (Ty IV)	0764-6001 Drain Inlet Cleaning
	LF	LF	EA
US 81/287 NB OVERPASS @ BNSF RR - MISCELLANEOUS REPAIRS	96	~	4
US 81/287 NB OVERPASS @ BNSF RR - SLOPE REPAIR	~	160	~
TOTALS	96	160	4

DESCRIPTIONS:

CRR (MOD) (Concrete Riprap (Type RR8 & RR9))
CCCG-21 (Concrete Curb and Concrete Curb and Gutter)

HL93 LOADING

SHEET 1 OF 1

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED
PROFESSIONAL ENGINEER

Miguel Cortés
12-7-2021

Texas Department of Transportation

Fort Worth Bridge Design

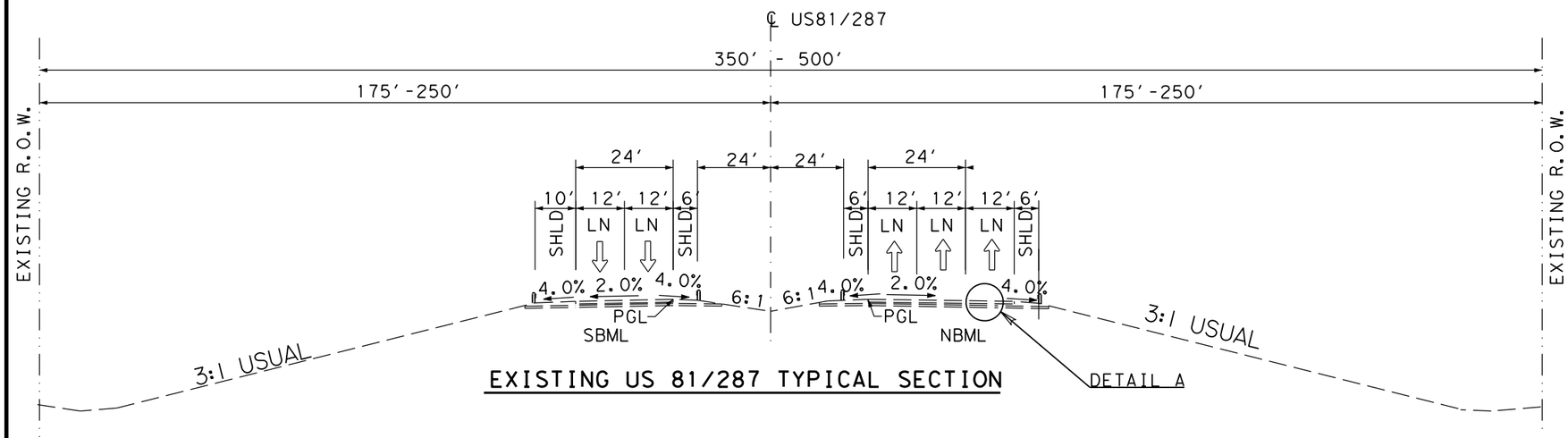
SUMMARY OF BRIDGE

US 81/287 NB OVERPASS @ BNSF RR

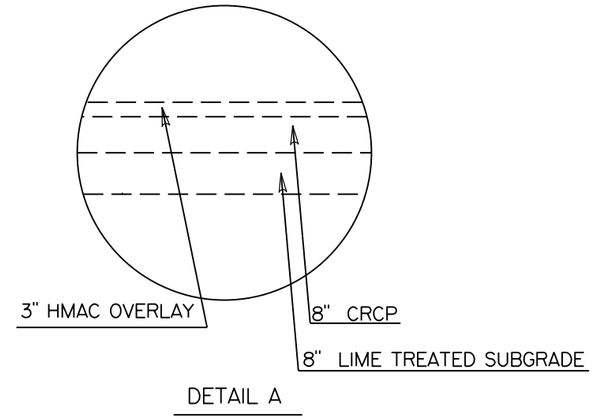
DN: MC	CK: ST	DW: GC/MC	CK: ST/MC

©TxDOT 12-06-21 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0014	15	080	US 81/287
	DIST	COUNTY		SHEET NO.
	02	TARRANT		3

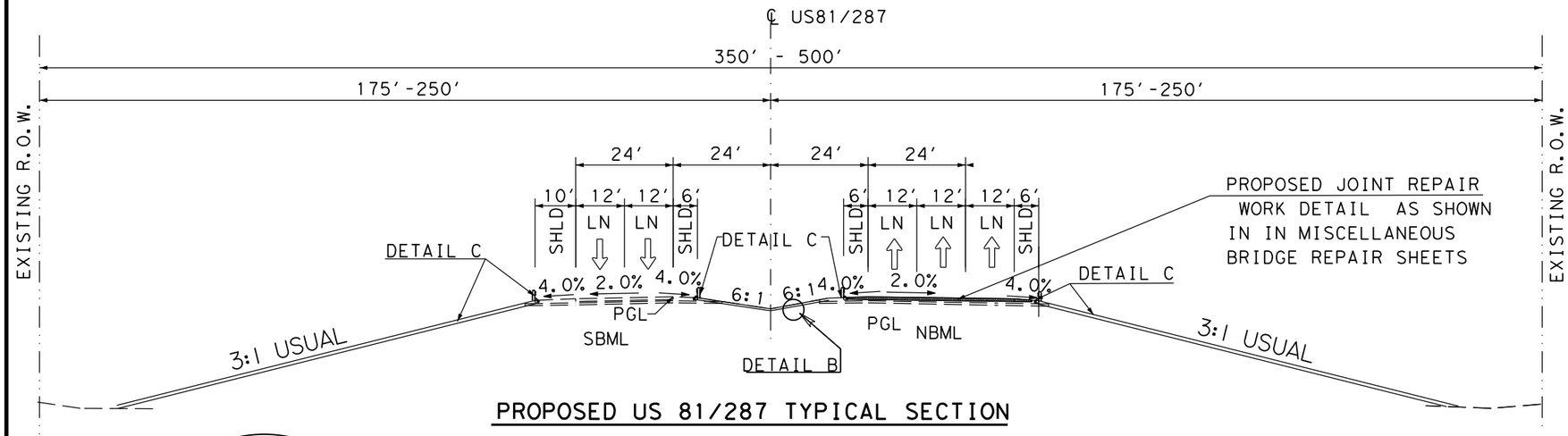
T:\BRIDGE\share\287bnsfRR.001415080\summary.dgn



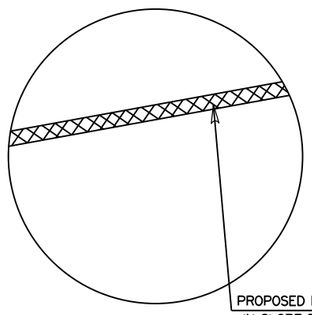
EXISTING US 81/287 TYPICAL SECTION



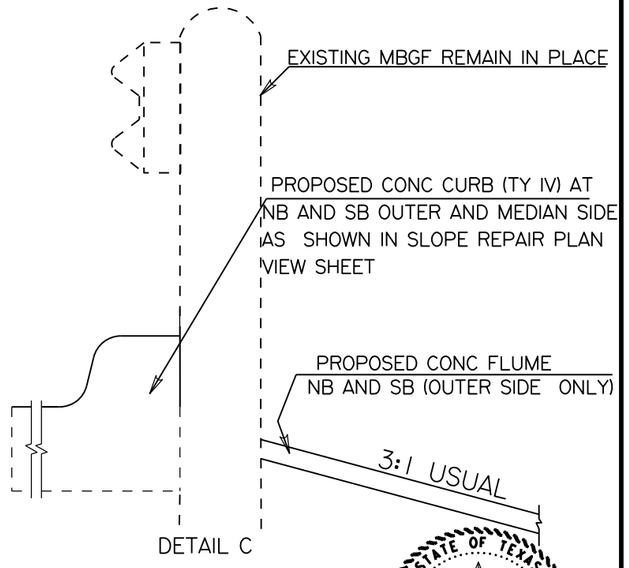
DETAIL A



PROPOSED US 81/287 TYPICAL SECTION



DETAIL B



(AT SOUTH, ABUTMENT-5)

STATE OF TEXAS
VANRAJSINH MAHIDA
137833
LICENSED PROFESSIONAL ENGINEER

Vanrajsinh Mahida
12/22/21

US 81/287

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	15	080	US 287/81
DIST	COUNTY		SHEET NO.
FTW	TARRANT		04

TYPICAL SECTIONS

Specification Data

Basis of Estimate

Item	Description	Rate	Unit
166	Fertilizer (16-8-8)	600 lb./acre**	ton
168	Vegetative Watering	169,400 gal./acre	1,000 gal.
210	Roll (Med Pneumatic Tire)(TY B) Surface Treat	1 hr./2000 sq. yd./crse**	hr.

** Non-Pay, for Contractor's Information Only.

Special Notes

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

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

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

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

Access is read-only.

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

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

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

Area Engineer's Email:	Minh.Tran@txdot.gov
Assistant Area Engineer's Email:	James.Bell1@txdot.gov
Design Manager's Email:	Sam.Yacoub@txdot.gov

Project Number: C 14-15-80

County: TARRANT **Control:** 0014-15-080

Highway: US 81

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

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/

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

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

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

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

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

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

Modifications to Lane Closure / Work Restrictions:

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

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

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

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

Provide all-weather surface for temporary ingress and egress to adjacent property, as directed. Materials, labor, equipment and incidentals necessary to provide temporary ingress and egress will not be paid for directly, but will be subsidiary to the various bid items.

Where necessary, the governing slopes indicated herein may be varied from the limits shown, to the extent approved.

Do not discolor or damage existing curb and curb and gutter during construction operations. In the event of discoloration or damage, clean or repair as directed.

Remove the grass from the crown of shoulders or pavement edges by blading or other approved methods. Payment for this work will not be made directly, but will be subsidiary to the various items of the contract.

Plugging of pipes or culverts will not be paid for directly, but will be subsidiary to the various bid items, unless otherwise shown on the plans.

Provide temporary drain openings at all low points or other drainage structures, as required, at the Contractor's expense.

Remove any obstructions to existing drainage due to the contractor's operations, as required, at the Contractor's expense.

Install all required concrete riprap flumes immediately following the construction of ditches in which they are to be placed. In addition, apply all erosion control measures as shown on the plans or as directed, immediately following construction of channels to their required line, grade, and section.

The following standard detail sheets have been modified:

Concrete Riprap And Shoulder Drains Embankments At Bridge Ends (Types RR8 & RR9)-CRR(MOD)

Project Number: C 14-15-80

County: TARRANT **Control:** 0014-15-080

Highway: US 81

Item 4 – Scope of Work

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

Item 5. Control of the Work

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

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

Item 7. Legal Relations and Responsibilities

This contract requires work to be done on railroad property. Cooperate with the railroads and comply with all of their requirements including obtaining any required training before performing work on railroad property.

Submit to the Engineer an original railroad liability insurance policy.

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

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

any determinations that their activities do not affect a USACE permit area. Maintain copies of these determinations for review by the Department or any regulatory agency.

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

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

(2) **Contractor Materials from Areas Other than Previously Evaluated Areas.** Provide the Department with a copy of all USACE coordination or approvals prior to initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to haul roads, equipment staging areas, borrow and disposal sites:
   a. Item 132, Embankment, used for temporary or permanent fill within a USACE permit area; and,
   b. Unsuitable excavation or excess excavation ["Waste"] (Item 110, Excavation) that is disposed of outside a USACE evaluated area.

The total area disturbed for this project is 0.64 acres. The disturbed area in this project, all project locations in the Contract, and the Contractor project specific locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the right of way. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the right of way to the Engineer and to the local government that operates a separate storm sewer system.

When a approach slab is milled, seal coated and overlaid, remove excess material. Do not just broom to the sides of the bridge, under guardrail, etc. Cover or protect all sealed expansion joints and rails on bridges and all railroad tracks encountered as approved. Clean and repair all of

Project Number: C 14-15-80

County: TARRANT **Control:** 0014-15-080

Highway: US 81

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

Prevention of Migratory Bird Nesting

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

Structures

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

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

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

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

Roadway closures during the following key dates and/or special events are prohibited to this project: No work that restricts or interferes with traffic shall be allowed between 3 PM on the day preceding a Holiday or Event and 9 AM on the day after the Holiday or Event.

Roadway closures during the following key dates and/or special events are prohibited:

Holiday Lane Closure Restrictions	
New Year's Eve and New Year's Day (December 31 through January 1)	3 PM December 30 through 9 AM January 2

Easter Holiday Weekend (Friday through Sunday)	3PM Thursday through 9 AM Monday
Memorial Day Weekend (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
Independence Day (July 3 through July 5)	3 PM June 30 through 9 AM July 6
Labor Day Weekend (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
Thanksgiving Holiday (Wednesday through Sunday)	3 PM Tuesday through 9 AM Monday
Christmas Holiday (December 23 through December 26)	3 PM December 22 through 9 AM December 27

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

Event Lane Closure Restrictions 3 PM the day before Event to 9 AM the day after the Event			
NASCAR Races at Texas Motor Speedway (generally 3 events):	NASCAR Nationwide and Sprint Cup Series (Held in late March/early April)	NASCAR Nationwide and Sprint Cup Series (Held in Late October/early November)	Indy Series Racing and NASCAR Truck Series (Held in June)
Within one mile radius of major retail traffic generators i.e. malls (Thanksgiving Day through January 2)			
Fort Worth Stock Show and Rodeo			
Arlington Entertainment District			
Grapevine Festivals (Including but not limited to: Carol of Lights, Black Friday Weekend, Christmas Parade, and weekends during Christmas Capital of Texas)			
MayFest			
Weatherford Peach Festival			

Project Number: C 14-15-80

County: TARRANT **Control:** 0014-15-080

Highway: US 81

Item 8. Prosecution and Progress

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

Only nighttime work will be allowed for all tasks as shown in sequence of the work sheets.

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

Prepare the progress schedule as a bar chart, include all planned work activities and sequences and show Contract completion within the number of working days specified. Submit an updated hard copy when changes to the schedule occur or when requested.

Item 100. Preparing Right of Way

Measurement for this item will be with the limits of measurements as shown on the plans.

Removal of existing concrete pavement will be in accordance with Item 104, "Removing Concrete" except that this work will not be paid for directly, but will be subsidiary to Item 100, "Preparing Right of Way."

Item 104. Removing Concrete

Concrete Riprap to be removed as shown in plans.

Item 110. Excavation

Cross-sections for pay quantity determination of earthwork may be developed photogrammetrically.

Review proposed waste sites to determine if any site is located in a "Base Floodplain" or "Floodway" as defined by the Federal Emergency Management Agency (FEMA).

If waste material from this project is placed in a base floodplain as defined by FEMA, obtain a permit from the local community responsible for enforcing National Flood Insurance Program

(NFIP) regulations. Ensure that the owner of the property receiving the waste has obtained the necessary permit.

Item 132. Embankment

The reconstructed embankment shall be of Type C material with a controlled plasticity index (PI) and liquid limit (LL). where $12 < PI < 20$ and $LL < 45$.

Compact embankment material to 98% of dry unit weight. Moisture content shall be between optimum and +3% optimum. No more than 12" loose lifts. Backfill placed within 3 ft of drilled shafts or walls shall be placed in loose lifts no more than 8" thick and compacted using hand tampers or small self-propelled compactor.

Furnish test results per Test Procedures Tex-104, 105, and 106-E (PIs), Tex-113 or 114-E (M-D Curves), and Tex-145 and/or Tex-146-E (Sulfates) for each material sample provided by the Engineer. Perform field density tests (Tex-115-E, Part I) at a frequency for each worked section to produce passing results prior to testing by the Engineer per Tex-115-E, Part I.

When embankment is placed as a bridge header bank, test each lift for compliance with density requirements, near the center of each travel lane at the following locations:

1. At the "beginning of bridge" or "end of bridge" station (if abutment is on retaining wall, location may be adjusted by not more than 5 feet.)
2. At 25-foot intervals for a distance of 150 feet in advance of the "beginning of bridge" station.
3. At 25-foot intervals for a distance of 150 feet after the "end of bridge" station.

Density tests must be conducted by a department-certified independent testing laboratory. Results of tests will be furnished to TxDOT within 24 hours after testing; a final copy of all test reports must be signed and sealed by a Professional Engineer in the State of Texas and furnished within five (5) working days after testing. Areas which do not meet minimum density requirements will be removed, re-compacted, and re-tested for compliance at the contractor's entire expense. Testing and reporting of test results will not be paid for directly, but will be subsidiary to this item.

Construct embankments for bridge header banks to final subgrade elevation prior to excavation for abutment caps and placement of foundation course at approach slabs. Payment for structural excavation and/or excavation for placement of foundation course will not be paid for directly, but will be subsidiary to the pertinent bid items.

Project Number: C 14-15-80

County: TARRANT **Control:** 0014-15-080

Highway: US 81

At all locations where guardrail is shown to flare, widen the embankment as necessary to accommodate the guardrail.

Item 162. Sodding for Erosion Control

Furnish and place Bermudagrass sod.

Item 166. Fertilizer

Fertilize all areas of project to be seeded or sodded.

Item 168. Vegetative Watering

Furnish and install an approved rain gauge at the project site, as directed. Furnishing and installation of the rain gauge will not be paid for directly, but will be subsidiary to Item 168.

Apply vegetative watering for an establishment period of thirteen weeks following application of seed or installation of sod, at a rate of 1/2 inch of water depth per week (approximately 13,030 gallons per acre). During the first four weeks after seeding, apply water twice per week, on non-consecutive days, each at half the weekly application rate. For the remainder of the establishment period, apply vegetative watering once per week during the months of January through June or September through December, at the weekly application rate; apply watering twice per week, on non-consecutive days during the months of July and August, each at one-half the weekly application rate.

Average weekly rainfall rates for the District are:

January—0.39"	April—0.86"	July—0.48"	October—0.68"
February—0.46"	May—1.00"	August—0.47"	November—0.46"
March—0.48"	June—0.63"	September—0.74"	December—0.37"

Item 403. Temporary Special Shoring

Obtain railroad approval for any alternate temporary shoring designs. The contractor is responsible for all costs associated with obtaining such approval. No additional time will be granted as compensation for delays resulting from failure to obtain timely railroad approval of temporary shoring designs.

Item 420. Concrete Substructures

Provide weepholes at riprap as directed.

Item 421. Hydraulic Cement Concrete

For Class P (Item 360) and S (Item 421) Concrete Only: For concrete plants equipped with 2 aggregate bins or no calibrated metering system, blend manufactured and natural sand at the aggregate source only. For concrete plants equipped with a minimum of 3 bins and a calibrated metering system, blending of the separate sands on-site is permitted to meet gradation and AIR requirements.

Strength/cylinder testing equipment must be equipped with a printer for an electronic print out of all test results.

Air entrainment requirements are waived for all classes of concrete except all Class S and all Class P concrete.

Concrete will not be rejected for low air content. Adjustment to the dosage of air entrainment will be as directed or allowed by the Engineer.

Include the approved mix design number on each delivery ticket.

Ensure that Contractor personnel performing job-control (QC) testing on concrete are ACI certified and maintain certification with annual proficiency/split tests performed with TxDOT. Provide a copy of all personnel certification papers to the Engineer at the preconstruction meeting. The Engineer may require the Contractor's testers to provide the certification papers upon arrival and before testing at the job site. Certified testers will be required to participate with certified TxDOT personnel annually for compression testing (Tex-418-A) and capping cylinders (Tex-450-A) to retain their certification on TxDOT projects.

Furnish a hard copy of all testing equipment calibration reports at the preconstruction meeting when non-TxDOT equipment is used to test concrete. Furnish updated reports as equipment is calibrated through the project contract. The calibration frequency will match TxDOT's and will apply for each piece of equipment as follows:

Slump Cone - Annual
Air Meter - Every 3 months
Compression Tester - Annual
Beam breaker - Annual

The Engineer may allow the use of local commercial laboratories under contract to provide these services. The Commercial Laboratory must fulfill requirements listed above prior to performing any work.

Optimized Aggregate Gradation is required for this project.

Project Number: C 14-15-80

County: TARRANT **Control:** 0014-15-080

Highway: US 81

Required Note:
Provide the following surface finish for the listed elements: *[list element and finish if different]*

Item 428. Penetrating Concrete Surface Treatment

Provide a Type 1-Silane surface treatment to areas shown on the detail sheets.

Item 432. Riprap

Provide weep holes as directed.

The quantities for riprap at the location indicated may be varied to the extent necessary to ensure proper functioning for the intended purpose.

All concrete riprap will be 4" (.33 ft) in thickness, unless otherwise shown on the plans, and must be reinforced.

An 9 inch (.75 ft.) by 36 inch (3 ft.) toe wall is required at the exposed edges of all concrete riprap, unless otherwise directed.

Provide a toe wall at all exposed edges of all protection stone riprap, unless otherwise directed.

Locations and lengths of riprap flumes shown on the plans are approximate. Actual lengths and locations are to be determined in the field.

Use rebar for all reinforcement. Do not use wire mesh or synthetic fiber.

Item 454. Bridge Expansion Joints

For header-type expansion joints refer to the following TxDOT website for the approved systems:

http://www.txdot.gov/inside-txdot/division/bridge/approved-systems/expansion-joints.html

Item 496. Removing Structures

When required by the plans, partial or complete removal of a structure for staged construction shall be accomplished in a manner which does not cause damage to the remainder of the structure or its supporting members.

Notify the Texas Department of State Health Services (DSHS) prior to demolition or renovation of bridges or other structures, using DSHS Form APB#5, "Demolition/Renovation Notification

Form". The form and instructions may be found on the DSHS Asbestos Programs Branch web page at http://www.dshs.state.tx.us/asbestos/notification.shtm. The DSHS notification form must be hand-delivered or mailed to (received at) the DSHS Austin office at least ten working days (10) days prior to commencing demolition or renovation. Fax or e-mail notifications will not be accepted. For projects with multiple bridges, a single notification, with a listing of all bridges or structures to be demolished or renovated and the expected start dates of their demolition or renovation (the start date is defined as the first date of visible demolition activities). Notify the DSHS Regional or Local inspector of all start date changes. The expected project completion date may be used as the "end" date.

Removal of riprap as required, approach slabs and shoulder drains to be included in the unit price bid.

Provide for the safety and health of employees and abide by all OSHA standards and regulations.

Item 502. Barricades, Signs, and Traffic Handling

The contractor force account 'safety contingency' that has been established for this project is intended to be utilized for work zone enhancements to improve the effectiveness of the traffic control plan that could typically not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's responsible person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

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

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

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

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

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

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

Project Number: C 14-15-80

County: TARRANT **Control:** 0014-15-080

Highway: US 81

Item 506. Temporary Erosion, Sedimentation, and Environmental Controls

Remove accumulated sediment or replace SW3P controls when the capacity has been reduced by 50% or when the depth of sediment at the control structure exceeds one foot.

Item 666. Reflectorized Pavement Markings with Retroreflective Requirements

Collection of retroreflectivity readings using a mobile retroreflectometer is the preferred method. If retroreflectivity readings are collected using a portable or handheld unit, then measurement is defined as a collective average of at least 20 readings taken along a 200-foot test section. A minimum of three measurements will be required per mile of roadway. Measurements collected on a centerline stripe will be averaged separately for stripe in each direction of travel. A TxDOT inspector must witness the calibration and collection of all retro-reflectivity data.

Item 6001. Portable Changeable Message Signs

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

Five (5) electronic portable changeable message sign unit(s) will be required. Individual or collective use of signs will be required by the Engineer when deemed necessary to supplement the traffic control plan.

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

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

Project Number: C 14-15-80

County: TARRANT **Control:** 0014-15-080

Highway: US 81

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

In addition to the shadow vehicles with truck mounted attenuator (TMA) that are specified as being required on the traffic control plan for this project, provide 0 additional shadow vehicle(s) with TMA.

Therefore, 2 total shadow vehicles with TMA will be required for this type of work. Determine if one or more of these operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0014-15-080 **DISTRICT** Fort Worth **COUNTY** Tarrant
HIGHWAY US 81

							TOTAL EST.	TOTAL FINAL
			CONTROL SECTION JOB		**0014-15-080**			
			PROJECT ID		**A00141196**			
			COUNTY		**Tarrant**			
			HIGHWAY		**US 81**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL		
	100-6001	PREPARING ROW		AC	0.640		0.640	
	104-6009	REMOVING CONC (RIPRAP)		SY	1,250.000		1,250.000	
	110-6003	EXCAVATION (SPECIAL)		CY	2,541.000		2,541.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)		CY	2,541.000		2,541.000	
	162-6002	BLOCK SODDING		SY	2,200.000		2,200.000	
	168-6001	VEGETATIVE WATERING		MG	72.680		72.680	
	401-6001	FLOWABLE BACKFILL		CY	82.000		82.000	
	403-6001	TEMPORARY SPL SHORING		SF	2,115.000		2,115.000	
	420-6007	CL A CONC (FLUME)		CY	9.000		9.000	
	428-6001	PENETRATING CONCRETE SURFACE TREATMENT		SY	393.000		393.000	
	429-6001	CONC STR REPAIR(CLEAN & COAT WTH EPOXY)		SF	100.000		100.000	
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)		SF	28.000		28.000	
	429-6009	CONC STR REPAIR (STANDARD)		SF	34.000		34.000	
	432-6009	RIPRAP (CONC) (CL B) (4")		CY	161.000		161.000	
	438-6004	CLEANING AND SEALING EXIST JOINTS(CL7)		LF	333.000		333.000	
	454-6008	HEADER TYPE EXPANSION JOINT		CF	24.000		24.000	
	454-6009	JOINT SEALANT		LF	96.000		96.000	
	500-6001	MOBILIZATION		LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING		MO	5.000		5.000	
	506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)		LF	100.000		100.000	
	506-6003	ROCK FILTER DAMS (INSTALL) (TY 3)		LF	100.000		100.000	
	506-6011	ROCK FILTER DAMS (REMOVE)		LF	200.000		200.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)		SY	225.000		225.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)		SY	225.000		225.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)		LF	1,600.000		1,600.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)		LF	1,600.000		1,600.000	
	529-6026	CONC CURB (TY IV)		LF	160.000		160.000	
	666-6224	PAVEMENT SEALER 4"		LF	450.000		450.000	
	666-6300	RE PM W/RET REQ TY I (W)4"(BRK)(100MIL)		LF	150.000		150.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)		LF	150.000		150.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)		LF	150.000		150.000	
	672-6007	REFL PAV MRKR TY I-C		EA	8.000		8.000	
	760-6001	DITCH CLEANING AND RESHAPING (FOOT)		LF	345.000		345.000	
	764-6001	DRAIN INLET CLEANING		EA	4.000		4.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN		EA	5.000		5.000	
	6185-6002	TMA (STATIONARY)		DAY	100.000		100.000	
	6185-6003	TMA (MOBILE OPERATION)		HR	30.000		30.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0014-15-080 **DISTRICT** Fort Worth **COUNTY** Tarrant
HIGHWAY US 81

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0014-15-080**			
		PROJECT ID		**A00141196**			
		COUNTY		**Tarrant**			
		HIGHWAY		**US 81**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	02	RAILROAD FLAGGING: RAILROAD FORCE ACCOUNT WORK (NON PARTICIPATING)	LS	1.000		1.000	
	08	CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT LAW ENFORCEMENT (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT RAILROAD FLAGGING (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)	LS	1.000		1.000	

			0014-15-080	TOTAL EST.
			A00141196	
			Tarrant	
			US 81	
BID CODE	DESCRIPTION	UNIT	EST.	
100-6001	PREPARING ROW	AC	0.640	0.640
104-6009	REMOVING CONC (RIPRAP)	SY	1,250.000	1,250.000
110-6003	EXCAVATION (SPECIAL)	CY	2,541.000	2,541.000
132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	2,541.000	2,541.000
162-6002	BLOCK SODDING	SY	2,200.000	2,200.000
168-6001	VEGETATIVE WATERING	MG	72.680	72.680
401-6001	FLOWABLE BACKFILL	CY	82.000	82.000
403-6001	TEMPORARY SPL SHORING	SF	2,115.000	2,115.000
420-6007	CL A CONC (FLUME)	CY	9.000	9.000
428-6001	PENETRATING CONCRETE SURFACE TREATMENT	SY	393.000	393.000
429-6001	CONC STR REPAIR(CLEAN & COAT WTH EPOXY)	SF	100.000	100.000
429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	28.000	28.000
429-6009	CONC STR REPAIR (STANDARD)	SF	34.000	34.000
432-6009	RIPRAP (CONC) (CL B) (4")	CY	161.000	161.000
438-6004	CLEANING AND SEALING EXIST JOINTS(CL7)	LF	333.000	333.000
454-6008	HEADER TYPE EXPANSION JOINT	CF	24.000	24.000
454-6009	JOINT SEALANT	LF	96.000	96.000
500-6001	MOBILIZATION	LS	1.000	1.000
502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	5.000	5.000
506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	100.000	100.000
506-6003	ROCK FILTER DAMS (INSTALL) (TY 3)	LF	100.000	100.000
506-6011	ROCK FILTER DAMS (REMOVE)	LF	200.000	200.000
506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	225.000	225.000
506-6024	CONSTRUCTION EXITS (REMOVE)	SY	225.000	225.000
506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1,600.000	1,600.000
506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1,600.000	1,600.000
529-6026	CONC CURB (TY IV)	LF	160.000	160.000
666-6224	PAVEMENT SEALER 4"	LF	450.000	450.000
666-6300	RE PM W/RET REQ TY I (W)4"(BRK)(100MIL)	LF	150.000	150.000
666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	150.000	150.000
666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	150.000	150.000
672-6007	REFL PAV MRKR TY I-C	EA	8.000	8.000
760-6001	DITCH CLEANING AND RESHAPING (FOOT)	LF	345.000	345.000
764-6001	DRAIN INLET CLEANING	EA	4.000	4.000
6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	5.000	5.000
6185-6002	TMA (STATIONARY)	DAY	100.000	100.000
6185-6003	TMA (MOBILE OPERATION)	HR	30.000	30.000
02	RAILROAD FLAGGING: RAILROAD FORCE ACCOUNT WORK (NON-PARTICIPATING)	LS	1.000	1.000
08	RAILROAD FLAGGING: CONTRACTOR FORCE ACCOUNT WORK (NON-PARTICIPATING)	LS	1.000	1.000
	LAW ENFORCEMENT	LS	1.000	1.000
18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000	1.000
	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000	1.000

STATE OF TEXAS
VANRAJSINH MAHIDA
137833
LICENSED
PROFESSIONAL ENGINEER
Vanrajsinh Mahida
12/20/2021

US 81/287

Texas Department of Transportation

QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
0014	15	080	US 287/81
DIST	COUNTY		SHEET NO.
FTW	TARRANT		07

DATE:
FILE: C:\CONTCA\OIN HOUSE\0014-15-080 US287 AT BNSF SLOPE FAILURE C drive back up 11-17-21\90%\Estimates and Quantity Report 12-6-21.xlsx]QUANTITY SUMMARY 12-7-21

Sequence of the work.

Applicable to all phases:

1 Place and maintain SW3P and EPIC for whole site.

2 For each phase, the contractor shall place/maintain and reconfigure advance warning signs, TXDOT Barricades standards (BC-21) and pavement markings per the TXDOT standards and guidelines provided in Texas manual on uniform traffic control devices (TMUTCD).

3 Place chanalization devices as per the standards listed on index sheet of these plans and other TCP.

4 Portable changeable message signs (PCMS) per TMUTCD, must be place 7 days minimum in advance of construction. The engineer shall approve the location of PCMS and wording of the PCMS prior to relocating PCMS for each phase.

5 Contractor is always to maintain positive drainage.

6 Construction vehicles/machinaries/workers are allowed near/in/above Railroad ROW for specific duration and types of activities approved by the engineer.However, No construction vehicle/workers allowed to cross rail track without written permission of an engineer.

7 Eliminate/alter/mask all traffic control devices not suitable for workzone situation. Restore/update all permanent traffic control device in the same manner to match pre-construction phase/next phase condition.

8 Contractor will not be allowed to advance to the next phase or stage of the work until completing work for the current phase and stage unless written approval by the engineer.

9 For any work on or from US 81/287 travel lane/shoulder or median area, only nighttime work will be allowed unless written permission of the engineer.

Phase 1. Construction of slope failure ,NB concrete flume and joint repaire(part)

1 Lane closure detail:

1.1 NB on ramp closure with detour.

2 No construction workers and/or machineries are allowed in median area without written permission of an engineer for this phase.

3 Maintain safe working environment in railroad R.O.W

4 Perform construct for following items:

4.A All slope failure work underneath of bridge.

4.B Concrete flume and Curb work near NB outer shoulder and part of all tasks of this workzone as shown in Miscellaneous bridge repairs sheets.

Phase 2. Construction of NB joint repair(part) for thru right lane (i.e. Middle lane)

1 Lane closure detail:

1.1 NB on ramp closure with detour.

1.2 NB thru right lane (i.e. middle lane) closure.
NB left lane open for traffic required lane shifting and using part of shoulder as travel lane.
Lateral buffer (LB)and width of travel lane shall use as shown in traffic control typical section and TCP layout for this phase.

2 No construction workers and/or machineries are allowed on main thru lane of NB and SB and median area without written permission of an engineer for this phase.

3 Perform construct for following items:

3.1 Part of all tasks of this workzone as shown in Miscellaneous bridge repairs sheets.

4 Contractor shall notify the engineer minimum 7 days prior to lane closure to restrict oversize loads during lane closure.

Phase 3. Construction of NB joint repair(part) thru left lane and inner shoulder.

1 Lane closure detail:

1.1 NB on ramp closure with detour.

1.2 NB thru left lane and shoulder closure.
NB right thru lane (i.e. middle lane) open for traffic required lane shifting.
Lateral buffer (LB)and width of travel lane shall use as shown in traffic control typical section and TCP layout for this phase.

2 Perform construct for following items:

2.1 Curb work near NB inner shoulder and part of all tasks of this workzone as shown in Miscellaneous bridge repairs sheets.

Phase 4. Construction of Concrete riprap in median area between NB and SB.

1 Lane closure detail:

1.1 NB thru left lane and shoulder closure.

1.2 SB thru left lane and shoulder closure.

2 Perform construct for following items:

2.1 Concrete Riprap in Median section. (limit of Riprap area include in phase 1 and in this phase shall be approved by the engineer).

2.2 Ditch cleaning/regrading in median Area.

Phase 5. Construction of Concrete curb at innerside of SB.

1 Lane closure detail:

1.1 SB thru left lane and shoulder closure.

2 Perform construct for following items:

2.1 Curb work.

Phase 6. Construction of Concrete curb at outerside of SB.

1 Lane closure detail:

1.1 SB thru right lane and shoulder closure.

1.2 Status of SB Ramp must be supported by advance warning sign and pcms.

2 Perform construct for following items:

2.1 Curb work.

2.2 Concrete flume.

Phase 7. Construction of Bridge repairing work for NB from North abutment.

1 Lane closure detail:

No lane closure is specified.
Location for entering and exiting for construction vehicles and worker shall be north side of Bridge from NB. (X=2317195.4573, Y=7024011.2137)
TCP for workzone away from travel lane shall diploy with PCMS and advance warning sign " CONSTRUCTION VEHICLE ENTERING AND EXITING ROADWAY"

2 Perform construct for following items:

2.1 This phase includes all work that requried to reach work area closed to north side (abutment 1).

STATE OF TEXAS
VANRAJSINH MAHIDA
137833
LICENSED PROFESSIONAL ENGINEER

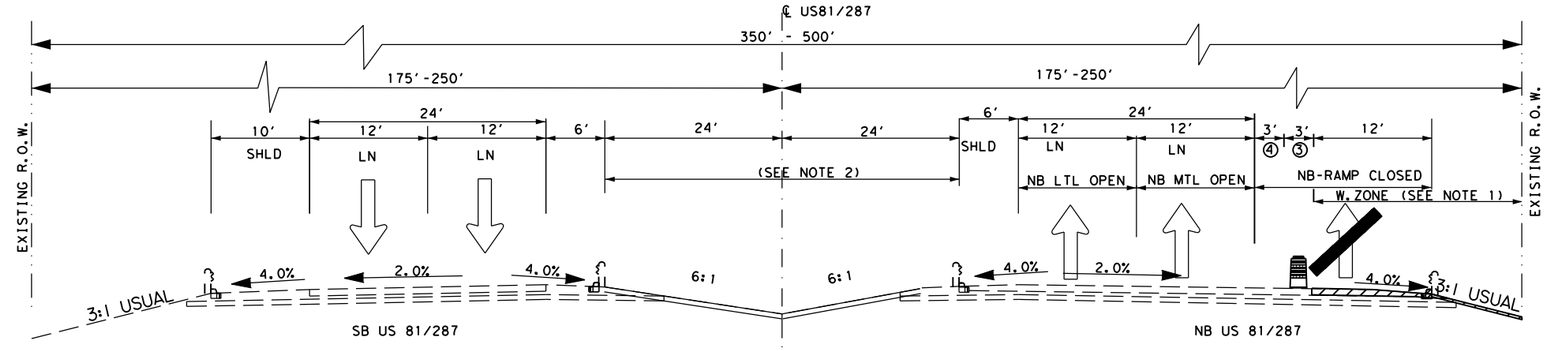
Vanrajsinh Mahida
12/20/2021

US 81/287

SQUENCE OF THE WORK

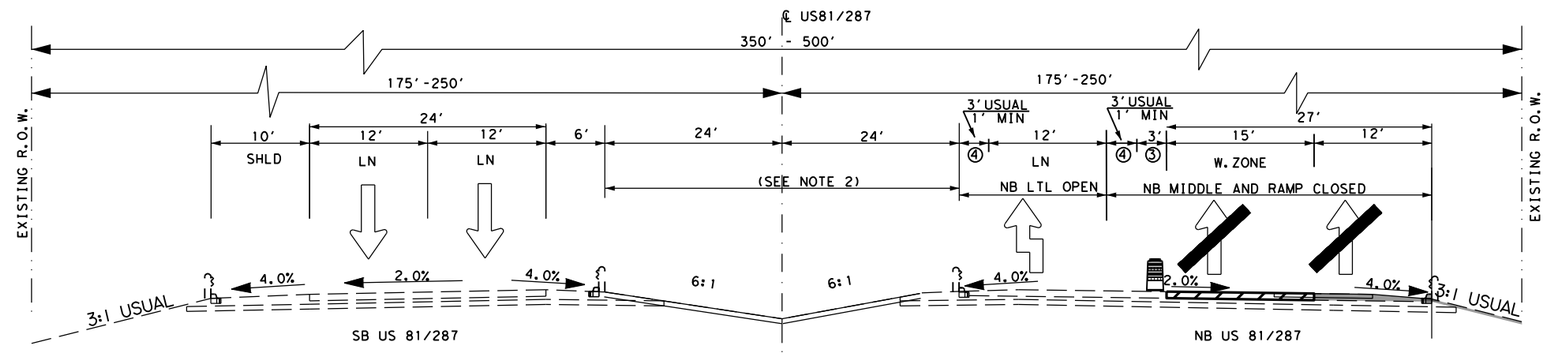
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	15	080	US 287/81
DIST	COUNTY		SHEET NO.
FTW	TARRANT		08



PHASE 1

PROPOSED US 81/287 TRAFFIC CONTROL TYPICAL SECTION



PHASE 2

PROPOSED US 81/287 TRAFFIC CONTROL TYPICAL SECTION

LEGEND

- ROADWAY CONSTRUCTION THIS PHASE.
- ROADWAY CONSTRUCTION PRIVIOUS PHASE.
- NB LANE OPEN FOR TRAFFIC.
- NB LANE OPEN FOR TRAFFIC WITH LANE SHIFTING (SHLD USE AS TRAVEL LANE)
- NB LANE CLOSE FOR TRAFFIC.
- SB LANE OPEN FOR TRAFFIC
- SB LANE CLOSE FOR TRAFFIC.
- CHENALIZATION DEVICE
- ③ LATERAL SPACE FOR CHENALIZATION DEVICE
- ④ LATERAL SPACE BETWEEN TRAFFIC AND CHENALIZATION DEVICE

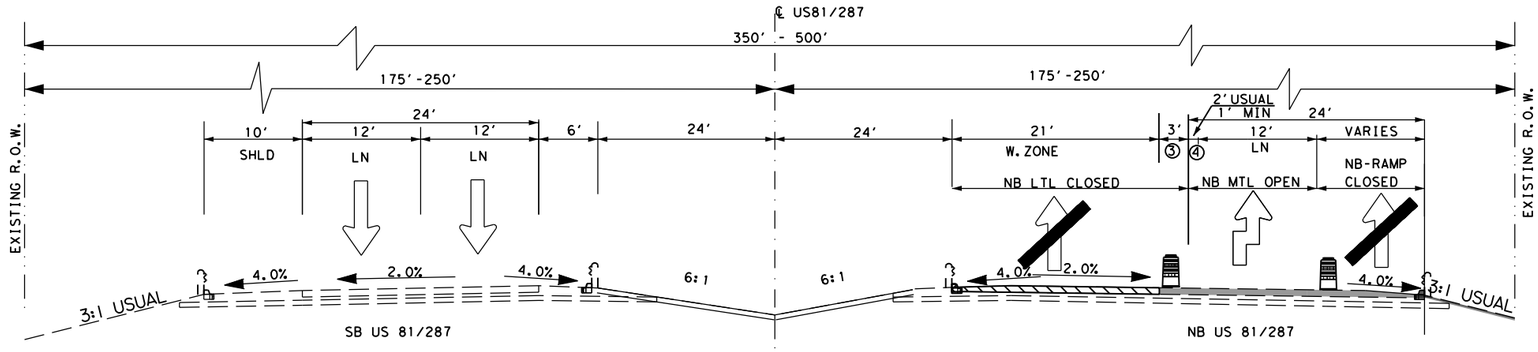
STATE OF TEXAS
VANRAJSINH MAHIDA
137833
LICENSED PROFESSIONAL ENGINEER

Vanrajsinh Mahida
12/20/2021

US 81/287

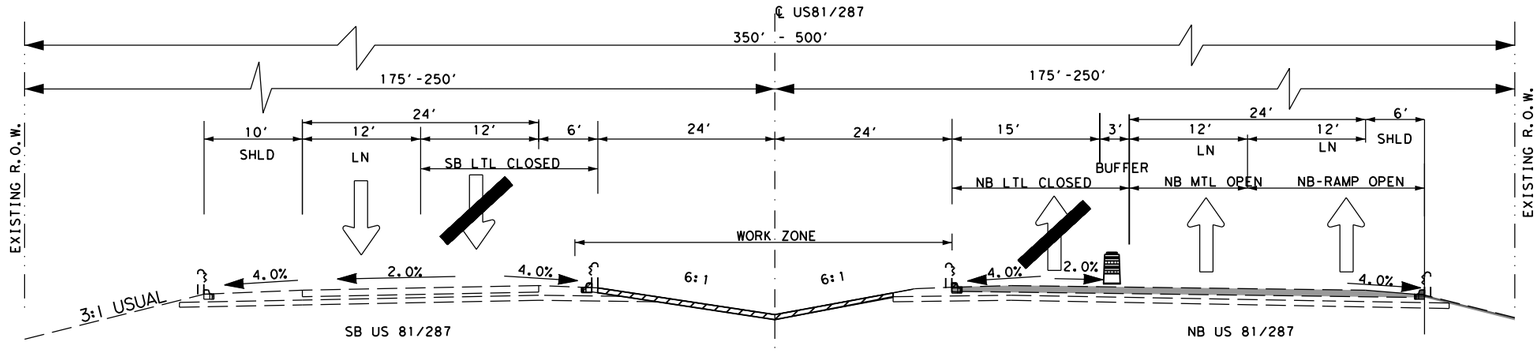
TRAFFIC CONTROL TYPICAL SECTIONS

CONT	SECT	JOB	HIGHWAY
0014	15	080	US 287/81
DIST	COUNTY		SHEET NO.
FTW	TARRANT		9



PHASE 3

PROPOSED US 81/287 TRAFFIC CONTROL TYPICAL SECTION



PHASE 4

PROPOSED US 81/287 TRAFFIC CONTROL TYPICAL SECTION

LEGEND

- ROADWAY CONSTRUCTION THIS PHASE.
- ROADWAY CONSTRUCTION PRIVIOUS PHASE.
- NB LANE OPEN FOR TRAFFIC.
- NB LANE OPEN FOR TRAFFIC WITH LANE SHIFTING
- NB LANE CLOSE FOR TRAFFIC.
- SB LANE OPEN FOR TRAFFIC
- SB LANE CLOSE FOR TRAFFIC.
- CHENALIZATION DEVICE
- ③ LATERAL SPACE FOR CHENALIZATION DEVICE
- ④ LATERAL SPACE BETWEEN TRAFFIC AND CHENALIZATION DEVICE

STATE OF TEXAS
VANRAJSINH MAHIDA
137833
LICENSED
PROFESSIONAL ENGINEER

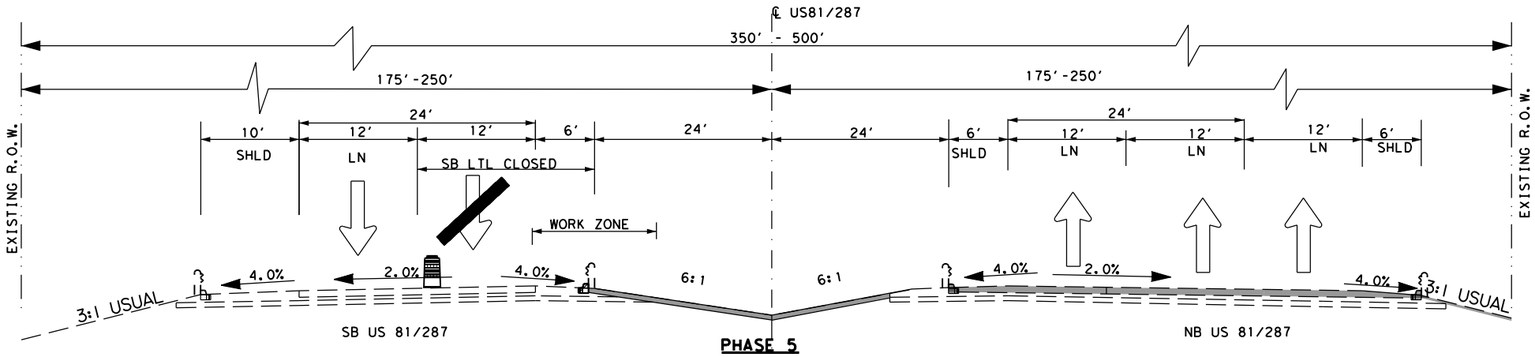
Vanrajsinh Mahida
12/20/2021

US 81/287

Texas Department of Transportation

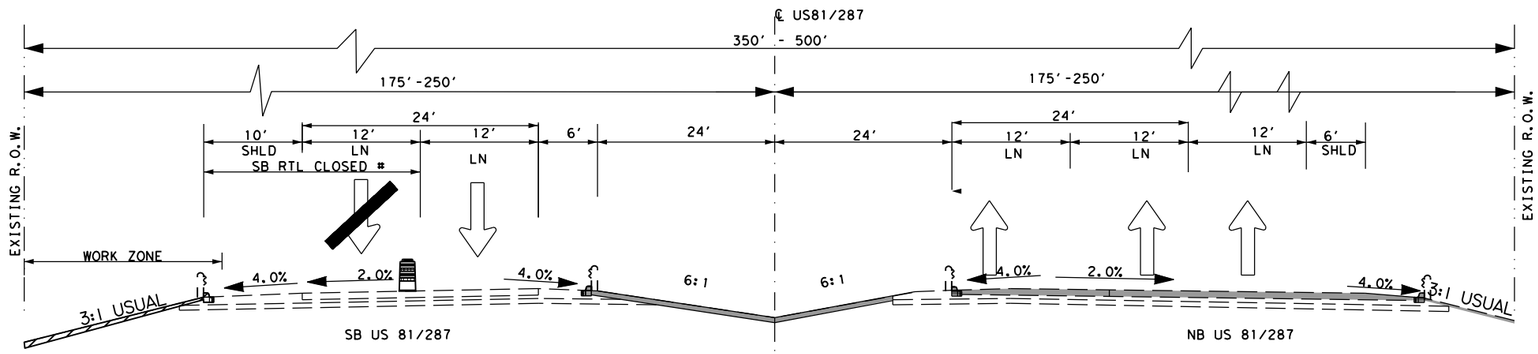
CONT	SECT	JOB	HIGHWAY
0014	15	080	US 287/81
DIST	COUNTY		SHEET NO.
FTW	TARRANT		10

TRAFFIC CONTROL TYPICAL SECTIONS



PHASE 5

PROPOSED US 81/287 TRAFFIC CONTROL TYPICAL SECTION



PHASE 6

PROPOSED US 81/287 TRAFFIC CONTROL TYPICAL SECTION

OFF RAMP STATUS (CLOSE/OPEN) AS DIRECTED BY ENGINEER MUST SUPPROTED BY APPROPRIATE TMUTCD COMPLIANCED WORKZONE SIGNS AND OTHER DEVICES.

LEGEND

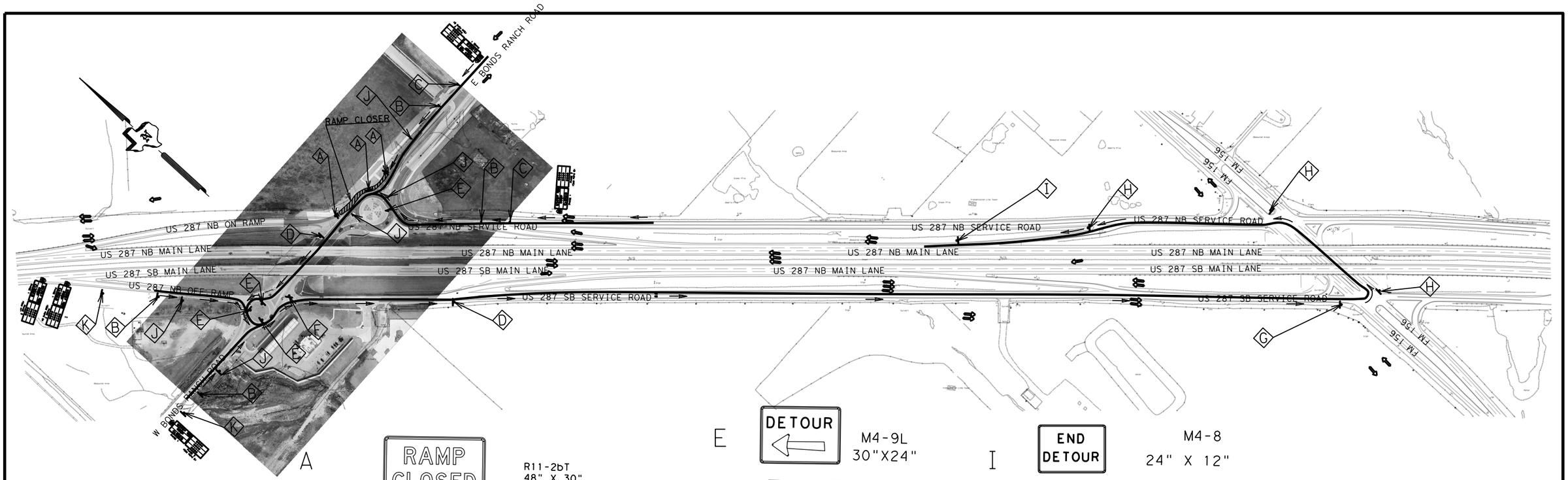
- ROADWAY CONSTRUCTION CURRENT PHASE.
- ROADWAY CONSTRUCTION PRIVIOUS PHASE.
- NB LANE OPEN FOR TRAFFIC.
- NB LANE CLOSE FOR TRAFFIC.
- SB LANE OPEN FOR TRAFFIC
- SB LANE CLOSE FOR TRAFFIC.
- CHENALIZATION DEVICE

STATE OF TEXAS
VANRAJSINH MAHIDA
137833
LICENSED PROFESSIONAL ENGINEER
Vanrajsinh Mahida
12/20/2021

US 81/287

TRAFFIC CONTROL TYPICAL SECTIONS

CONT	SECT	JOB	HIGHWAY
0014	15	080	US 287/81
DIST	COUNTY		SHEET NO.
FTW	TARRANT		11



A — RAMP CLOSED — R11-2bT 48" X 30"

B — DETOUR AHEAD — CW20-2D 48" X 48"

C — RAMP CLOSED AHEAD — CW20-3D 48" X 48"

D
- DETOUR — M4-9S 30"X24"
- NORTH — M3-1 24"X12"
- 81 — M1-4 24"X24"
- 287 — M1-4 30"X24"

E — DETOUR — M4-9L 30"X24"

F
- DETOUR — M4-9R 30"X24"
- NORTH — M3-1 24"X12"
- 81 — M1-4 24"X24"
- 287 — M1-4 30"X24"

G — DETOUR — M4-9TL 30"X30"

H
- DETOUR — M4-9L 30"X24"
- NORTH — M3-1 24"X12"
- 81 — M1-4 24"X24"
- 287 — M1-4 30"X24"

I — END DETOUR — M4-8 24" X 12"

J — DETOUR — M4-9S 30"X24"

K
- RAMP CLOSED — R11-2bT 48" X 30"
- NORTH — M3-1 24"X12"
- 81 — M1-4 24"X24"
- 287 — M1-4 30"X24"

LEGEND

- SIGN
- TYPE 3 BARRICADE
- PORTABLE CHANGEBLE MESSAGE SIGN (PCMS)
- PROPOSED DETOUR TRAFFIC DIRECTION
- EXISTING TRAFFIC DIRECTION

STATE OF TEXAS
VANRAJSINH MAHIDA
137833
LICENSED PROFESSIONAL ENGINEER

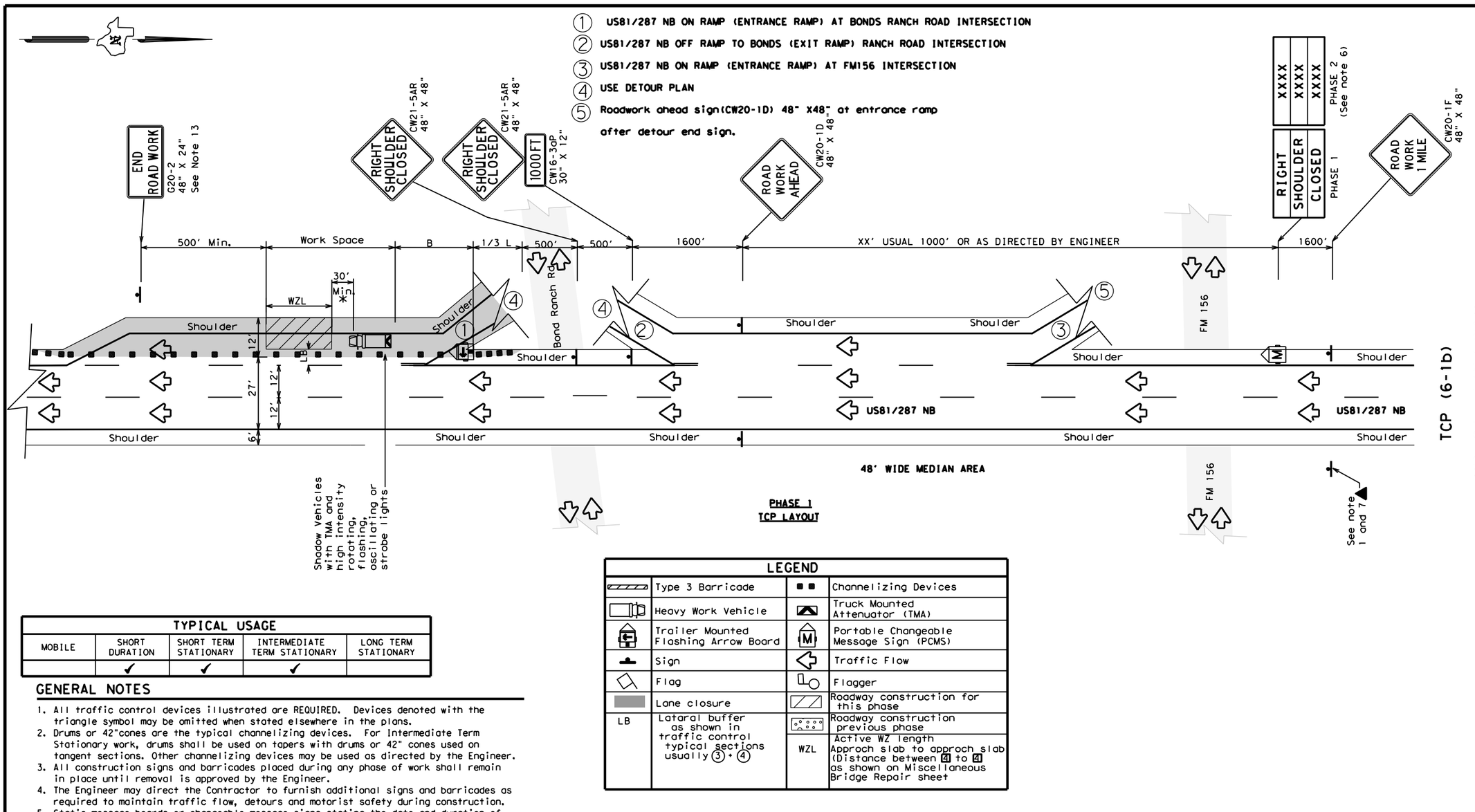
Vanrajsinh Mahida
12/14/21

US 287/81

DETOUR DETAILS

SCALE: NTS

CONT	SECT	JOB	HIGHWAY
0014	15	080	US 287/81
DIST	COUNTY		SHEET NO.
FTW	TARRANT		12



PHASE 1
TCP LAYOUT

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
	Lane closure		Roadway construction for this phase
LB	Lateral buffer as shown in traffic control typical sections usually ③ • ④		Roadway construction previous phase
		WZL	Active WZ length Approch slab to approch slab (Distance between 4 to 4 as shown on Miscellaneous Bridge Repair sheet

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

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	
70	L=WS	700'	770'	840'	70'	140'	475'

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

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.

STATE OF TEXAS
VANRAJSINH MAHIDA
137833
LICENSED PROFESSIONAL ENGINEER
Vanrajsinh Mahida
12/20/2021

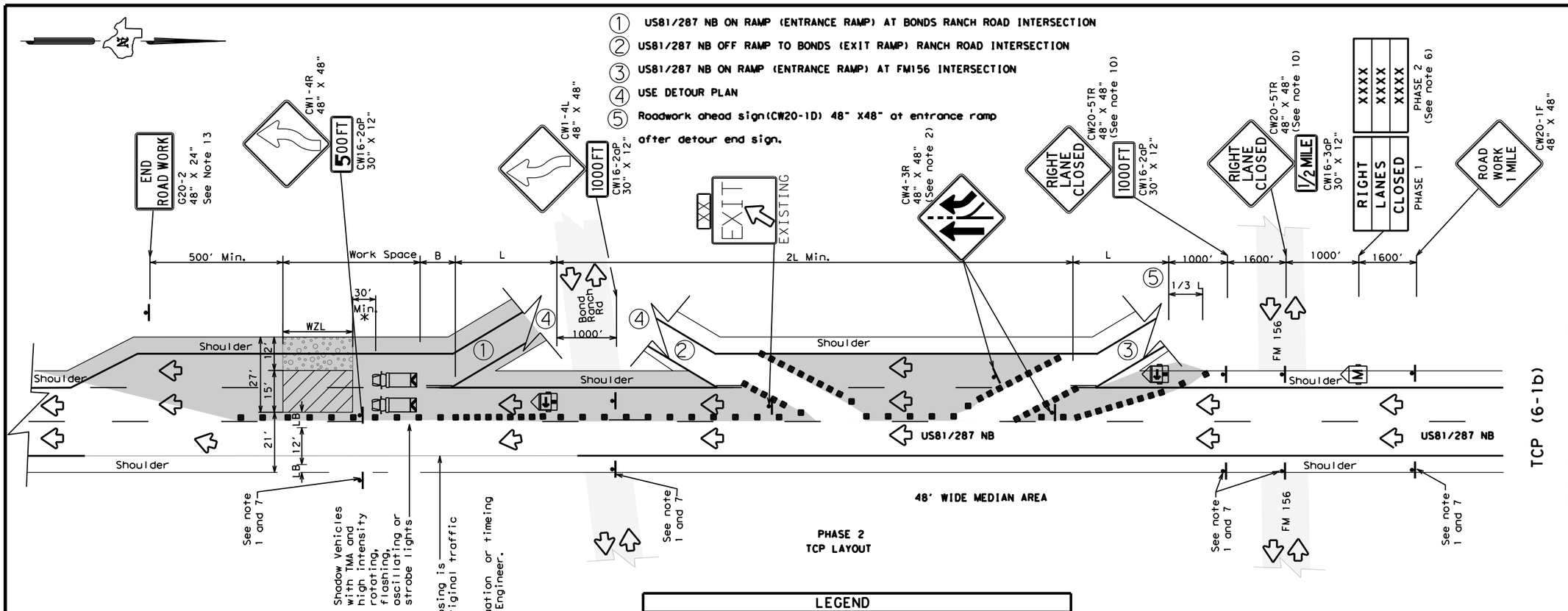
US 81/287

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	15	080	US 287/81
DIST	COUNTY		SHEET NO.
FTW	TARRANT		13

TCP LAYOUT

SCALE: NTS



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
	Lane closure		Roadway construction for this phase
LB	Lateral buffer as shown in traffic control typical sections usually ③ • ④		Roadway construction previous phase
		WZL	Active WZ length Approch slab to approch slab (Distance between 4 to 4 as shown on Miscellaneous Bridge Repair sheet

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"
70	L=WS	700'	770'	840'	70'	140'	475'

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

* 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.

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.

STATE OF TEXAS
VANRAJSINH MAHIDA
137833
LICENSED PROFESSIONAL ENGINEER
Vanrajsinh Mahida
12/20/2021

US 81/287

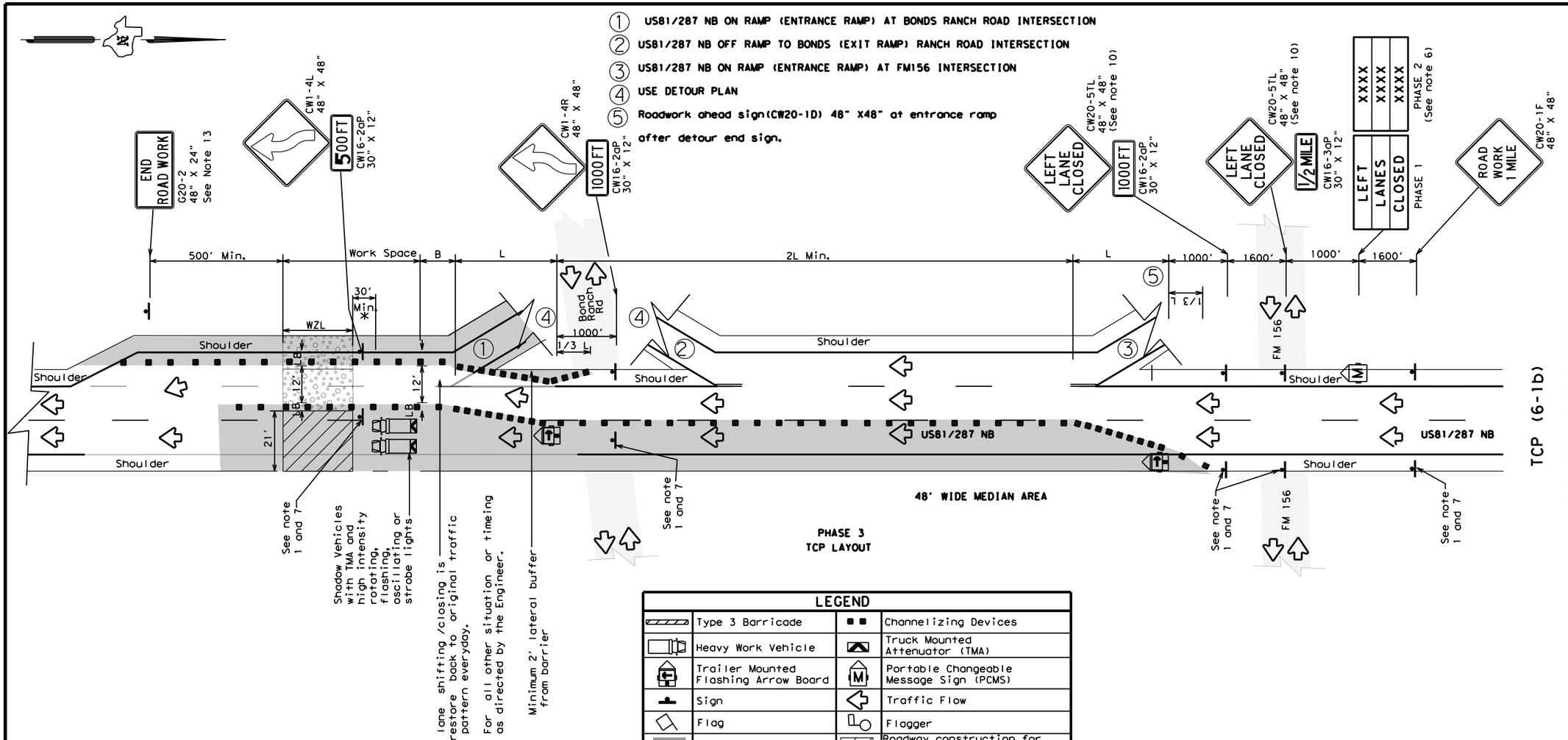
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	15	080	US 287/81
DIST	COUNTY		SHEET NO.
FTW	TARRANT		14

TCP LAYOUT

SCALE: NTS

① US81/287 NB ON RAMP (ENTRANCE RAMP) AT BONDS RANCH ROAD INTERSECTION
② US81/287 NB OFF RAMP TO BONDS (EXIT RAMP) RANCH ROAD INTERSECTION
③ US81/287 NB ON RAMP (ENTRANCE RAMP) AT FM156 INTERSECTION
④ USE DETOUR PLAN
⑤ Roadwork ahead sign(CW20-1D) 48" X48" at entrance ramp after detour end sign.



PHASE 3
TCP LAYOUT

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
	Lane closure		Roadway construction for this phase
LB	Lateral buffer as shown in traffic control typical sections usually ③ • ④		Roadway construction previous phase
		WZL	Active WZ length Approch slab to approch slab (Distance between 4 to 4 as shown on Miscellaneous Bridge Repair sheet

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"
70	L=WS	700'	770'	840'	70'	140'	475'

** 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
	✓	✓	✓	

* 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.

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.

STATE OF TEXAS
VANRAJSINH MAHIDA
137833
LICENSED PROFESSIONAL ENGINEER
Vanrajsinh Mahida
12/20/2021

US 81/287

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0014	15	080	US 287/81
DIST	COUNTY		SHEET NO.
FTW	TARRANT		15

TCP LAYOUT

SCALE: NTS

DATE:
FILE:

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

SHEET 1 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

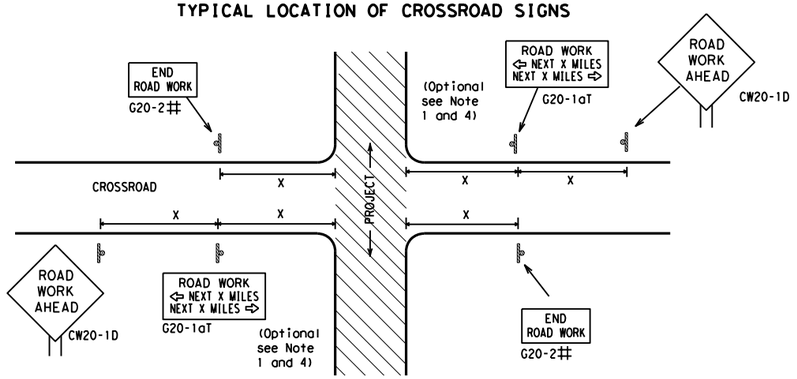
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	FTW	TARRANT		17
5-10 5-21				

DATE:
FILE:

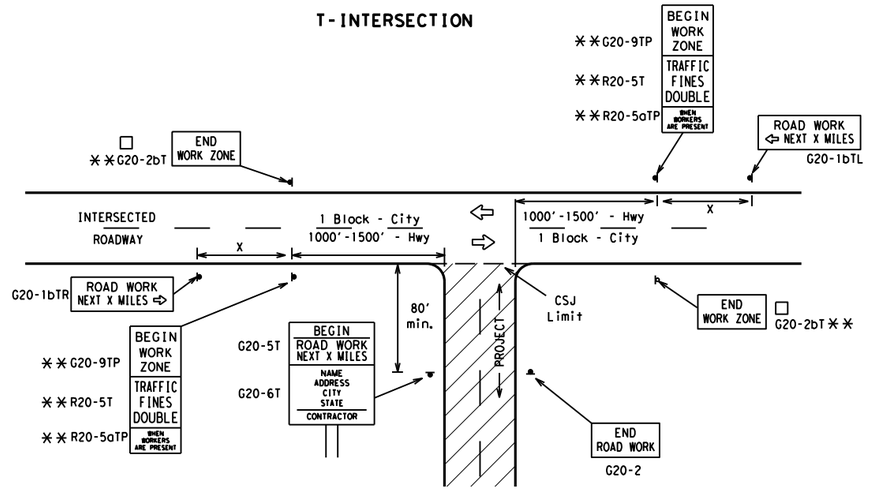
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

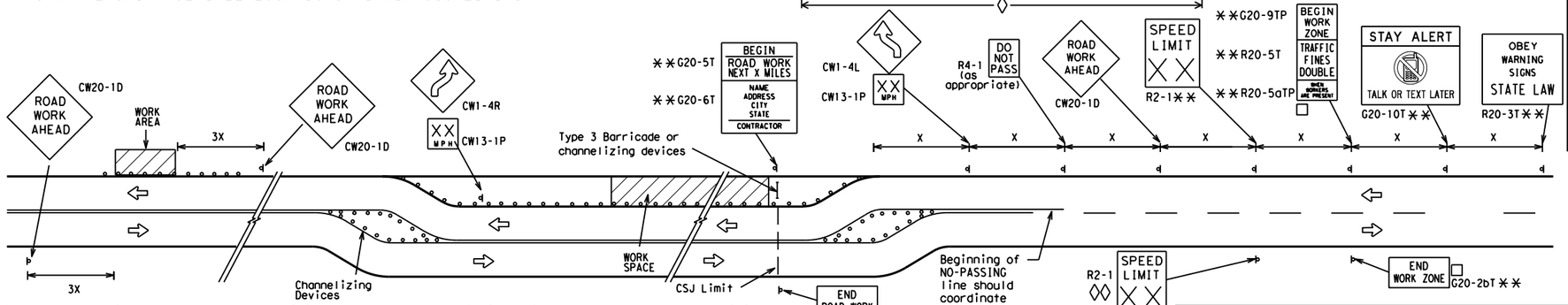
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

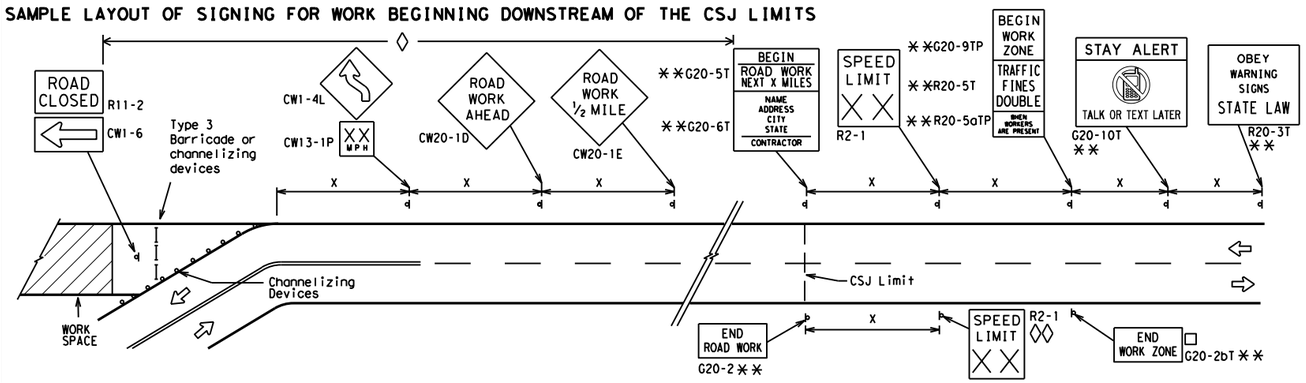
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	TARRANT		18

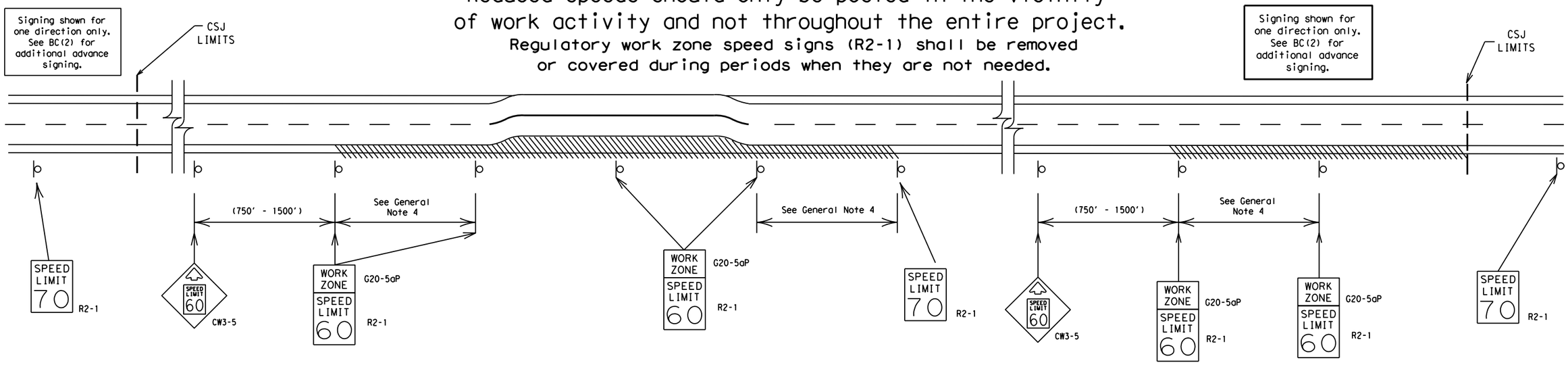
DATE:
FILE:

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

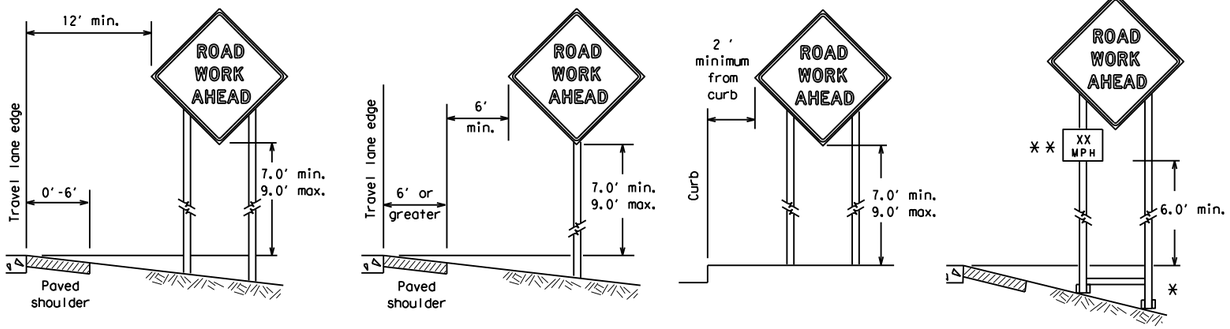
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	TARRANT		19

DATE:
FILE:

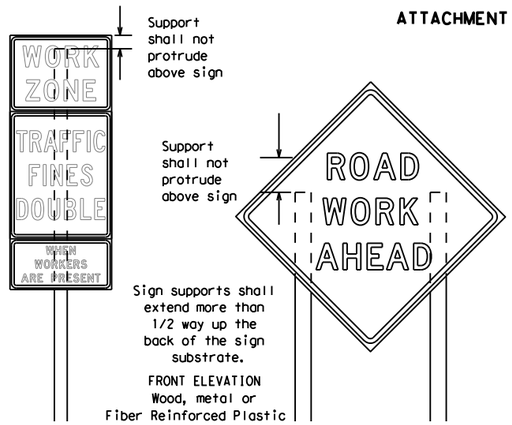
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

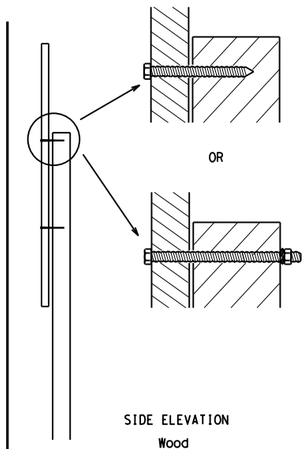


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





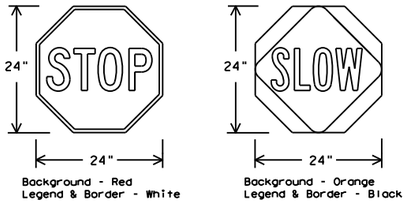
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

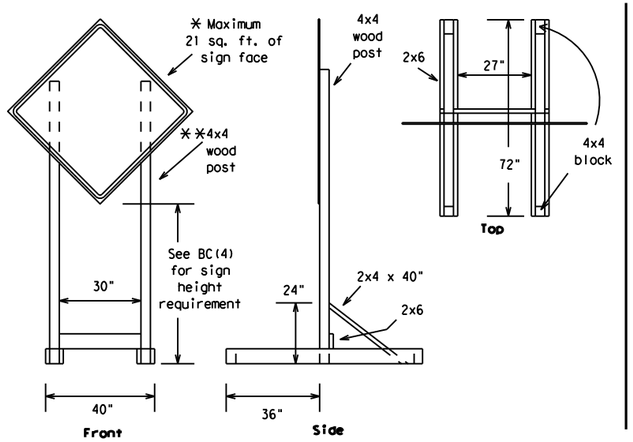
Traffic Safety Division Standard

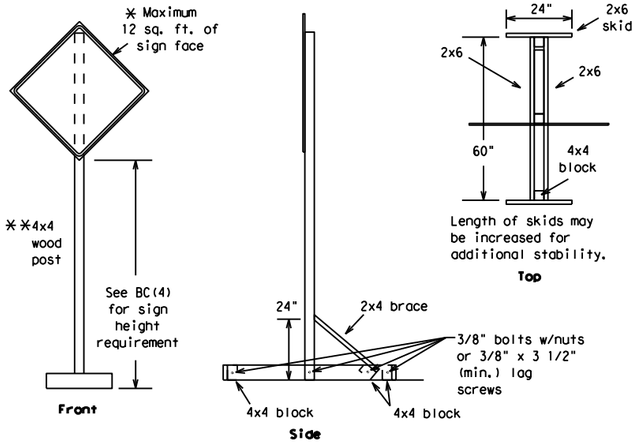
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	TARRANT		20

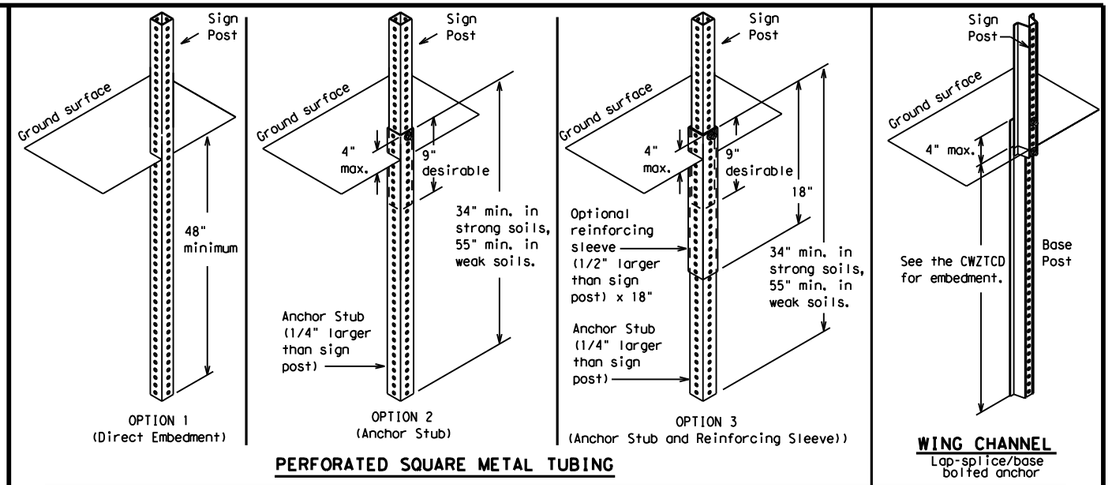
DATE:
FILE:





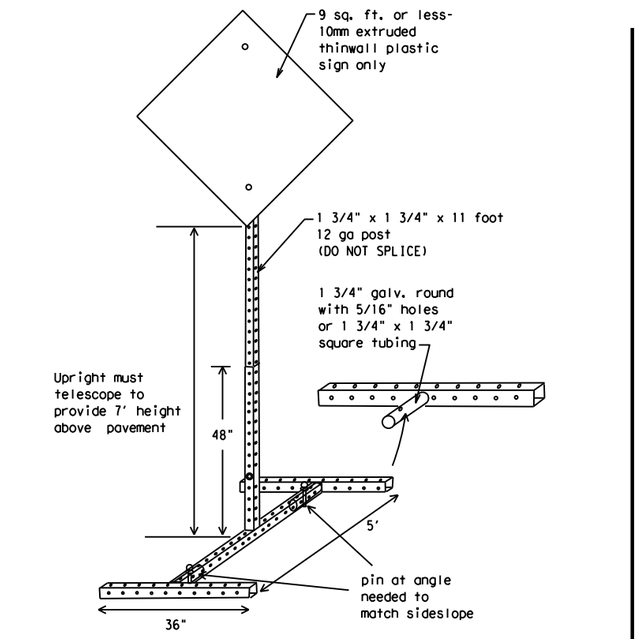
SKID MOUNTED WOOD SIGN SUPPORTS

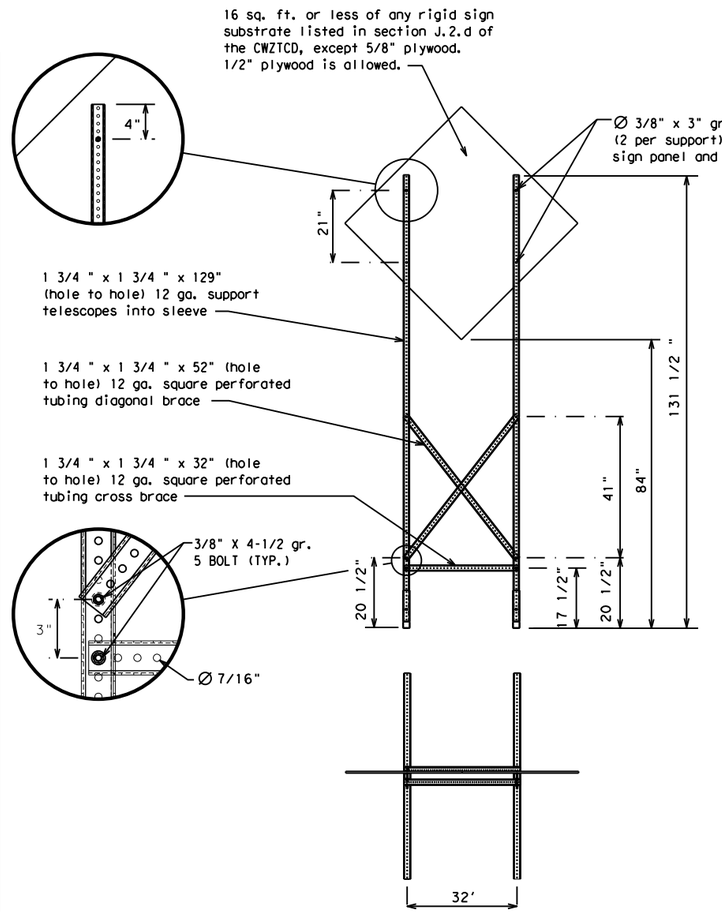
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

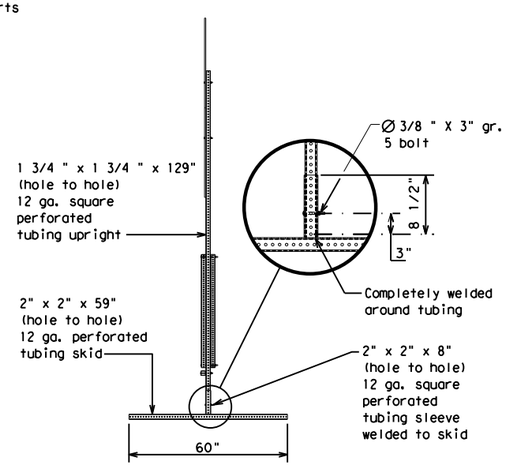


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	TARRANT		21

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

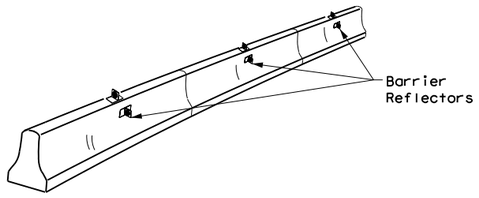
BC(6)-21

FILE:	bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS		0014	15	080	US 287/81
9-07 8-14		DIST	COUNTY		SHEET NO.
7-13 5-21		FTW	TARRANT		22

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

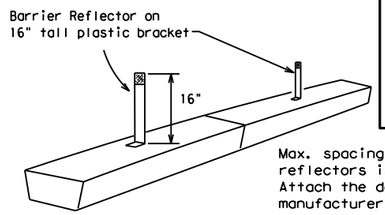
DATE:
FILE:

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



CONCRETE TRAFFIC BARRIER (CTB)

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

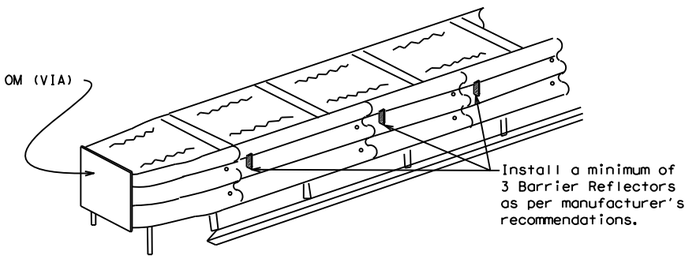


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

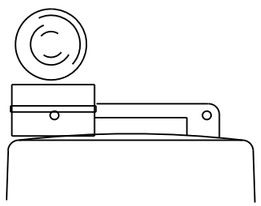


DELINEATION OF END TREATMENTS

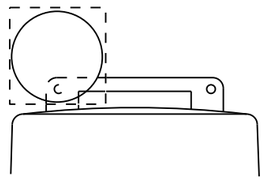
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

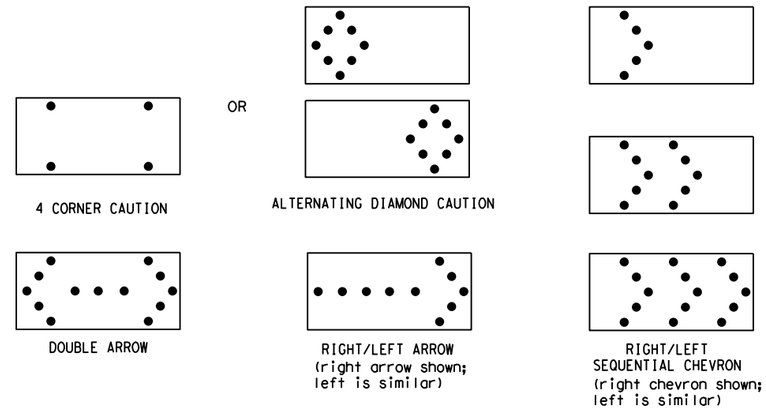
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	TARRANT		23

101

DATE:
FILE:

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

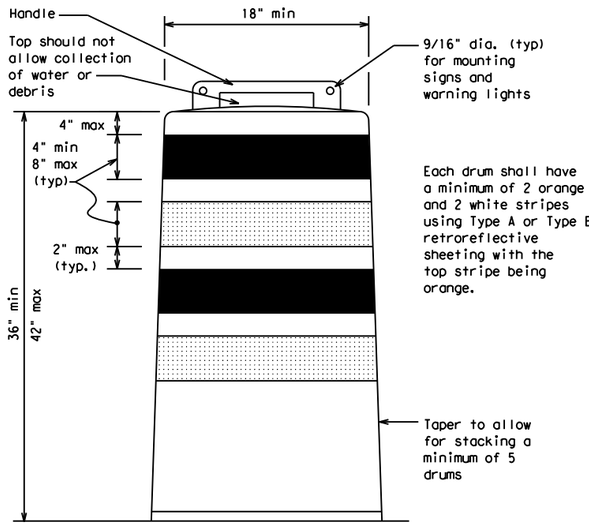
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

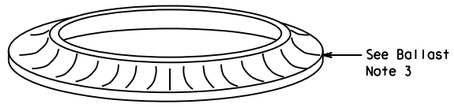
RETROREFLECTIVE SHEETING

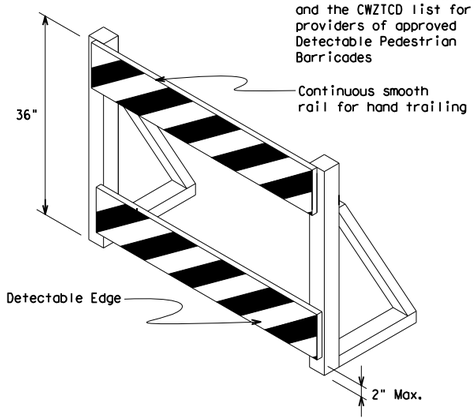
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

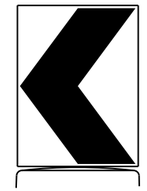




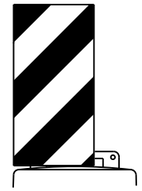


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

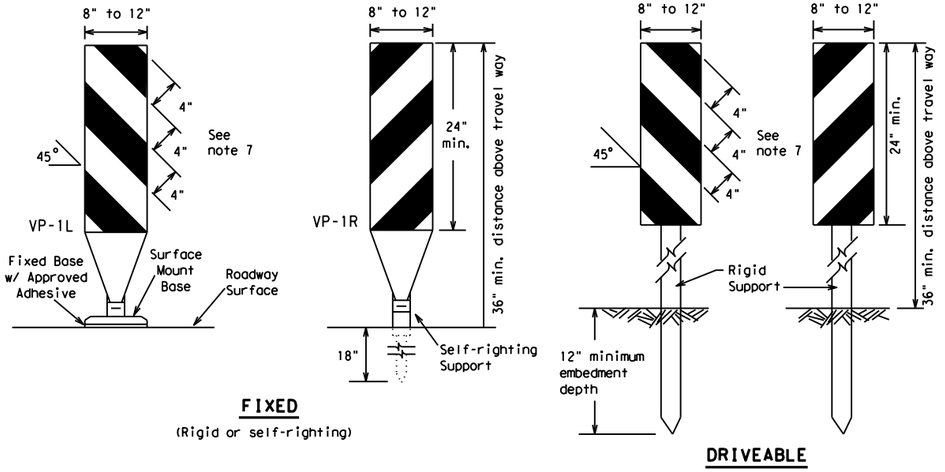
Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

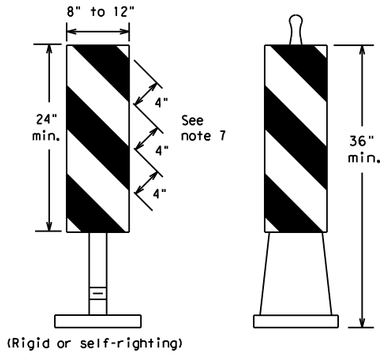
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	FTW	TARRANT		24
7-13				

DATE:
FILE:



FIXED
(Rigid or self-righting)

DRIVEABLE

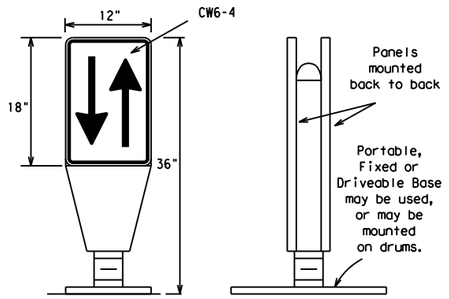


(Rigid or self-righting)

PORTABLE

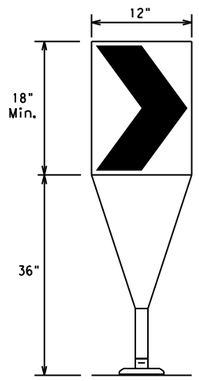
VERTICAL PANELS (VPs)

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



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



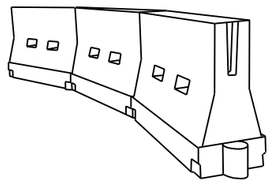
Fixed Base w/ Approved Adhesive
(Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

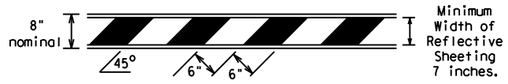
BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	TARRANT		25

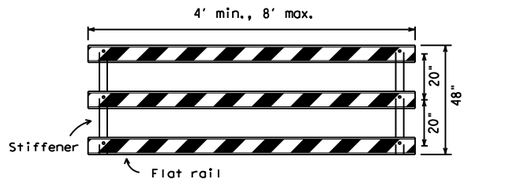
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



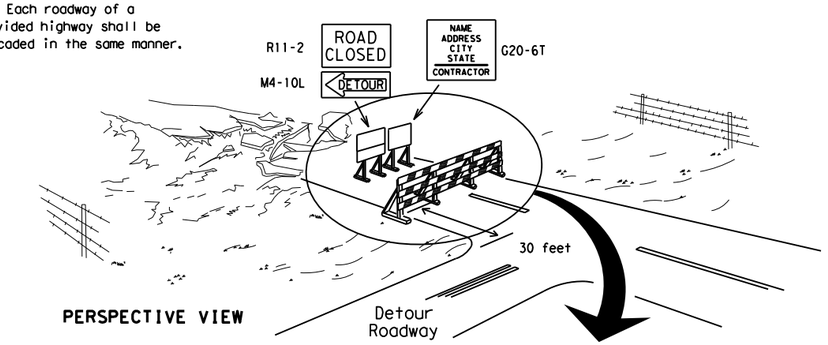
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

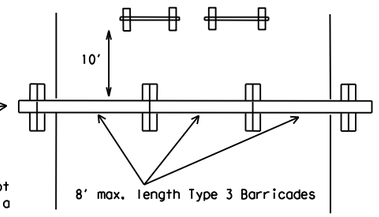
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

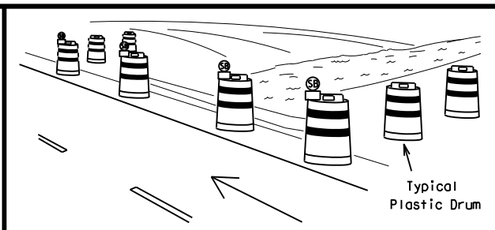
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

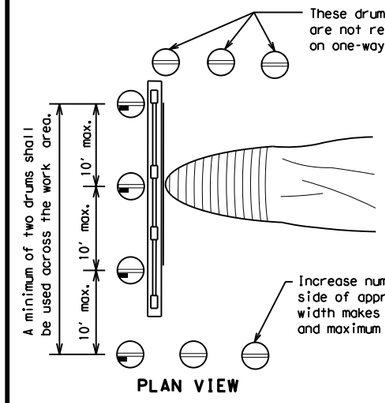
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

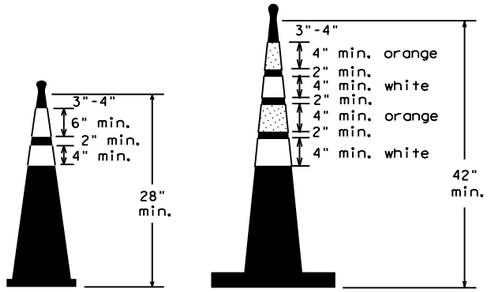
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

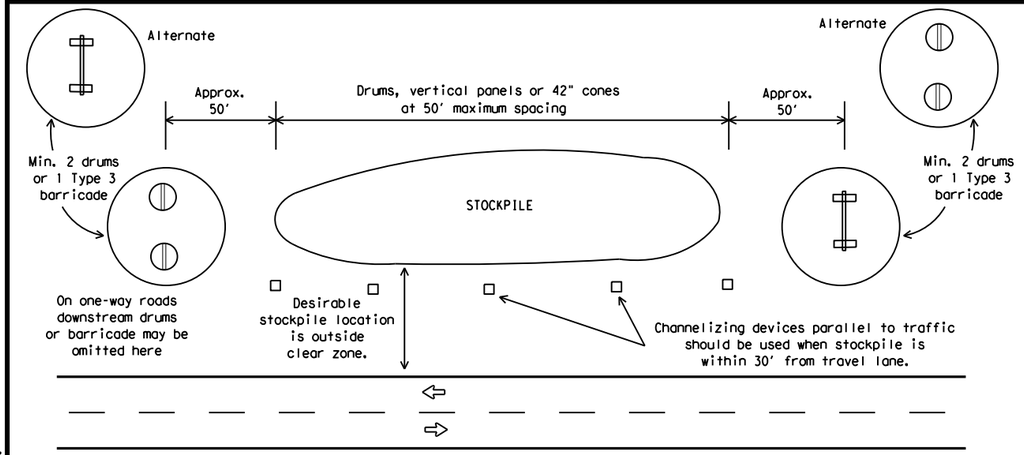
PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

DATE:
FILE:

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	FTW	TARRANT		26

104

DATE:
FILE:

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

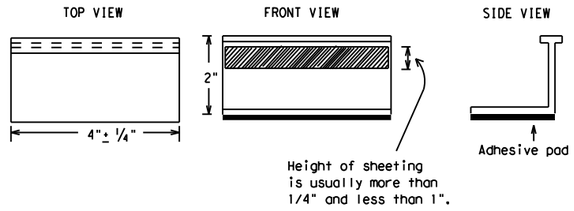
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

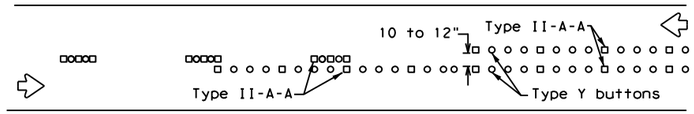
BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	FTW	TARRANT		27
11-02 8-14				

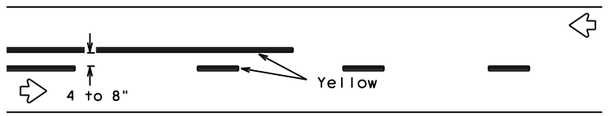
DATE:
FILE:

PAVEMENT MARKING PATTERNS

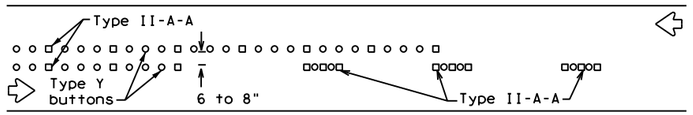
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



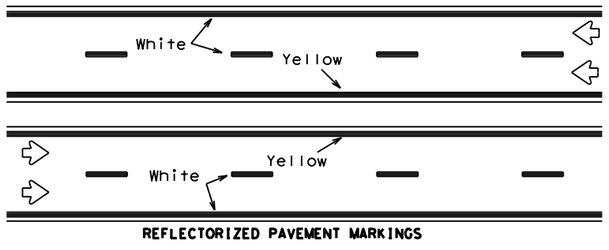
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



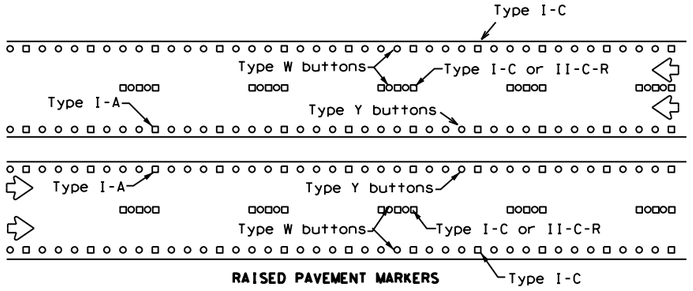
RAISED PAVEMENT MARKERS - PATTERN B

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

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



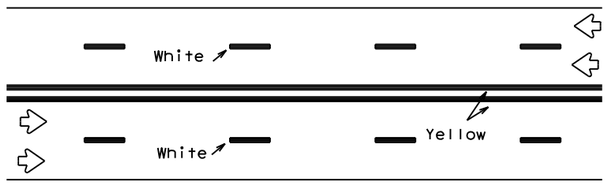
REFLECTORIZED PAVEMENT MARKINGS



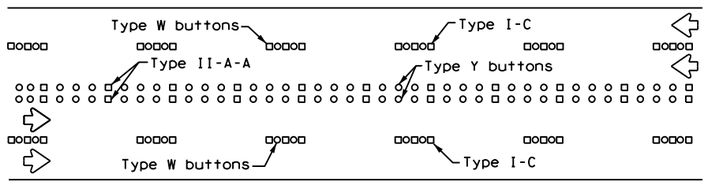
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



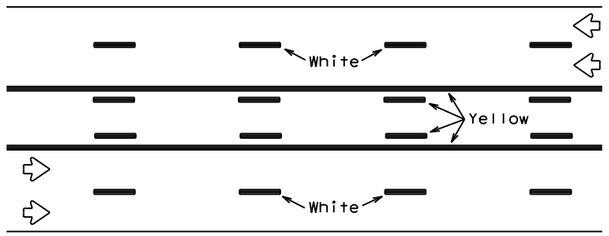
REFLECTORIZED PAVEMENT MARKINGS



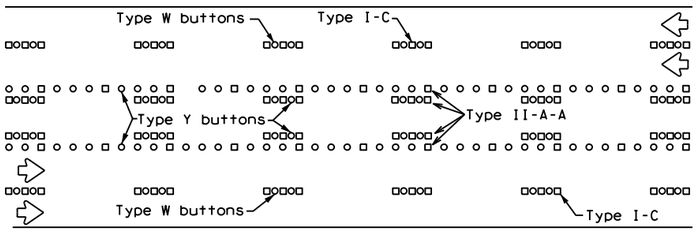
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

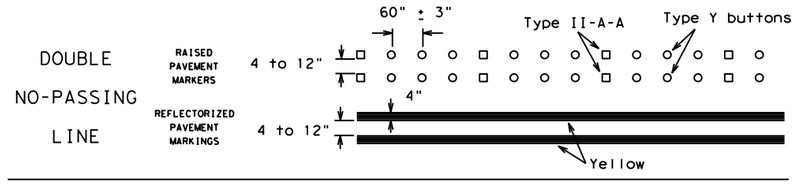
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

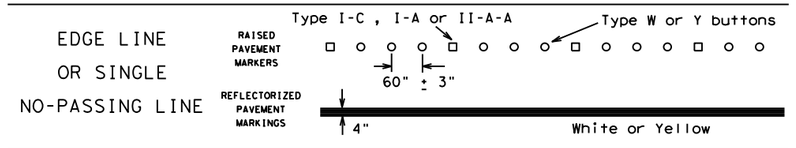
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

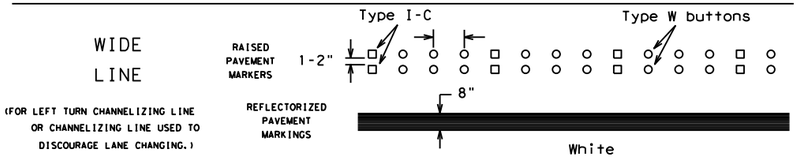


EDGE LINE OR SINGLE NO-PASSING LINE



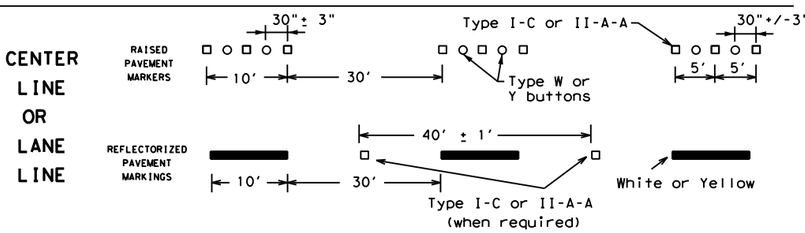
WIDE LINE

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

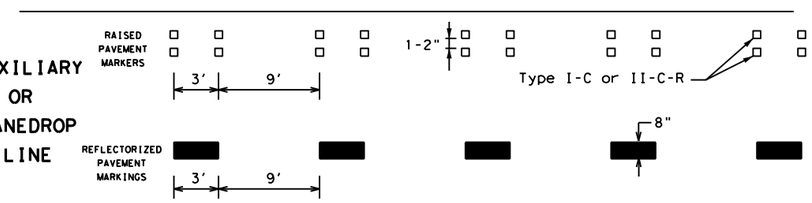


BROKEN LINES

CENTER LINE OR LANE LINE

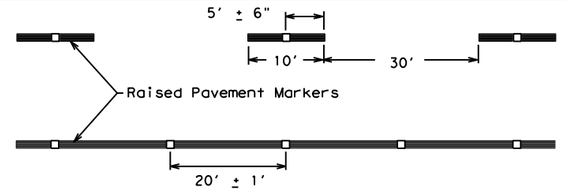


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

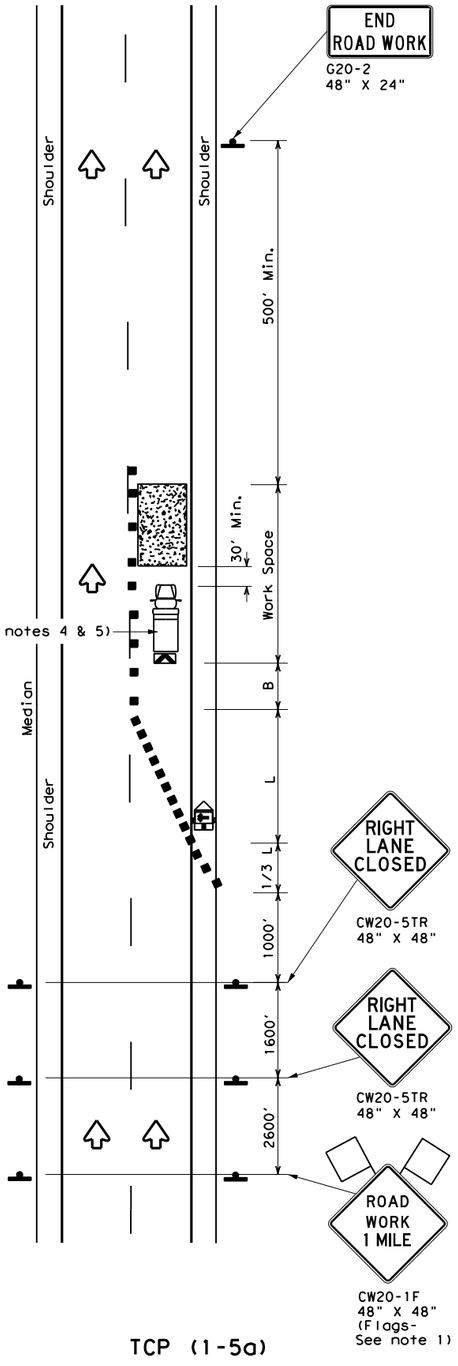
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

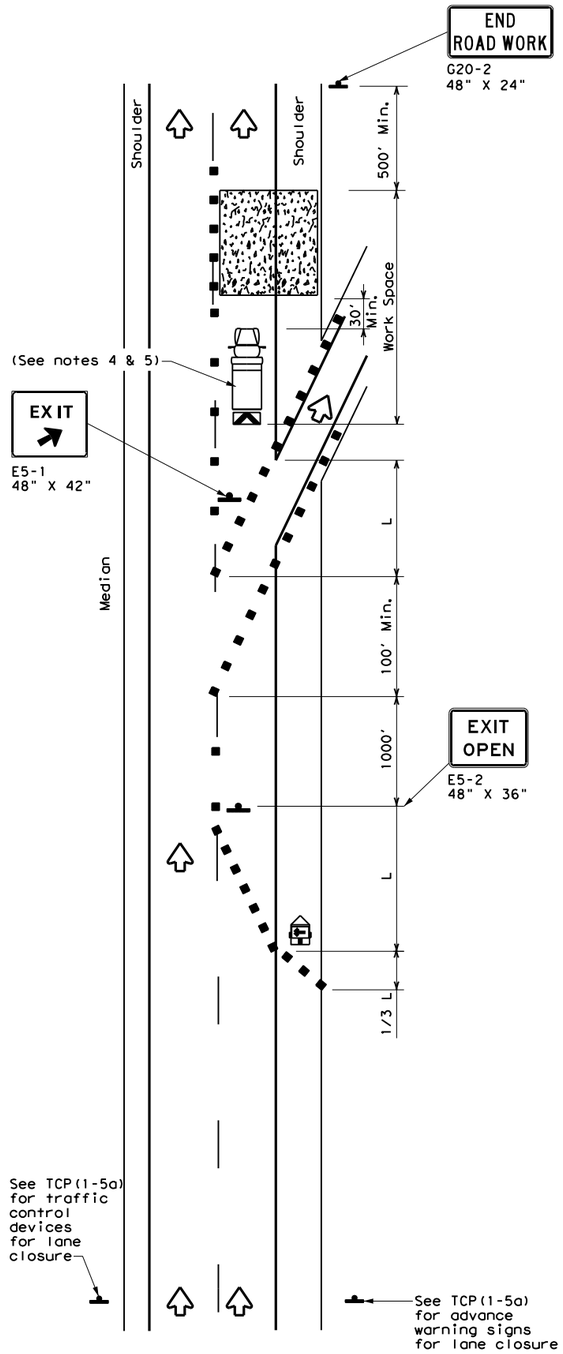
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0014	15	080	US 287/81
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		28

DATE:
FILE:



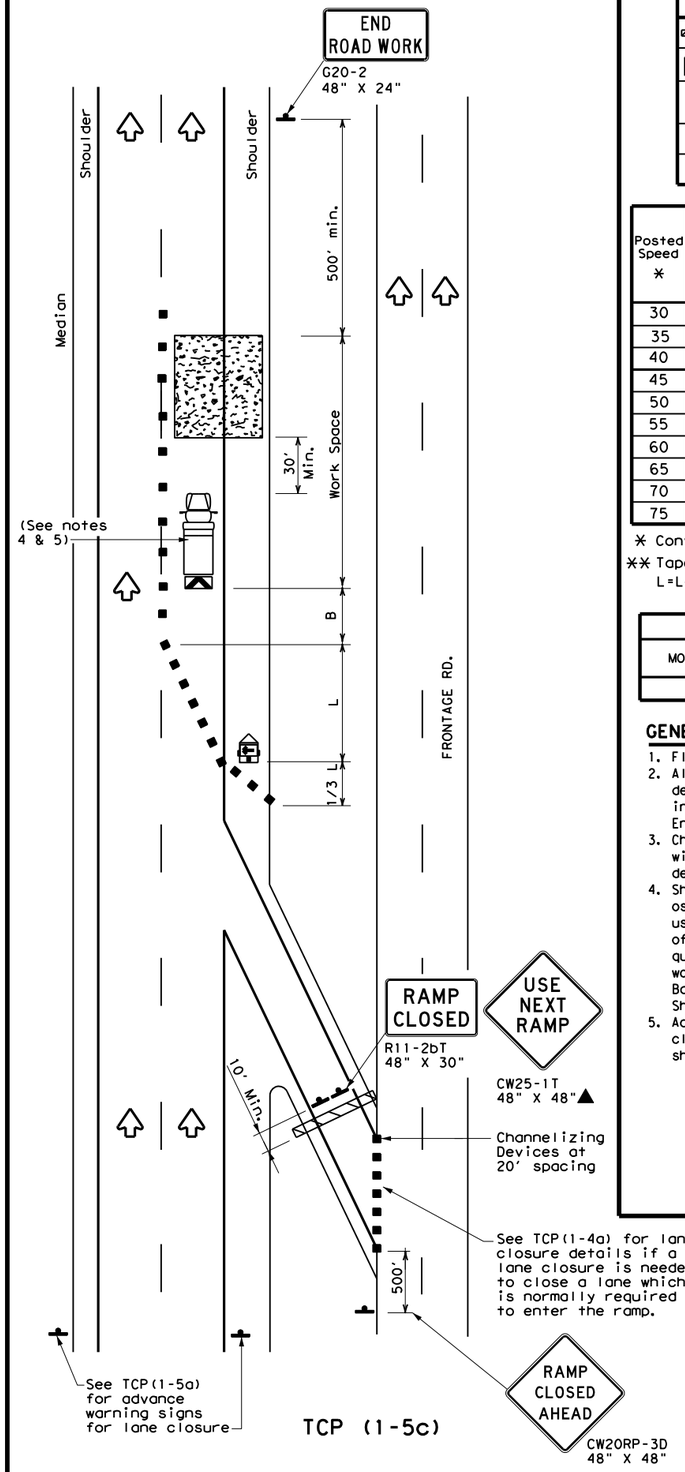
TCP (1-5a)

ONE LANE CLOSURE



TCP (1-5b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (1-5c)

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. 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

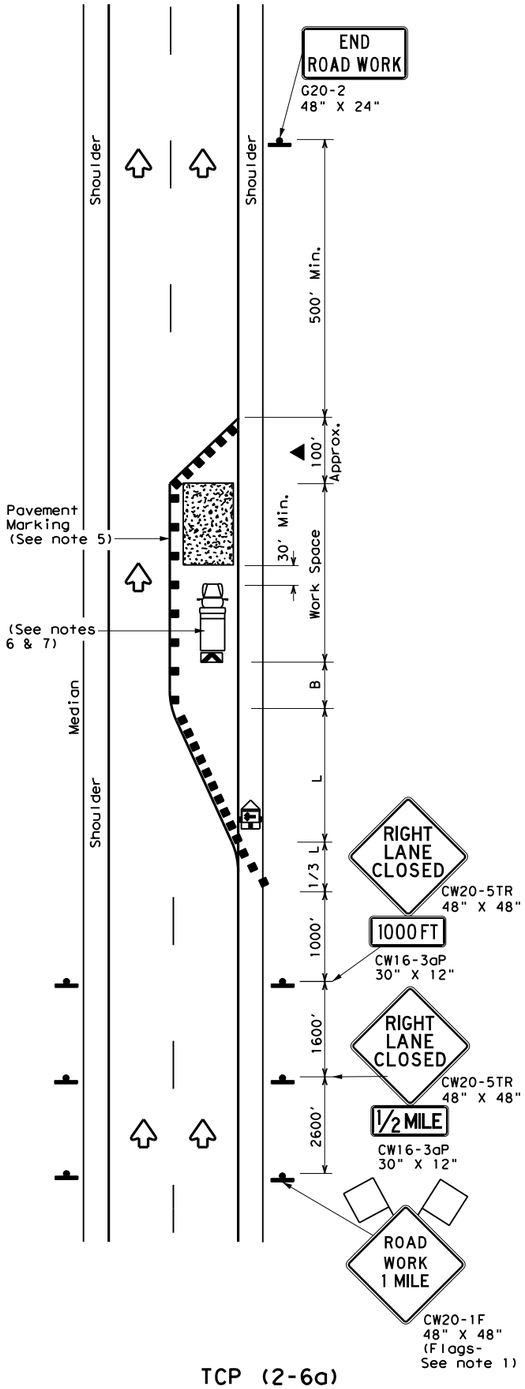
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP(1-5)-18

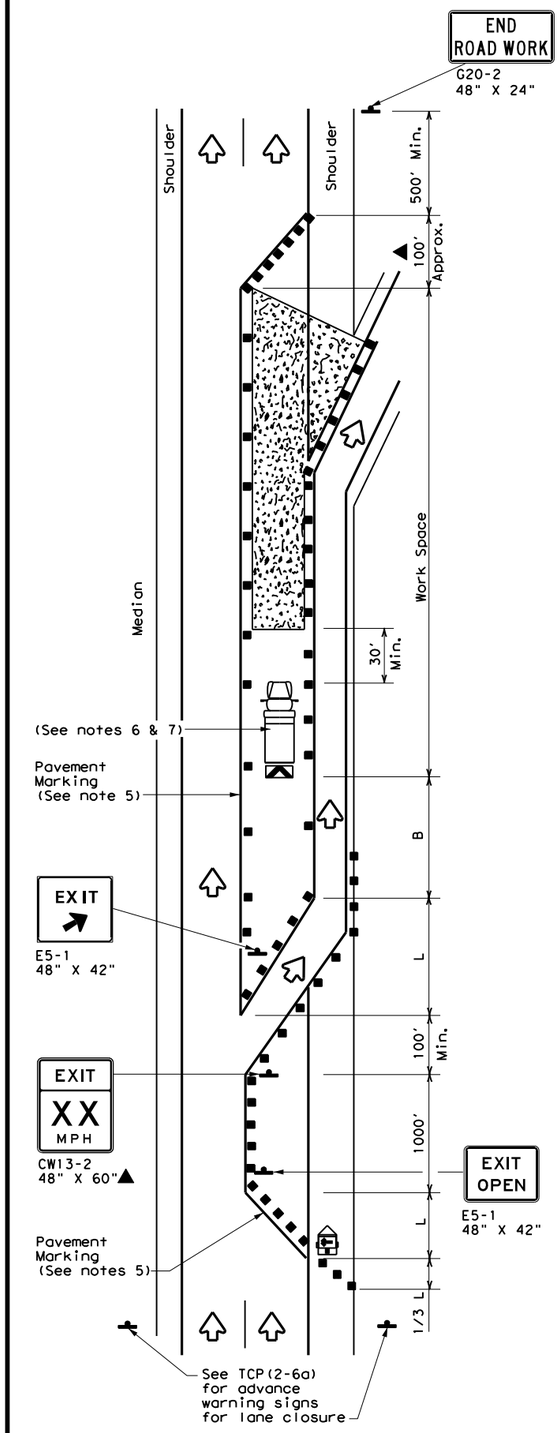
FILE: tcp1-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	0014	15	080	US 287/81
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		29

DATE:
FILE:



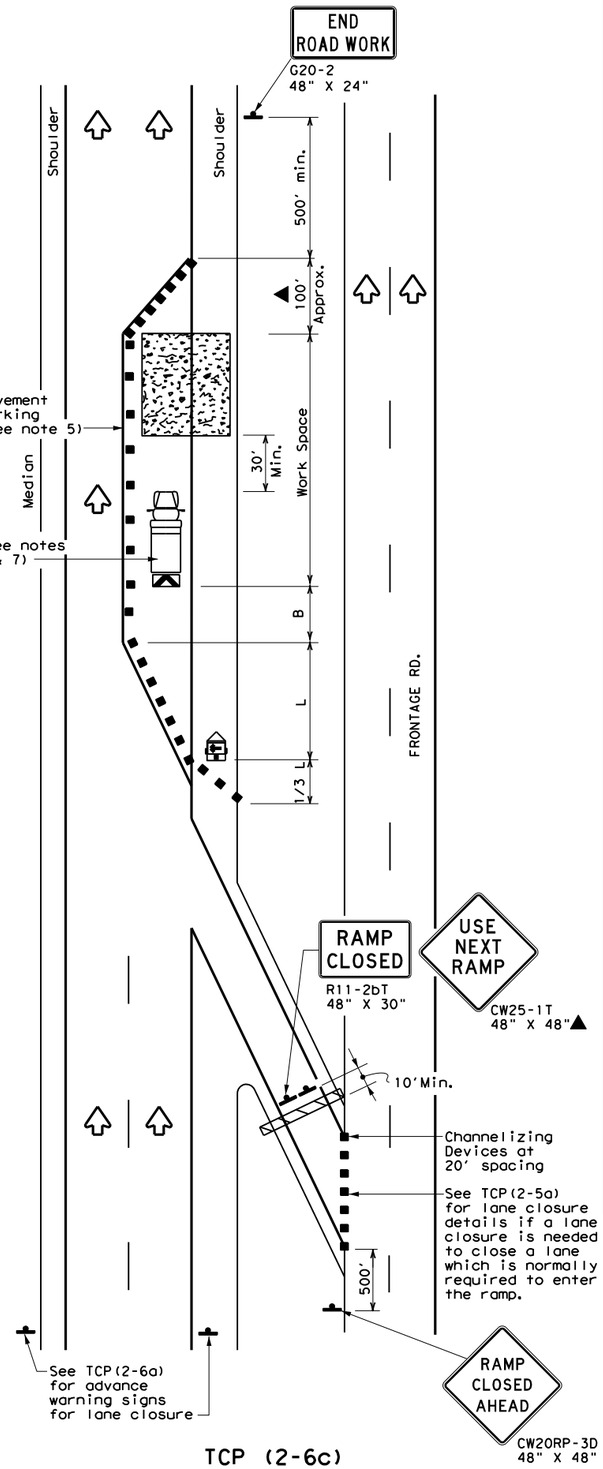
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

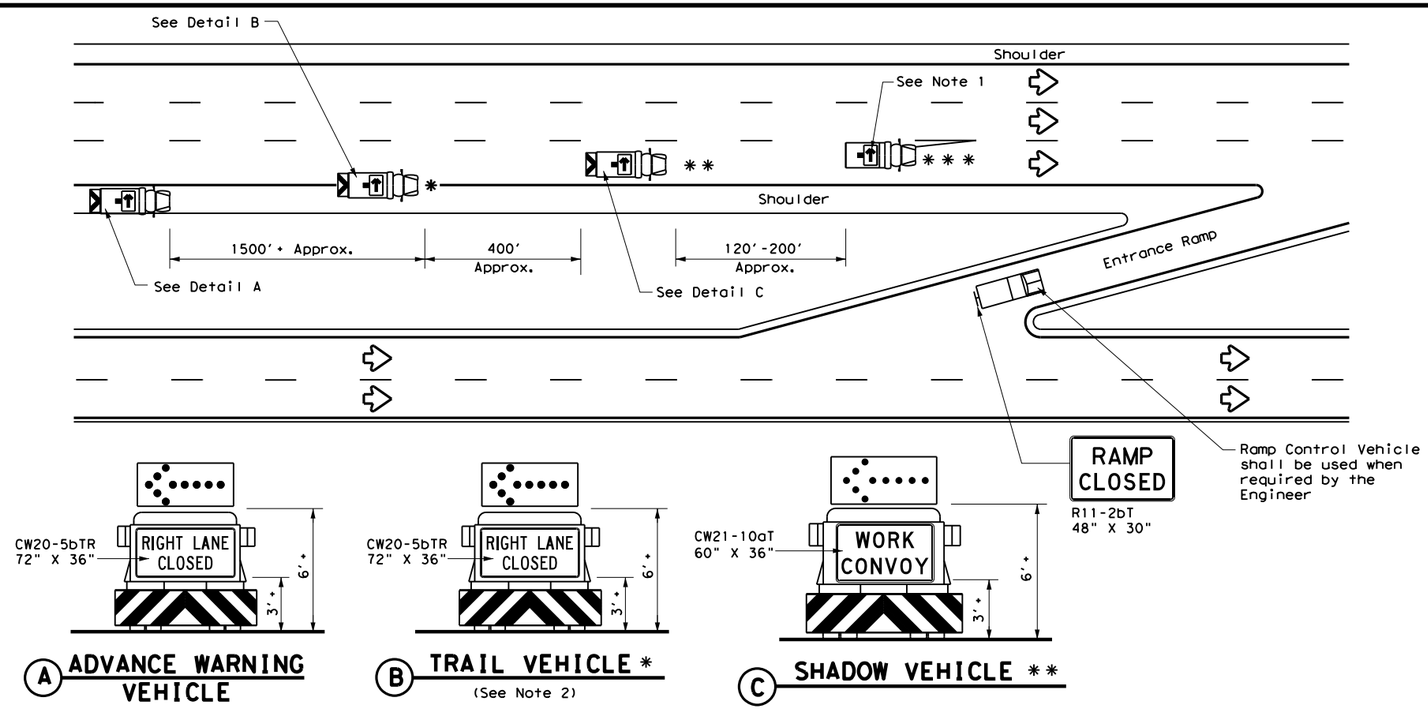
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

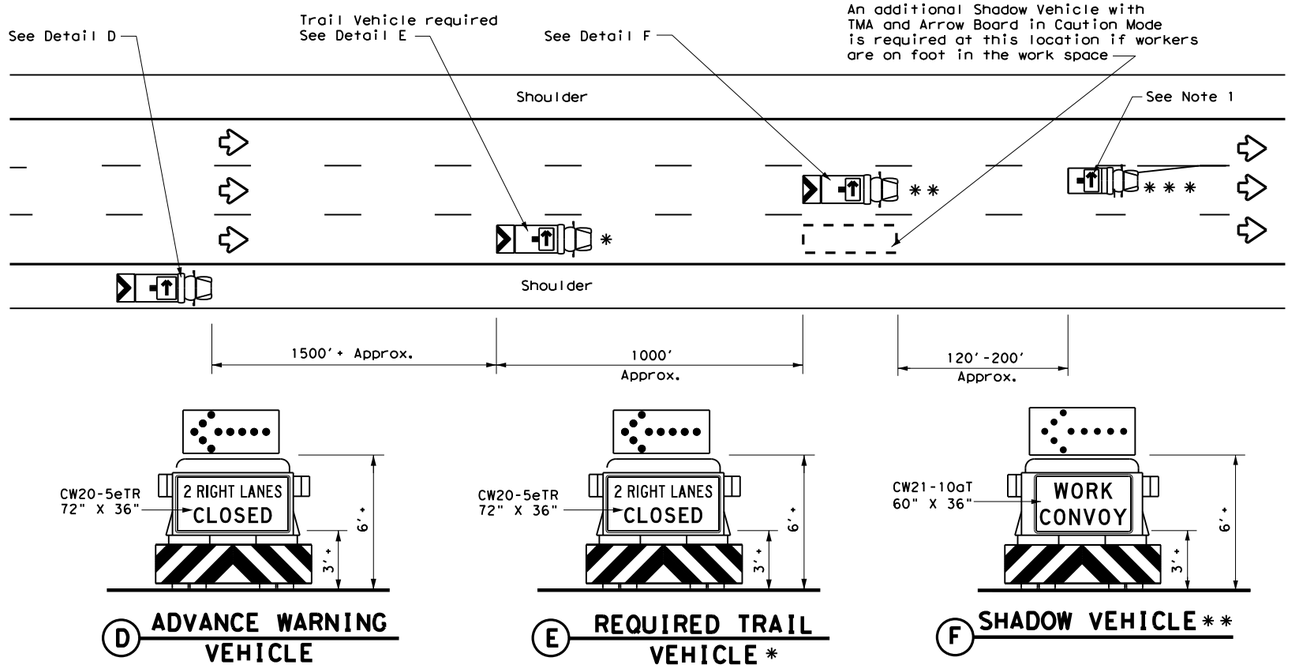
TCP(2-6)-18

FILE: tcp2-6-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	0014	15	080	US 287/81
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		30

DATE:
FILE:



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



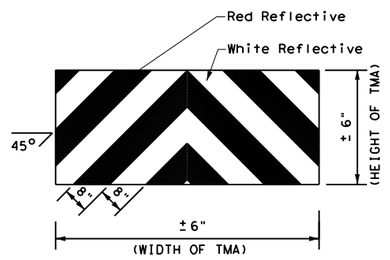
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

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

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

GENERAL NOTES

1. 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

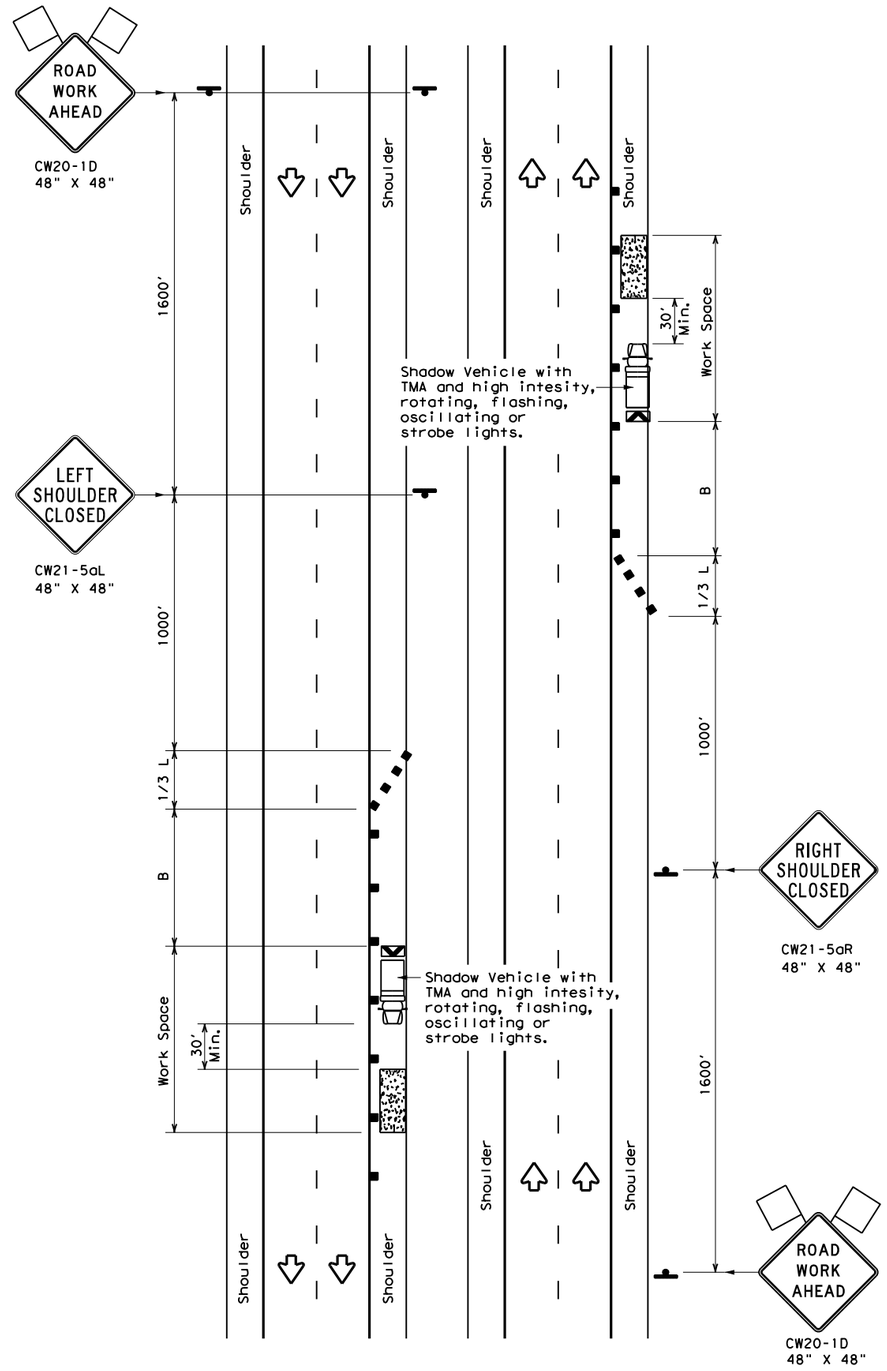
TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

FILE: tcp3-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	FTW	TARRANT		31
1-97				

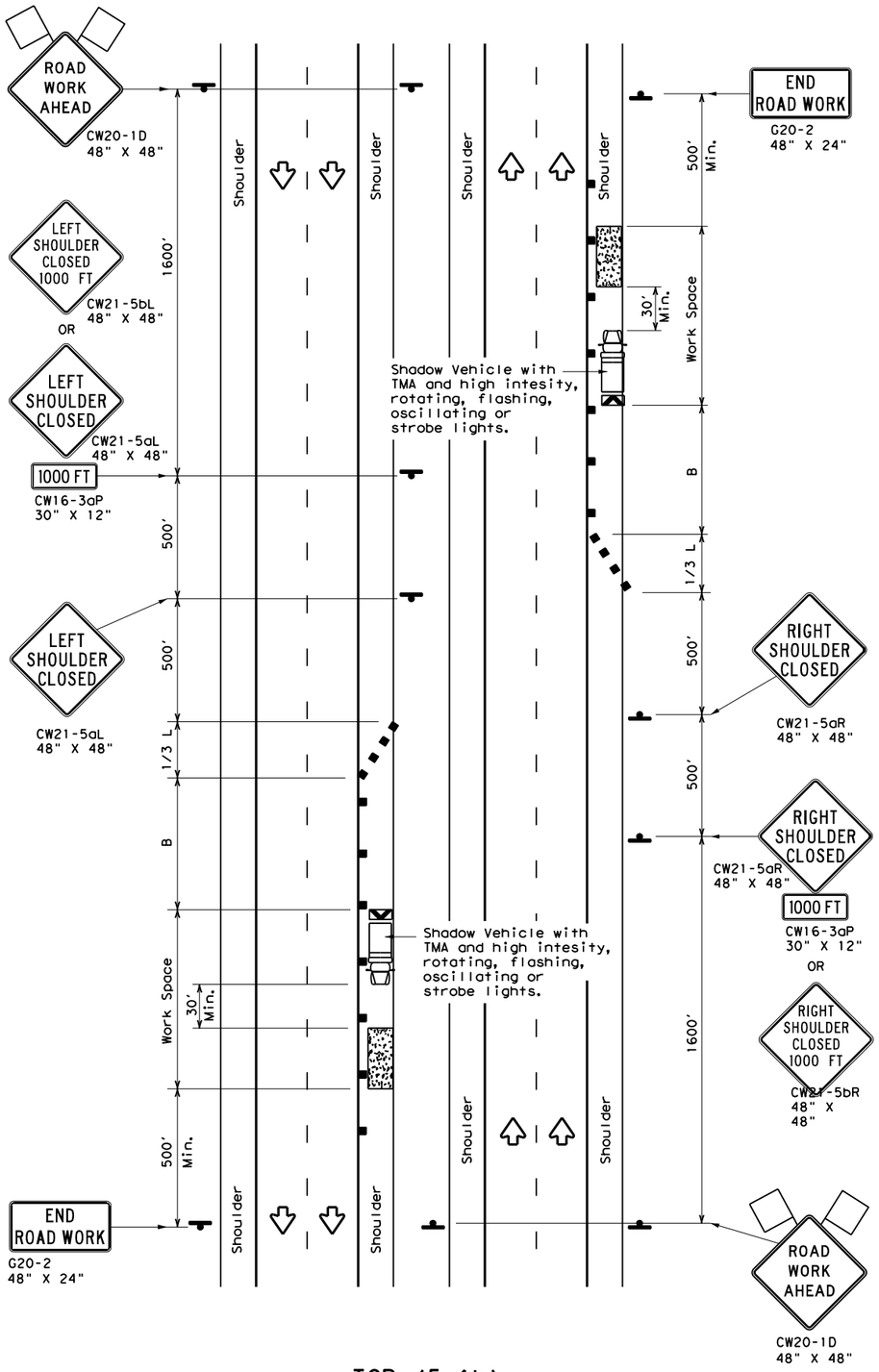
176

DATE:
FILE:



TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

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

Texas Department of Transportation

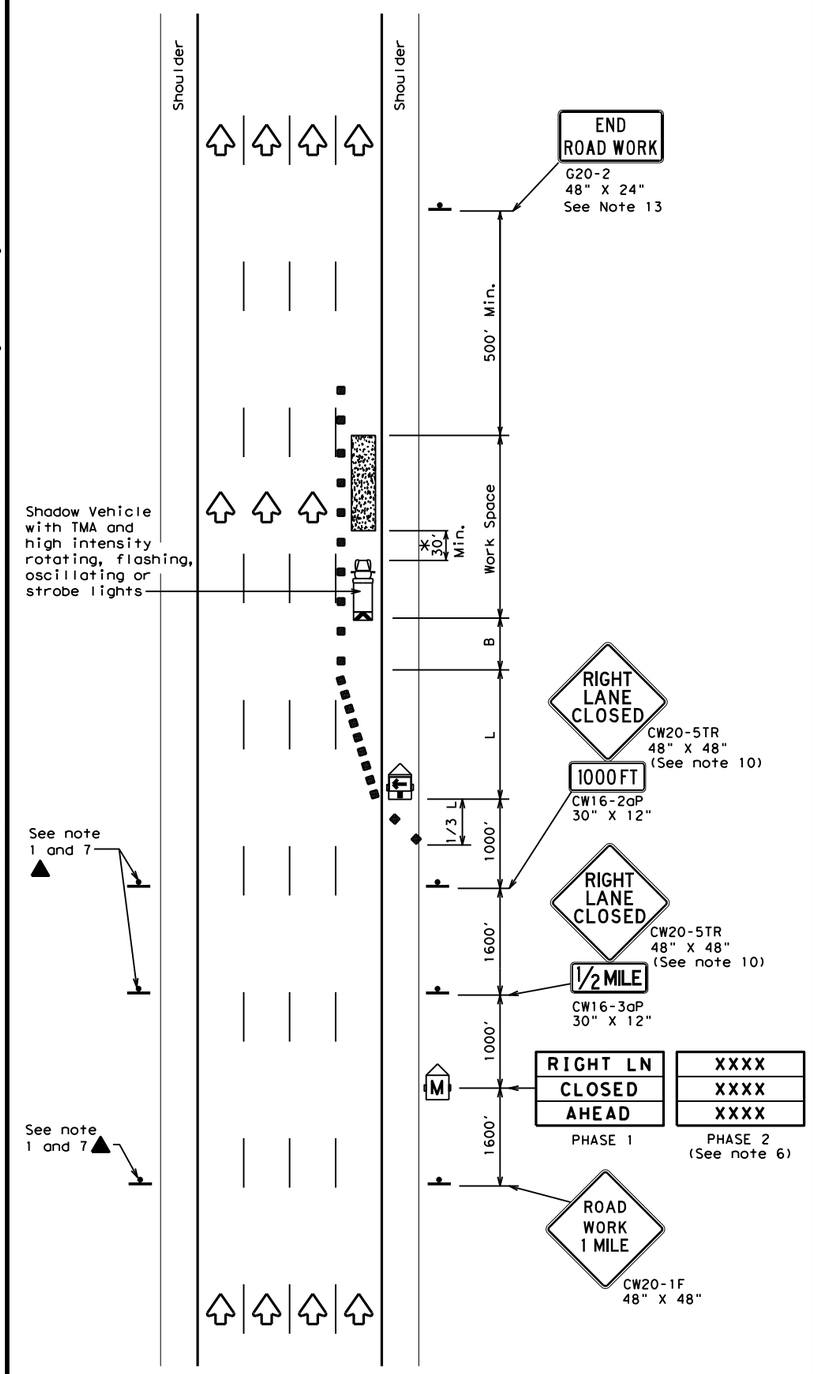
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

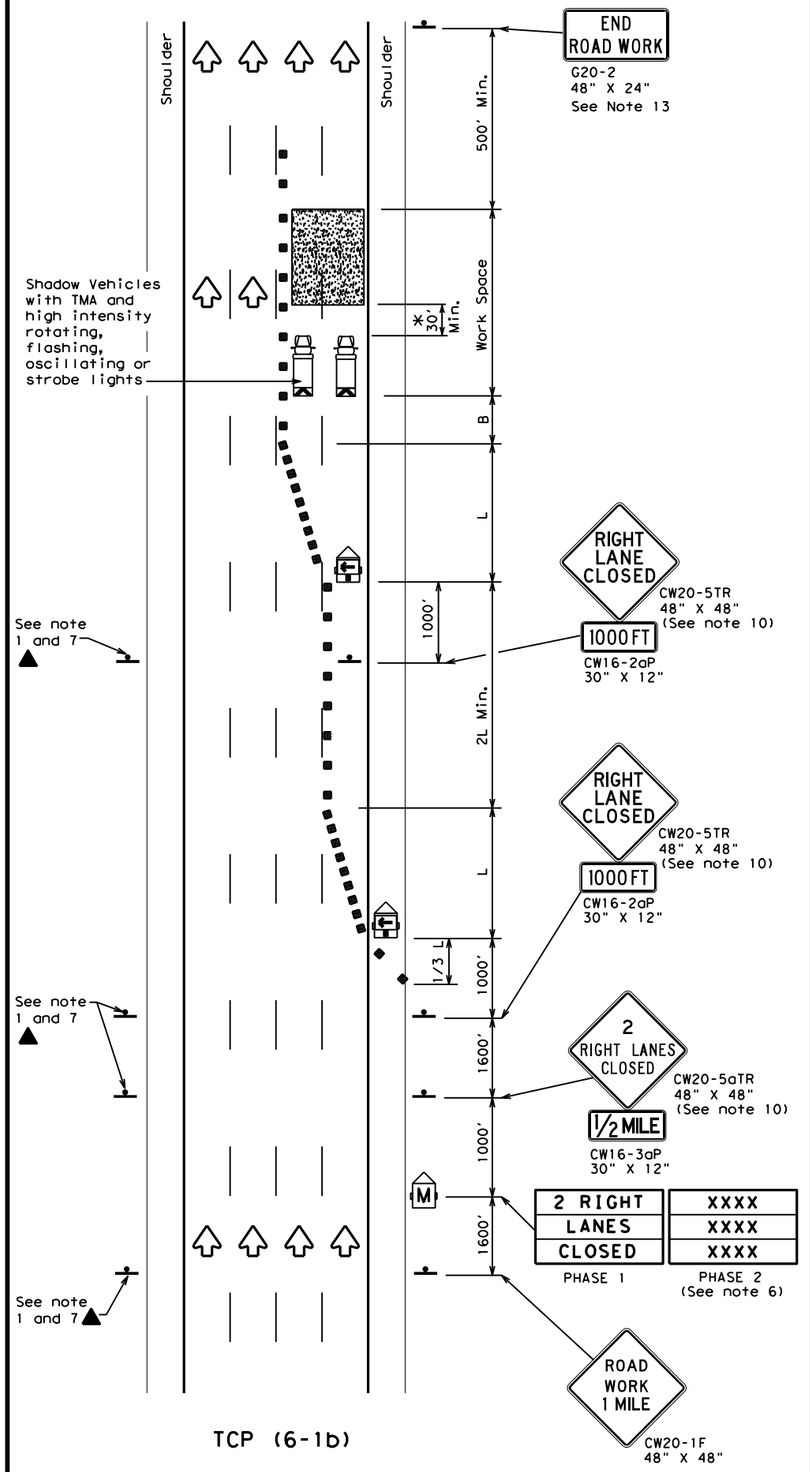
FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	0014	15	080	US 287/81
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		32

DATE:
FILE:



TCP (6-1a)

TYPICAL FREEWAY ONE LANE CLOSURE



TCP (6-1b)

TYPICAL FREEWAY TWO LANE CLOSURE

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

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

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

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

GENERAL NOTES

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

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

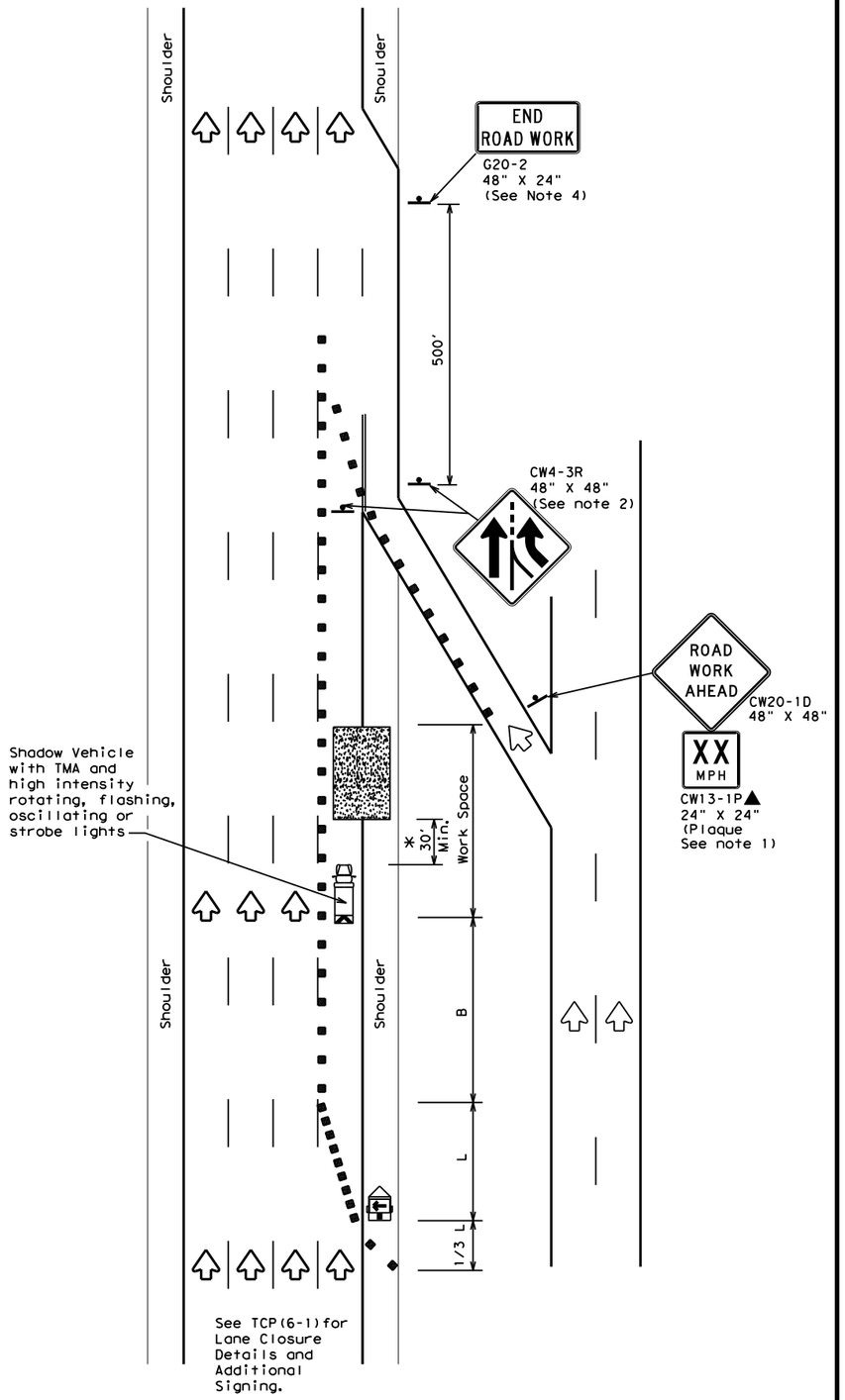
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

TCP(6-1)-12

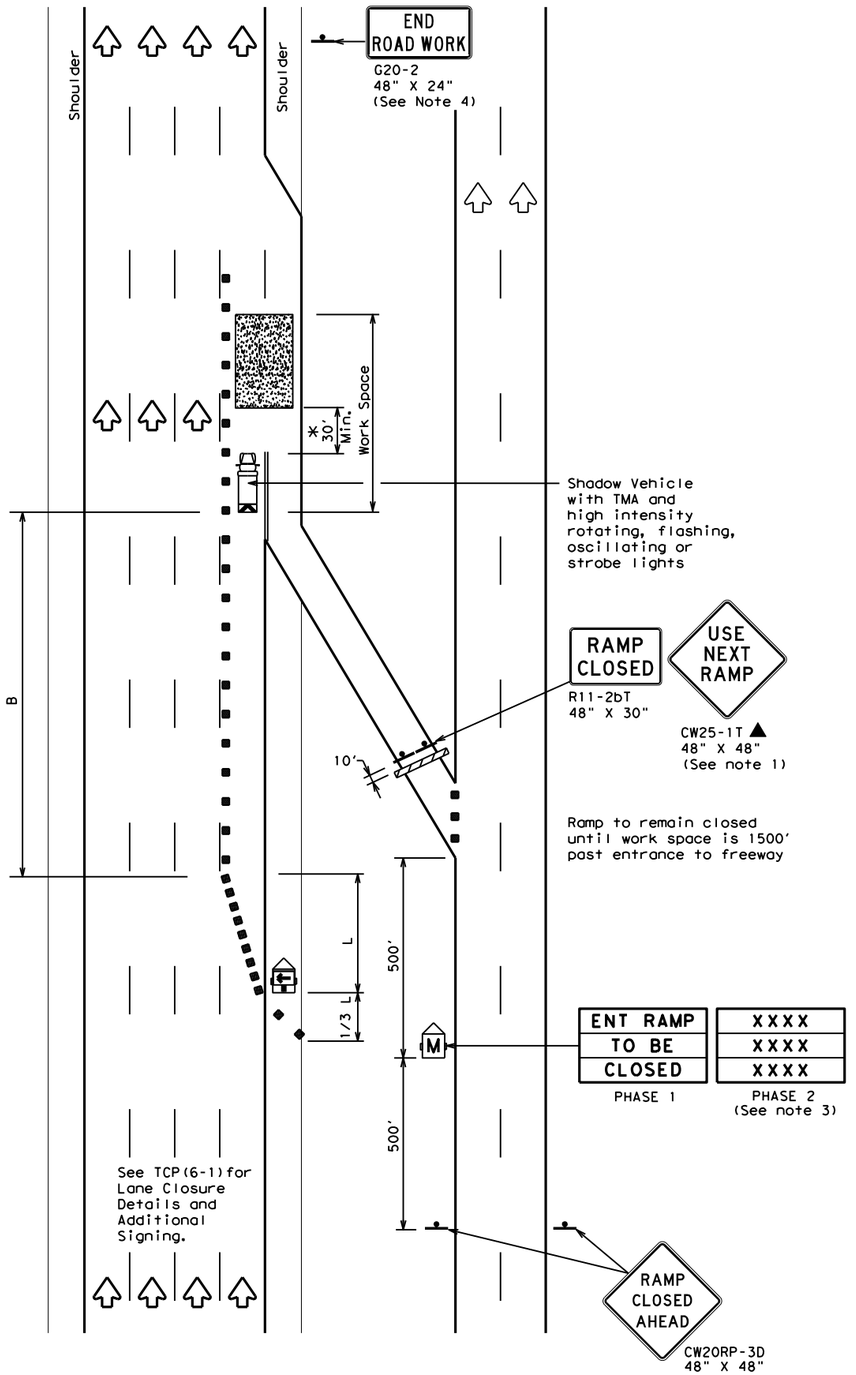
FILE: tcp6-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-12	0014	15	080	US 287/81
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		33

DATE:
FILE:



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" ** 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. 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.

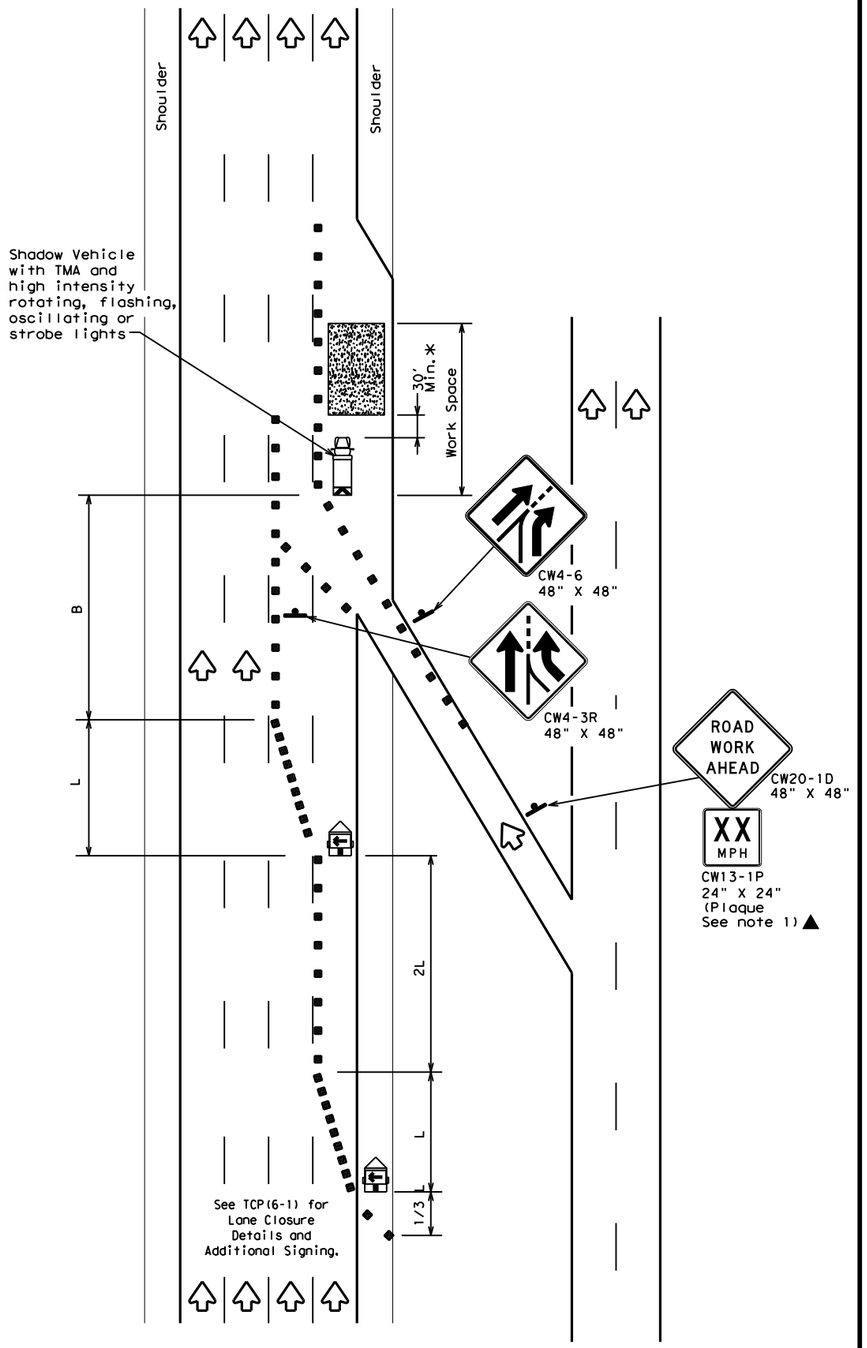
Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

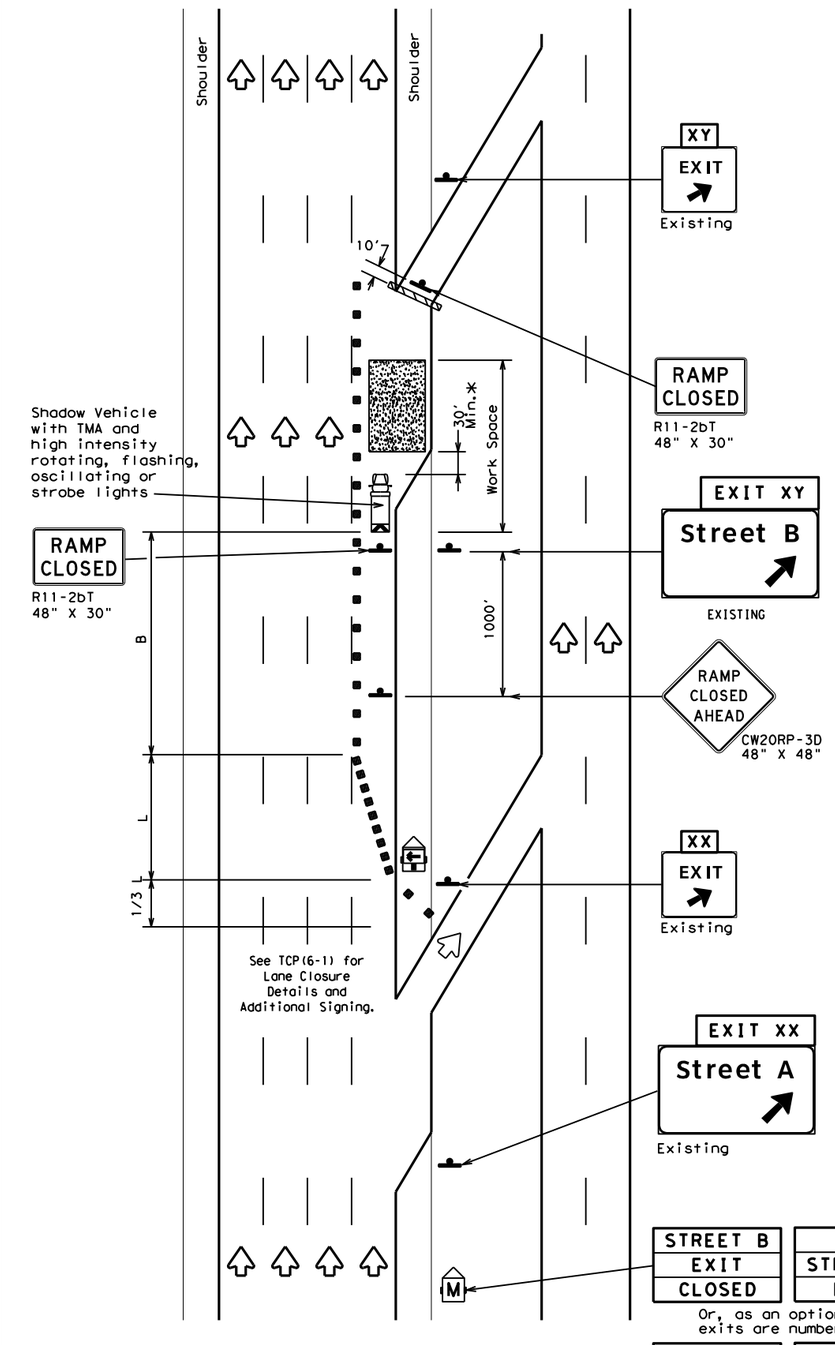
TCP(6-2)-12

FILE: tcp6-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	FTW	TARRANT		34



TCP (6-3a)

ENTRANCE RAMP OPEN



STREET B EXIT CLOSED	USE STREET A EXIT

Or, as an option when exits are numbered

EXIT XY CLOSED	USE EXIT XX

Place 1 mile (approx.) in advance of Street A exit.

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

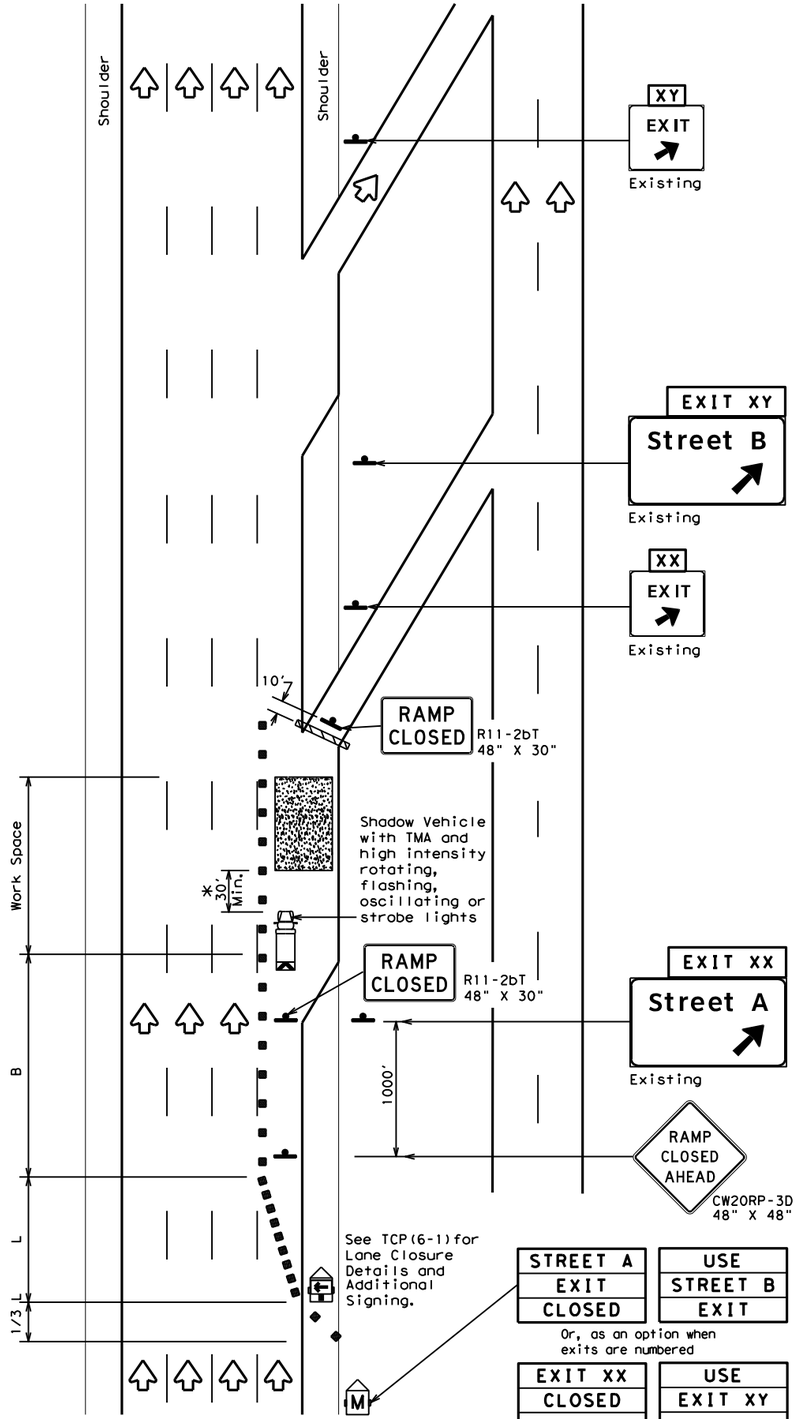
TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

TCP(6-3)-12

FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	FTW	TARRANT		35

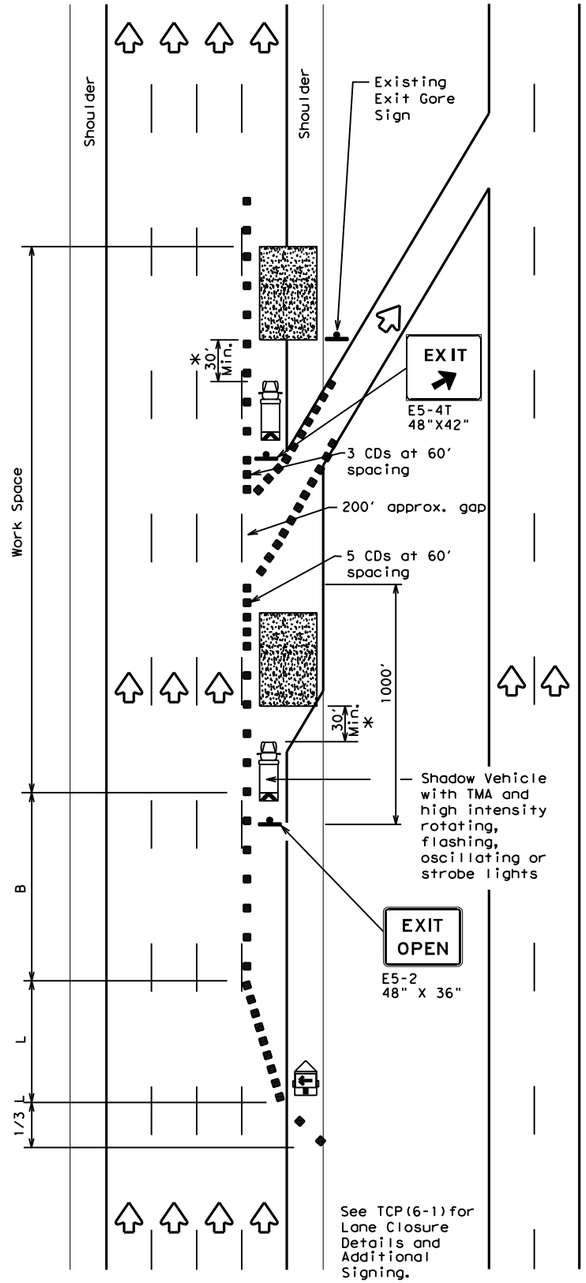
DATE:
FILE:

DATE:
FILE:



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

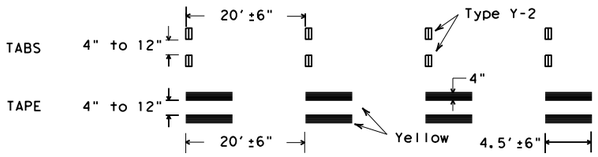
FILE: tcp6-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT Feburary 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	FTW	TARRANT		36

DATE:
FILE:

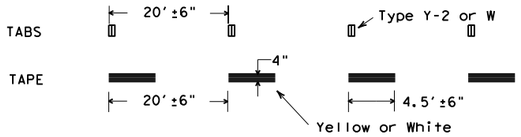
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

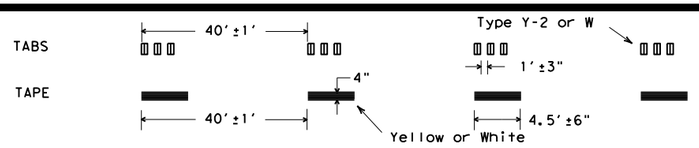


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



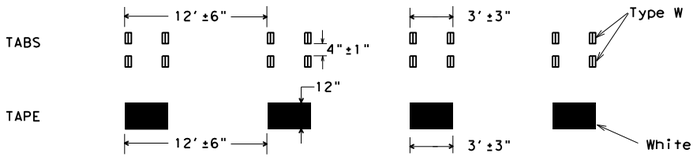
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

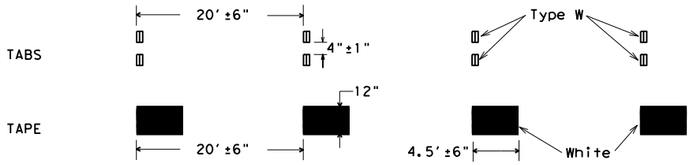


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



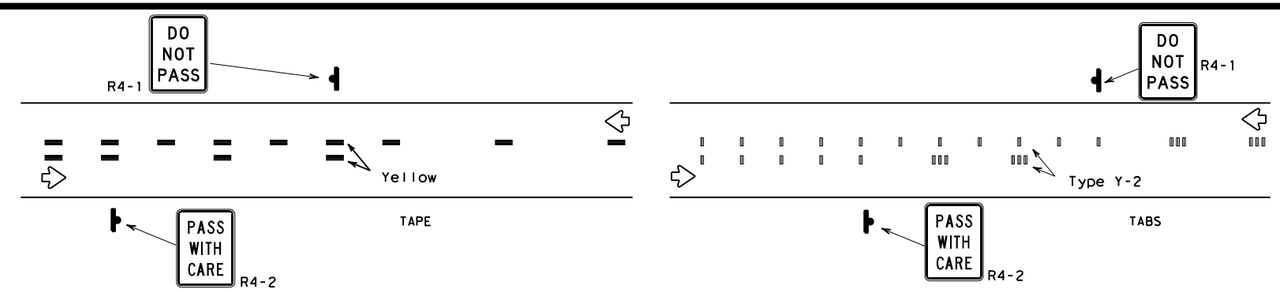
NOTES:

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

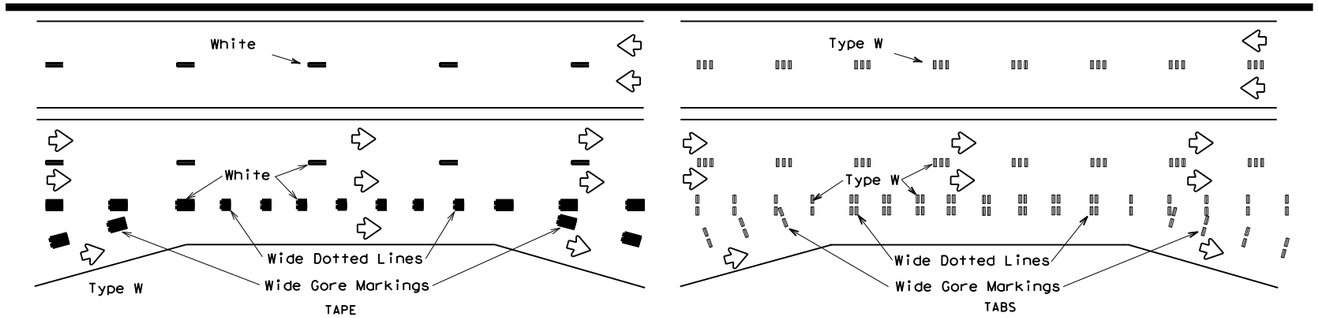
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

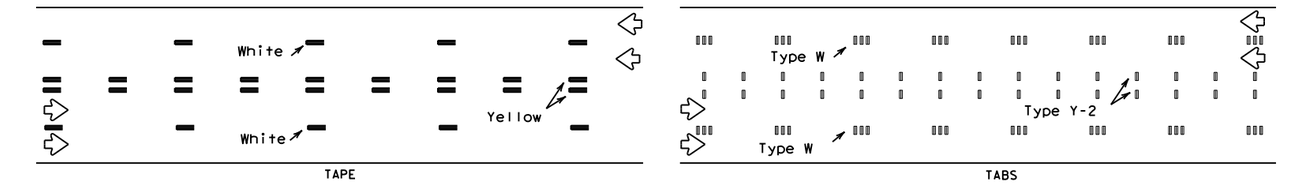
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



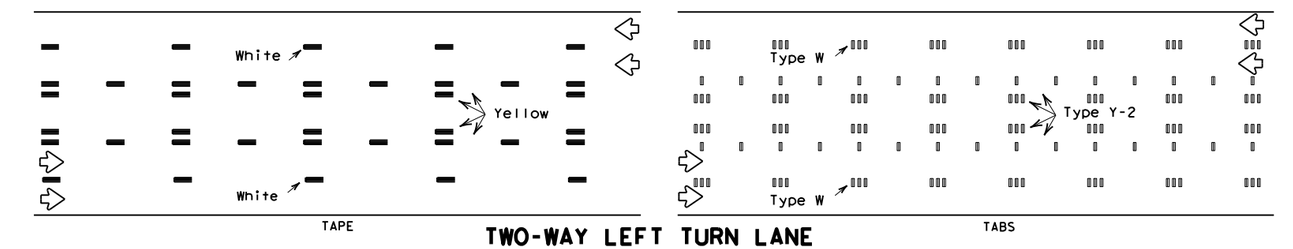
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



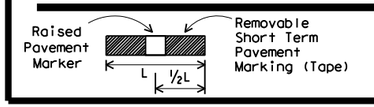
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

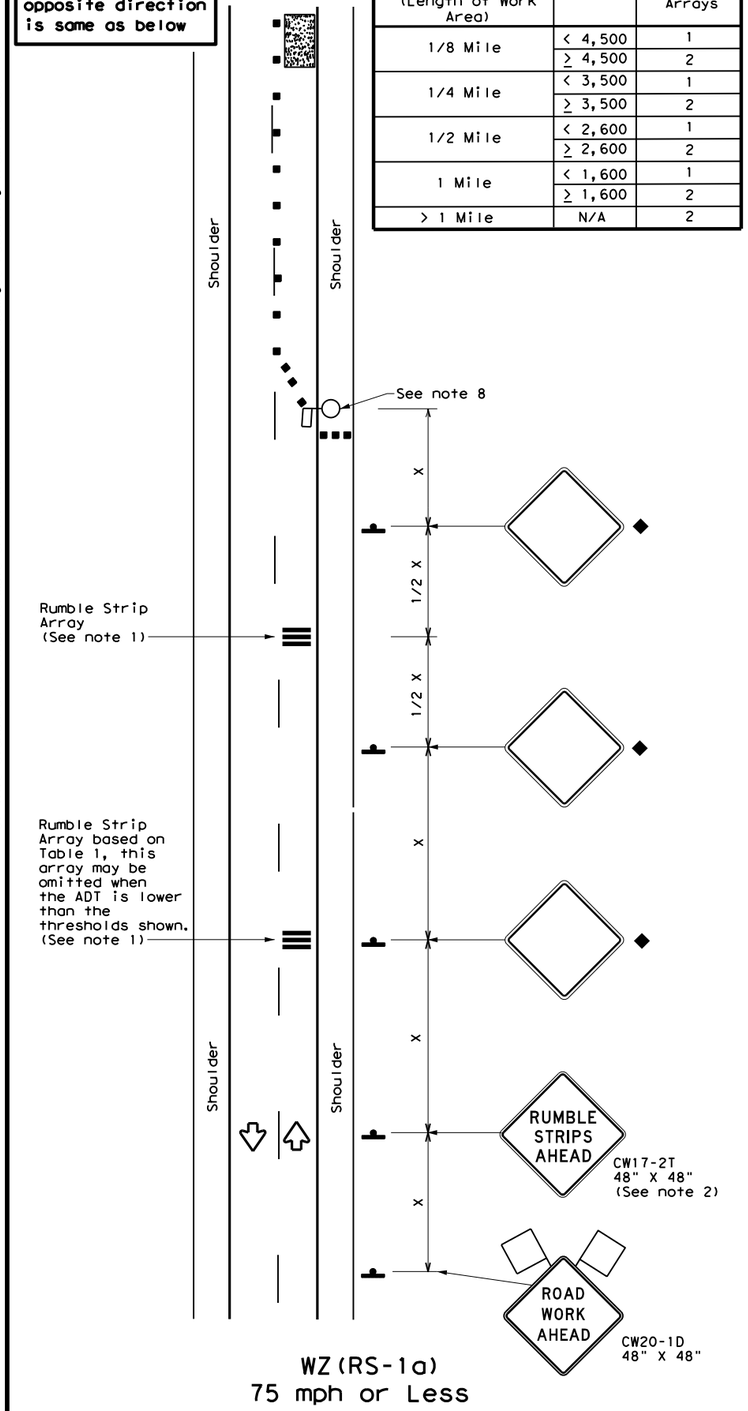
WZ(STPM)-13

FILE:	wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS		0014	15	080	US 287/81
1-97		DIST	COUNTY		SHEET NO.
3-03		FTW	TARRANT		37
7-13					

DATE:
FILE:

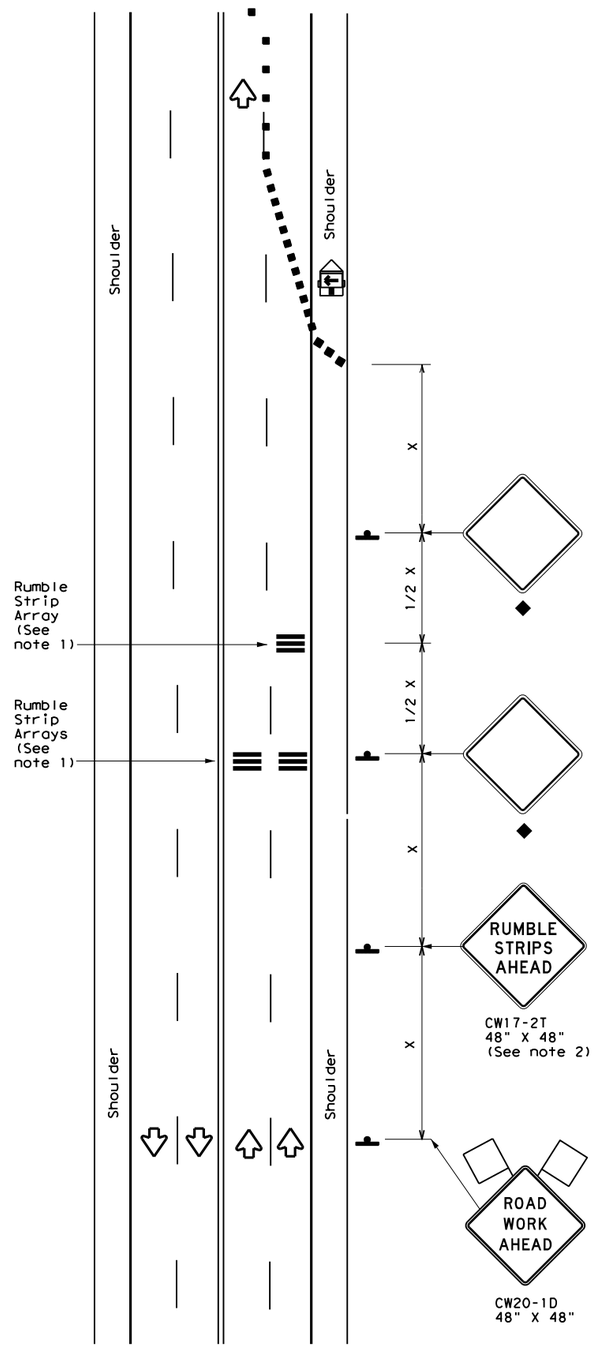
Warning sign and rumble strip sequence in opposite direction is same as below

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



WZ(RS-1a)
75 mph or Less

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)
75 mph or Less

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

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

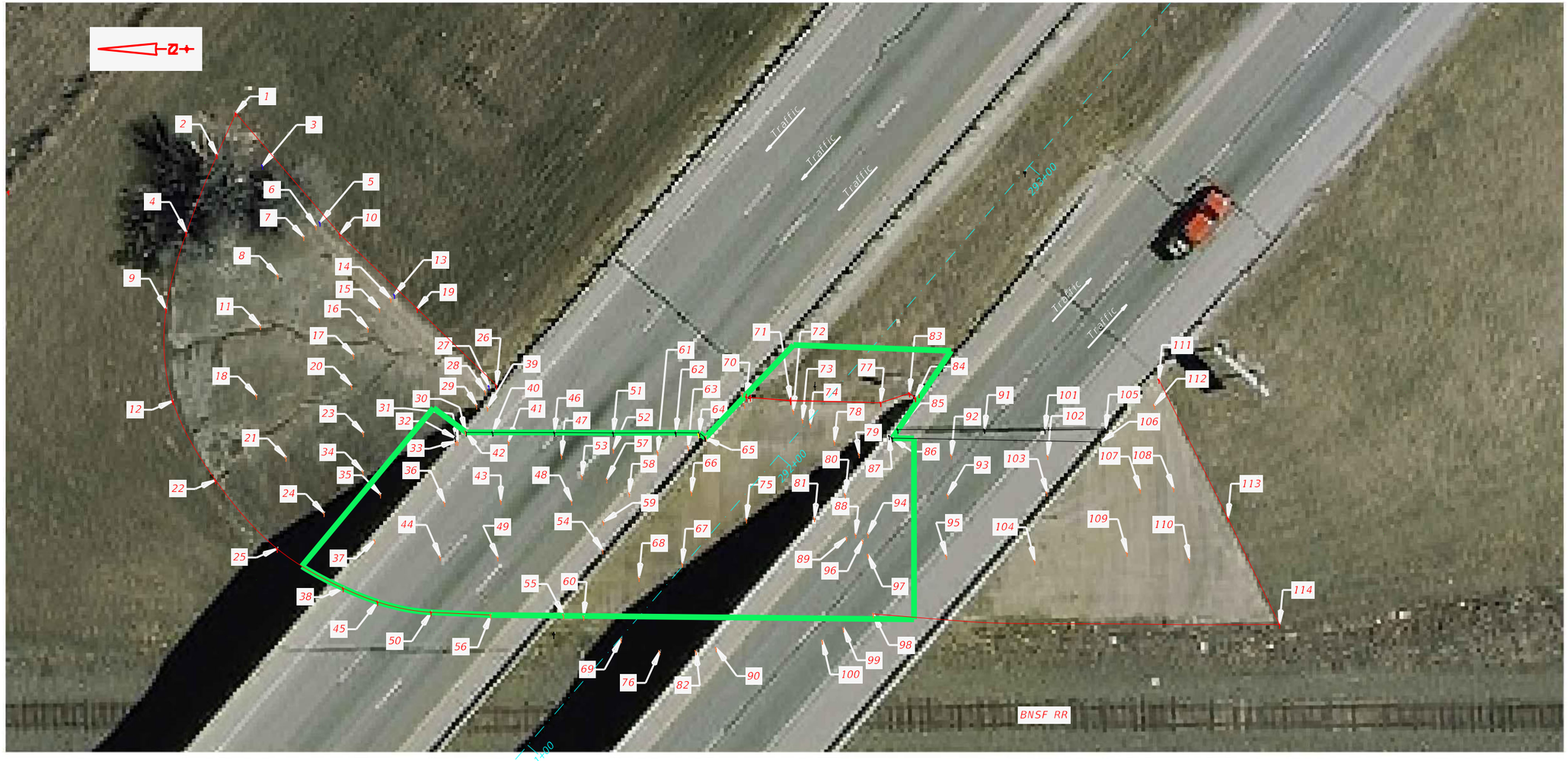
Texas Department of Transportation

Traffic Operations Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-16

FILE: wzrs16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
2-14	DIST	COUNTY		SHEET NO.
4-16	FTW	TARRANT		38



SCALE: 1"=30'
0 15 30

SHEET 1 OF 2

PLAN

Refer to Sheet 2 of 2 for Survey Data

Proposed Repair Limits

STATE OF TEXAS
SANDIP TAMRAKAR
125726
LICENSED
PROFESSIONAL ENGINEER

Sandip Tamrakar
12/07/2021

Texas Department of Transportation
Fort Worth Bridge Design

SURVEY PLAN

US 81/287 OVERPASS @ BNSF RR

	DN: ST	CK: ST	DW: GC/ST	CK: GC/ST
©TxDOT 12-06-21	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 81/287
	DIST	COUNTY		SHEET NO.
	FTW	Tarrant		39

T:\BRIDGE\share\287bnsfRR.001415080\Slope Failure\100%\Survey Plan.dgn

SURVEY DATA

Point No.	Elevation	X	Y
1	735.235	2318335.3690	7023119.2050
2	735.791	2318324.5380	7023124.3360
3	738.412	2318321.5480	7023112.5300
4	735.717	2318304.4550	7023132.7260
5	745.623	2318306.4140	70723097.8270
6	745.800	2318305.4370	7023098.8610
7	745.455	2318302.7440	7023102.1220
8	745.441	2318292.8670	7023109.0790
9	735.850	2318284.5590	7023138.4460
10	748.133	2318303.2190	7023092.6430
11	745.582	2318279.6910	7023113.9040
12	736.645	2318260.5940	7023137.1690
13	755.699	2318287.1540	7023078.7660
14	755.865	2318286.1700	7023079.7170
15	755.680	2318283.6320	7023082.7000
16	755.730	2318287.5280	7023085.7920
17	755.293	2318271.6450	7023089.7020
18	745.427	2318261.5440	7023115.2820
19	758.416	2318283.4090	7023072.8660
20	755.385	2318263.6090	7023090.3940
21	746.334	2318245.2370	7023107.9010
22	738.116	2318239.7020	7023126.4020
23	755.318	2318251.2540	7023087.5560
24	745.515	2318230.5800	7023098.2590
25	738.218	2318221.4930	7023110.6740
26	767.953	2318263.0080	7023052.5940
27	767.321	2318262.8090	7023054.5260
28	767.492	2318261.5350	7023055.4960
29	767.591	2318257.8860	7023057.8730
30	768.451	2318251.1610	7023060.9170
31	762.701	2318248.5110	7023062.9510
32	762.777	2318249.4700	7023063.5570
33	762.650	2318248.5660	7023063.4590
34	754.040	2318241.1950	7023087.8560
35	752.989	2318235.1500	7023083.4290
36	753.742	2318232.6960	7023066.7130
37	745.730	2318223.2010	7023085.1180
38	737.992	2318210.8430	7023093.6400
39	768.427	2318257.2690	7023055.0160
40	768.718	2318250.7206	7023053.7816
41	762.860	2318248.2840	7023049.7000
42	768.569	2318250.8750	7023060.7200
43	754.275	2318232.8680	7023052.0040
44	745.570	2318218.5380	7023068.1530
45	737.468	2318207.0970	7023084.7360
46	768.732	2318250.3620	7023037.6730
47	760.996	2318244.4340	7023035.9600
48	754.584	2318232.3450	7023033.5630
49	745.750	2318218.1480	7023053.1150
50	737.540	2318204.1320	7023070.8260
51	768.911	2318249.9990	7023022.3080
52	763.267	2318245.7190	7023022.4010
53	756.219	2318238.9200	7023030.7220
54	749.414	2318219.4440	7023025.6750
55	737.415	2318202.7190	702036.2550
56	737.527	2318207.0970	7023084.7360
57	755.117	2318237.9113	7023024.2423

SURVEY DATA (CONT'D)

Point No.	Elevation	X	Y
58	751.436	2318234.1510	7023018.4520
59	752.657	2318226.8980	7023025.3540
60	738.207	2318202.2240	7023031.0240
61	763.122	2318244.8610	7023010.8120
62	768.946	2318249.7160	7023005.9940
63	761.573	2318245.9910	7023002.8210
64	768.956	2318249.5410	7022999.8200
65	768.959	2318248.2570	7022998.3420
66	749.672	2318234.1510	7023002.2230
67	748.085	2318215.5980	7023004.9860
68	746.565	2318212.0810	7023016.3700
69	738.163	2318196.1610	7023021.3580
70	767.646	2318258.6110	7022987.3880
71	768.352	2318257.5870	7022975.8330
72	767.279	2318254.9040	7022975.2150
73	766.211	2318252.5190	7022972.8500
74	765.711	2318251.2650	7022970.8250
75	748.585	2318226.7720	7022988.0180
76	738.211	2318192.7830	7023011.3210
77	768.247	2318256.4940	7022952.3650
78	763.896	2318246.6130	7022964.6150
79	762.001	2318243.2020	7022958.2410
80	753.475	2318232.7580	7022962.0670
81	748.632	2318226.7280	7022970.2270
82	738.448	2318192.6170	7023001.8600
83	768.623	2318258.9008	7022944.7942
84	768.943	2318257.5500	7022943.2260
85	769.198	2318249.4092	7022948.0295
86	764.545	2318247.1820	7022949.4930
87	764.545	2318247.7700	7022950.3020
88	749.168	2318222.2570	7022959.5650
89	747.230	2318221.4840	7022961.9530
90	738.796	2318193.2990	7022996.5670
91	768.830	2318248.9159	7022925.3751
92	761.352	2318242.4100	7022934.2060
93	755.269	2318232.0640	7022935.3550
94	749.140	2318222.2790	7022956.3670
95	745.912	2318216.2270	7022936.0030
96	747.171	2318220.7590	7022957.7560
97	745.994	2318216.8750	7022956.4580
98	737.090	2318201.4110	7022955.3800
99	737.317	2318197.8070	7022963.2320
100	739.087	2318194.7100	7022968.8130
101	768.397	2318248.5780	7022909.6060
102	760.750	2318241.7440	7022909.0530
103	755.161	2318232.1870	7022909.4360
104	744.706	2318214.3840	7022912.9760
105	768.017	2318248.4172	7022893.7682
106	763.484	2318245.0800	7022895.1070
107	754.955	2318232.4850	7022885.0840
108	755.082	2318232.6730	7022876.3200
109	745.709	2318216.0900	7022888.8360
110	744.763	2318214.0770	7022872.6290
111	767.127	2318261.0710	7022879.6250
112	765.763	2318254.3910	7022880.9170
113	749.958	2318224.5600	7022862.3360
114	735.145	2318196.5660	7022849.3940

STATE OF TEXAS
SANDIP TAMRAKAR
125726
LICENSED
PROFESSIONAL ENGINEER

Sandip Tamrakar
12/07/2021

Texas Department of Transportation

Fort Worth Bridge Design

SURVEY PLAN

US 81/287 OVERPASS @ BNSF RR

	DN: ST	CK: ST	DW: GC/ST	CK: GC/ST
©TxDOT 12-06-21	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 81/287
	DIST	COUNTY		SHEET NO.
	FTW	Tarrant		40

T:\BRIDGE\share\287bnsfRR.001415080\Slope Failure\100%\Survey Plan.dgn

Drainage Ditch Points[1]			
Point Name	X	Y	Elevation
DT1	2318204.5930	7023152.5300	736.9010'
DT2	2318194.4420	7022847.7410	734.6910'

(1) See "Slope Repair Cross Section" sheets for more details

ESTIMATED QUANTITIES			
ITEM	DESCRIPTION	UNIT	TOTAL
104 6009	REMOVING CONC (RIPRAP)	SY	1250
110 6003	EXCAVATION (SPECIAL)	CY	2541
132 6006	EMBANKMENT (FINAL) (DENS CONT) (TY C) FILL	CY	2541
	PREFABRICATED SOIL DRAINAGE MAT	SY	248 [2]
401 6001 [3]	FLOWABLE BACKFILL	CY	77
403 6001	TEMPORARY SPECIAL SHORING	SF	2115
420 6007	CL A CONC (FLUME)	CY	9
432 6009	RIPRAP (CONC) (CL B) (4 IN)	CY	161
529 6026	CONC CURB (TY IV)	LF	160
760 6001 [4]	DITCH CLEANING AND RESHAPING (FOOT)	LF	345

For Contractor's information only:

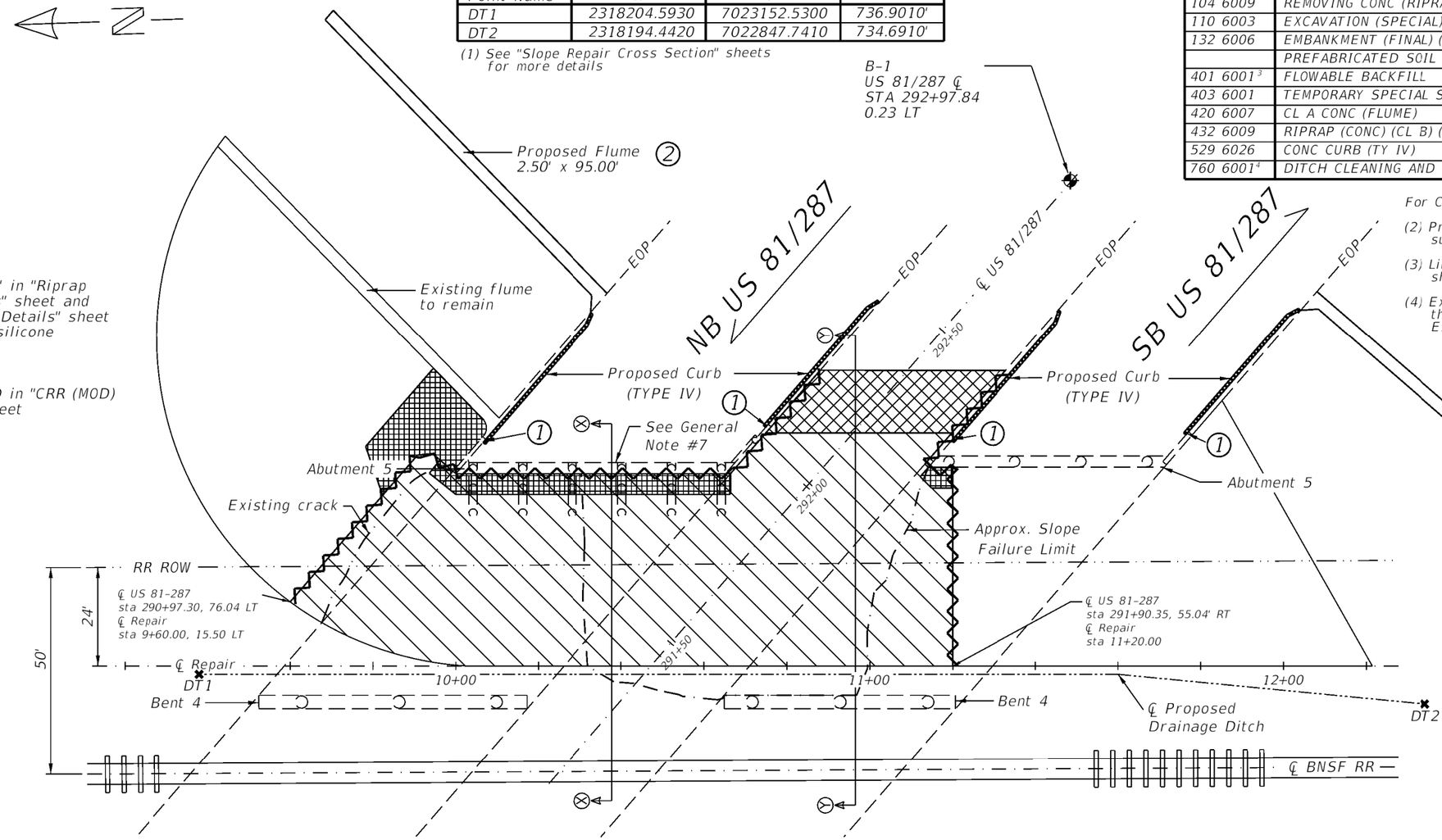
(2) Prefabricated soil drainage mat is subsidiary to Item 132.

(3) Limit of flowable fill is approximate and should be field verified.

(4) Excavation for Drainage Ditch in front of the Proposed CRR toe Wall = 305 LF. Excavation for Drainage Ditch at Median = 40 LF.

(1) See 'Detail A' in "Riprap Repair Limits" sheet and "Relief Joint Details" sheet for Class 7 silicone seal details

(2) See SEC D-D in "CRR (MOD) Standard" sheet



	Existing NBI #
NB US 81/287	02-220-0-0014-15-331
SB US 81/287	02-220-0-0014-15-385

SCALE

20' 40'

GENERAL NOTES

Excavatable flowable fill placement under existing and proposed riprap (section not to scale)

Riprap and embankment remove and replace section

New riprap section

Temp. Special Shoring (TSS) (See details in "TSS Layouts")

1. Refer to utility plans for location of existing underground utilities. Contractor must field verify locations of utilities prior to beginning excavation or construction.
2. Test hole location is approximate. See "Boring Log" sheet for test hole data.
3. Repair limit will involve removal of unstable loose concrete riprap and soft soil debris. Contractor must field verify all dimensions, identify potential hazards, and make necessary shoring plan prior to beginning construction. Submit shoring plan and construction sequence to Engineer for approval.
4. Construct concrete riprap in accordance with "CRR (MOD) Standard" sheet, RR9. Use Cap Option A at bridge abutment.
5. Refer to "Survey Plan" sheets for survey elevations.
6. Flowable fill should be placed in lifts not to exceed 8" at a time. Allow each lift to set prior to placing next lift.
7. For the NB Bridge Repairs refer to the "Relief Joint Details" sheet.

STATE OF TEXAS
CHUN HO LEE
124680
LICENSED PROFESSIONAL ENGINEER

12/07/2021

SHEET 1 OF 2

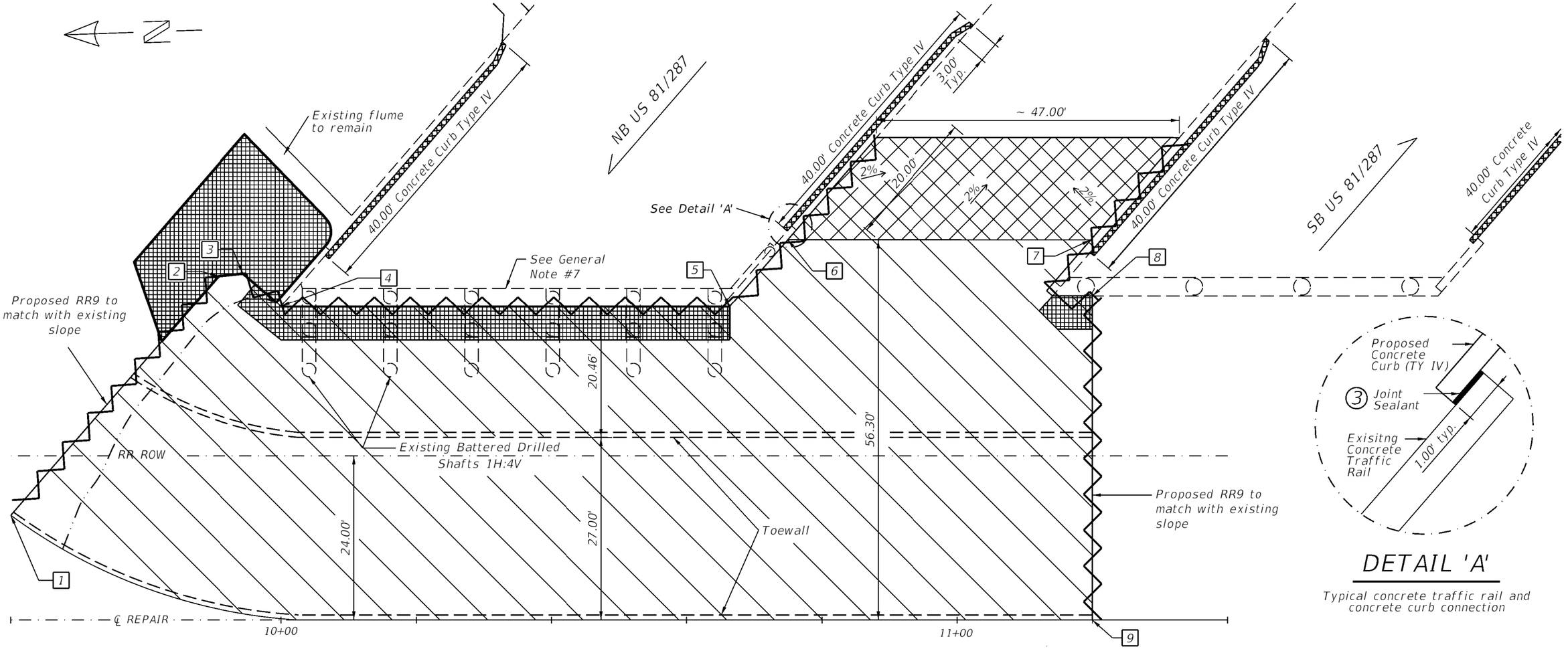
Texas Department of Transportation | Bridge Division

SLOPE REPAIR PLAN VIEW

US 81/287 OVERPASS AT BNSF RR

FILE: 100%_Tarrant_0014-15-080.dgn	DN: AB	CK: CHL	DW: AB	CK: RLE
©TxDOT December 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 81/287
	DIST	COUNTY		SHEET NO.
	FTW	Tarrant		41

DATE:
FILE:



DETAIL 'A'

Typical concrete traffic rail and concrete curb connection

SCALE

10' 20'

POINT	STATION	OFFSET
1	9+60.00	15.50' LT
2	9+90.74	50.92' LT
3	9+93.63	51.33' LT
4	9+98.10	47.46 LT
5	10+64.48	47.46 LT
6	10+72.14	56.30 LT
7	11+19.77	56.30 LT
8	11+20.00	48.00 LT
9	11+20.00	0.00 LT

Excavatable flowable fill placement under existing and proposed riprap (section not to scale)

Riprap and embankment remove and replace section

New riprap section

Temp. Special Shoring (TSS) (See details in "TSS Layouts")

(3) Apply joint sealant between the face of the existing bridge railings and the back of proposed concrete curbs. Joint sealant to be in accordance with DMS-6310 "Joint Sealants and Fillers". Joint sealant material Class 7. Also refer to "Relief Joint Details" sheet for additional joint sealant details.

STATE OF TEXAS
CHUN HO LEE
124680
LICENSED PROFESSIONAL ENGINEER

12/07/2021

SHEET 2 OF 2

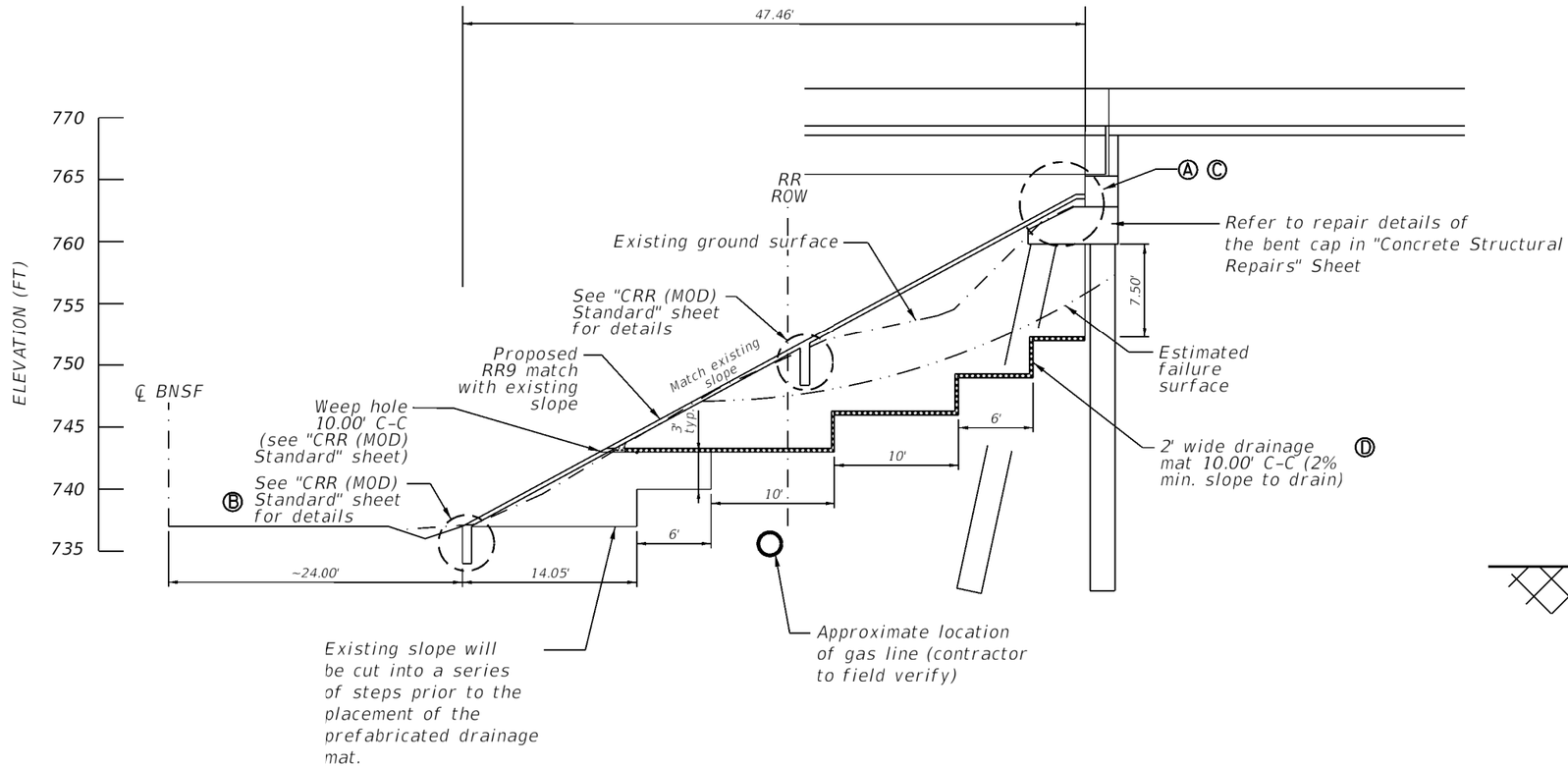
Texas Department of Transportation | Bridge Division

RIPRAP REPAIR LIMITS

US 81/287 OVERPASS AT BNSF RR

FILE: 100%_Tarrant_0014-15-080.dgn	DN: AB	CK: CHL	DW: AB	CK: RLE			
©TxDOT December 2021	CONT	SECT	JOB	HIGHWAY			
REVISIONS	0014	15	080	US 81/287			
	DIST	COUNTY		SHEET NO.			
	FTW	Tarrant		42			

DATE:
FILE:

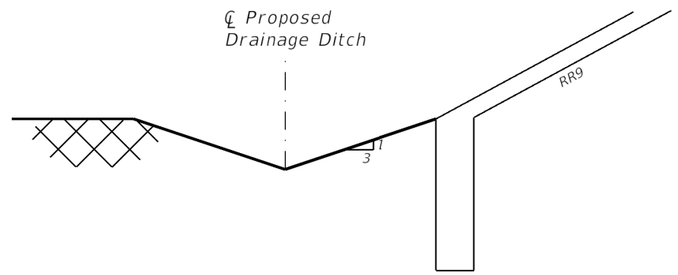


Ⓐ See cap Option A in "CRR (MOD) Standard" sheet for concrete riprap and existing cap connection

Ⓑ See toe wall details in "CRR (MOD) Standard" sheet for reinforcement information

Ⓒ For areas near existing abutment cap that may not provide enough spacing for proper compaction of embankment fill, use excavatable flowable fill

Ⓓ Provide drainage system consisting of 2' wide prefabricated soil drainage mats located at 10'-0" center to center (typ.). Provide filter fabric meeting the requirements of DMS-6200 "Filter Fabric". The drain core shall have a compressive strength of 4000 psf minimum when tested in accordance with ASTM D1621 (Procedure A) and have a minimum overall thickness of 0.300 in. Place mats and filter fabric against the soil cut face as directed. Overlap the fabric as necessary a minimum of 6" in the direction of water flow. Each mat should terminate with a connection to a weep hole (see weep hole details in "CRR (MOD) Standard" sheet. Prefabricated soil drainage mats are subsidiary to Item 132.



Drainage Ditch Detail N.T.S.

(1) See "Slope Repair Plan View" sheet for beginning and ending points of drainage ditch.
(2) Maintain drainage ditch centerline parallel to the top of the repaired section of the concrete riprap toe wall as is shown in the "Slope Repair Plan View" sheet.
(3) Maintain side slope inclination of 3H:1V when possible. It is permissible to have side slope inclination of 2H:1V when neccessary.
(4) Do NOT excavate the ditch deeper than 18" from the top of the proposed concrete riprap toe wall. Do NOT extend the excavation of the ditch to the existing pier protection crash walls.

X-X

STA 9+60.00
TO
STA 10+64.48

GENERAL NOTES

1. The reconstructed embankment shall be of Type C material with a controlled plasticity index (PI) and liquid limit (LL). Where 12 < PI < 20 and LL < 45.
2. Compact embankment material to 98% of dry unit weight. Moisture content shall be between optimum and +3% optimum. No more than 12" loose lifts. Backfill placed within 3 ft of drilled shafts or walls shall be placed in loose lifts no more than 8" thick and compacted using hand tampers or small self-propelled compactor.
3. Limit the length of each zone removed to the amount that can be completed in 10 calendar days. At no time will any cut face higher than 5 ft be exposed for over 7 calendar days.
4. Dimensions shown are approximate and not to scale. Contractor to field verify all dimensions prior to beginning construction.

SHEET 1 OF 2

STATE OF TEXAS
CHUN HO LEE
124680
LICENSED PROFESSIONAL ENGINEER

12/07/2021

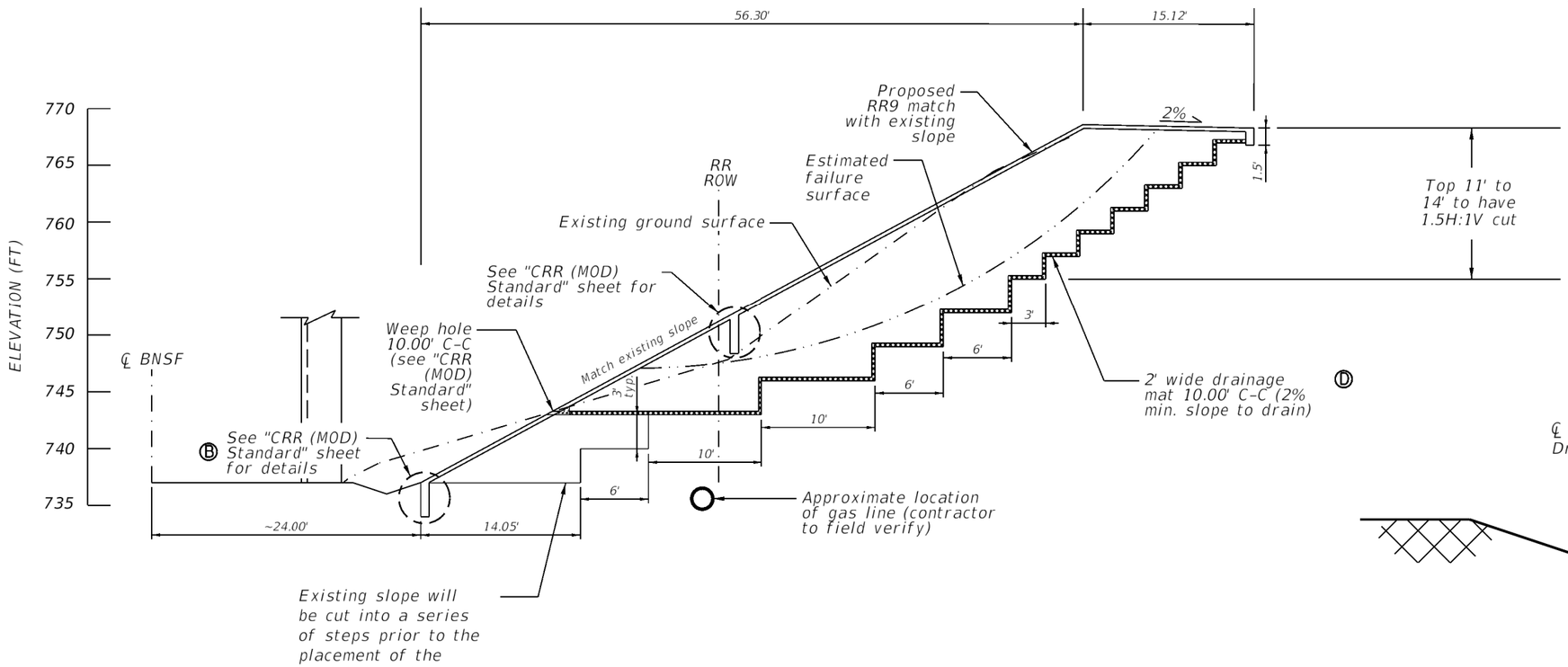
Texas Department of Transportation | Bridge Division

SLOPE REPAIR CROSS SECTION

US 81/287 OVERPASS AT BNSF RR

FILE: 100%_Tarrant_0014-15-080.dgn	DN: AB	CK: CHL	DW: AB	CK: RLE
©TxDOT December 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 81/287
	DIST	COUNTY		SHEET NO.
	FTW	Tarrant		43

DATE:
FILE:

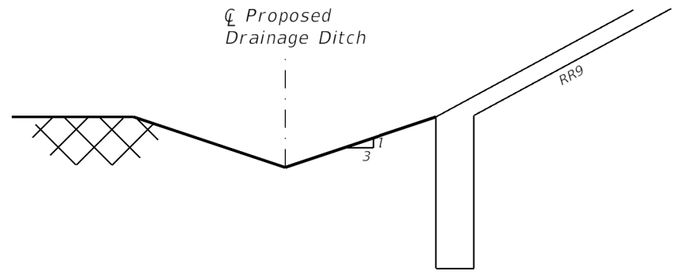


Y-Y

STA 10+64.48
TO
STA 11+13.24

Ⓑ *See toe wall details in "CRR (MOD) Standard" sheet for reinforcement information*

Ⓓ *Provide drainage system consisting of 2' wide prefabricated soil drainage mats located at 10'-0" center to center (typ.). Provide filter fabric meeting the requirements of DMS-6200 "Filter Fabric". The drain core shall have a compressive strength of 4000 psf minimum when tested in accordance with ASTM D1621 (Procedure A) and have a minimum overall thickness of 0.300 in. Place mats and filter fabric against the soil cut face as directed. Overlap the fabric as necessary a minimum of 6" in the direction of water flow. Each mat should terminate with a connection to a weep hole (see weep hole details in "CRR (MOD) Standard" sheet. Prefabricated soil drainage mats are subsidiary to Item 132.*



Drainage Ditch Detail N.T.S.

(1) See "Slope Repair Plan View" sheet for beginning and ending points of drainage ditch.
(2) Maintain drainage ditch centerline parallel to the top of the repaired section of the concrete riprap toe wall as is shown in the "Slope Repair Plan View" sheet.
(3) Maintain side slope inclination of 3H:1V when possible. It is permissible to have side slope inclination of 2H:1V when neccessary.
(4) Do NOT excavate the ditch deeper than 18" from the top of the proposed concrete riprap toe wall. Do NOT extend the excavation of the ditch to the existing pier protection crash walls.

STATE OF TEXAS
CHUN HO LEE
124680
LICENSED PROFESSIONAL ENGINEER

12/07/2021

SHEET 2 OF 2

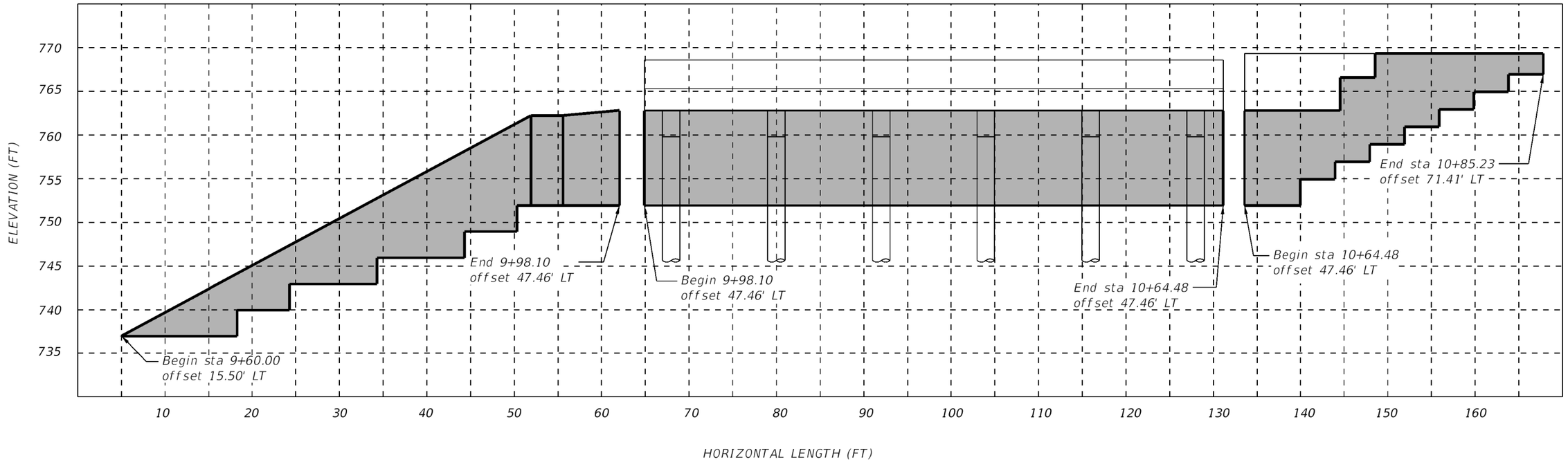
Texas Department of Transportation | Bridge Division

SLOPE REPAIR CROSS SECTION

US 81/287 OVERPASS AT BNSF RR

FILE: 100%_Tarrant_0014-15-080.dgn	DN: AB	CK: CHL	DW: AB	CK: RLE
©TxDOT December 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 81/287
	DIST	COUNTY		SHEET NO.
	FTW	Tarrant		44

DATE:
FILE:



Temp. Special Shoring Limits

GENERAL NOTES

1. For contractor's information only. Contractor must submit temporary special shoring system for engineer's approval prior to beginning construction. The details and design calculations must bear the seal of a professional engineer in the State of Texas. Design and submittal shall be in accordance to Item 403 TEMPORARY SPECIAL SHORING in the TxDOT Standard Specifications.

STATE OF TEXAS
CHUN HO LEE
124680
LICENSED PROFESSIONAL ENGINEER

12/07/2021

SHEET 1 OF 2

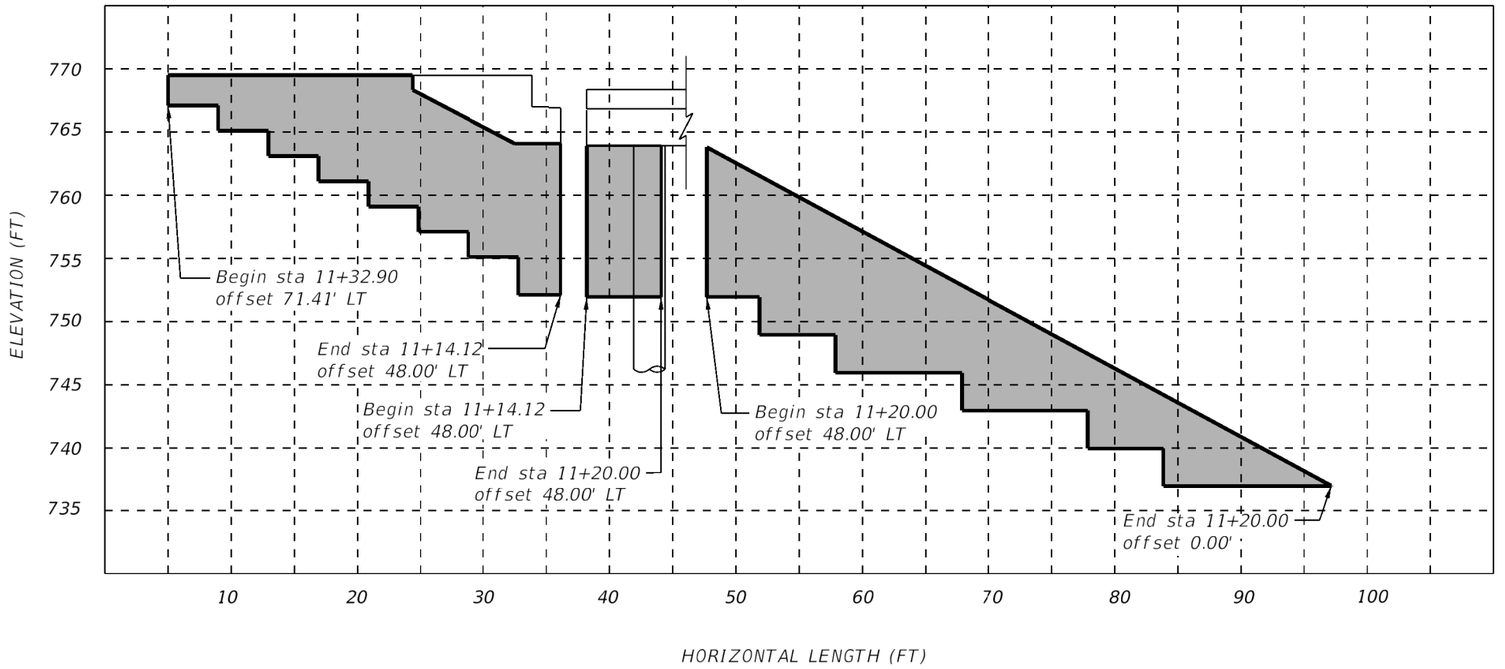
Texas Department of Transportation | Bridge Division

Temporary Special Shoring Layouts

NB US 81/287 OVERPASS AT BNSF RR

FILE: 100%_Tarrant_0014-15-080.dgn	DN: AB	CK: CHL	DW: AB	CK: RLE
©TxDOT December 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 81/287
	DIST	COUNTY		SHEET NO.
	FTW	Tarrant		45

DATE:
FILE:



Temp. Special Shoring Limits

GENERAL NOTES

1. For contractor's information only. Contractor must submit temporary special shoring system for engineer's approval prior to beginning construction. The details and design calculations must bear the seal of a professional engineer in the State of Texas. Design and submittal shall be in accordance to Item 403 TEMPORARY SPECIAL SHORING in the TxDOT Standard Specifications.

STATE OF TEXAS
CHUN HO LEE
124680
LICENSED
PROFESSIONAL ENGINEER

12/07/2021

DATE:
FILE:

SHEET 2 OF 2

Texas Department of Transportation | Bridge Division

Temporary Special Shoring Layouts

SB US 81/287 OVERPASS AT BNSF RR

FILE: 100%_Tarrant_0014-15-080.dgn	DN: AB	CK: CHL	DW: AB	CK: RLE
©TxDOT December 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 81/287
	DIST	COUNTY		SHEET NO.
	FTW	Tarrant		46

DRILLING LOG

WinCore Version 3.3	County	Tarrant	Hole	B-1	District	Fort Worth
	Highway	US 287 S at BNSF	Structure	Slope	Date	12/22/21
	CSJ	88GEOTECH09	Station	292+97.84	Grnd. Elev.	766.80 ft
			Offset	+0.23'	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, soft, brown to dark brown with light brown stains (Fill) (CH)							HP: 4, limestone nodules from
										HP: 3.25
5		6 (6) 7 (6)								HP: 3.25
										HP: 3.75
				6.2	33.4	25	62	46	129.3	HP: 3.5, #200: 87%
10		8 (6) 10 (6)								
										HP: 3.5
752.3				9	37.4	23	64	46	129.5	HP: 4.5, #200: 94%
15		12 (6) 14 (6)	CLAY, stiff to very stiff, dark brown with light brown stains (Fill) (CH)							
				0	34.1	25	88	64	126.7	HP: 4.5, #200: 93%
				19.6	43.5	22	59	43	127.5	HP: 4.5, #200: 92%
20		18 (6) 25 (6)								
										HP: 4.5
25		11 (6) 11 (6)								
				19	40.3	25	69	51	123	HP: 3.0, #200: 95%
30		14 (6) 22 (6)								
										HP: 4.5
35		17 (6) 19 (6)								-concrete fragments at 35 feet
730.8			LIMESTONE, WEATHERED LIMESTONE, hard, light gray							
726.8		50 (1.5) 50 (0.75)								
40										

Remarks: Methods of drilling: Continuous Flight Auguring. Groundwater was not enocuntered. Lat: 32.926980°, Long: -97.360750°, SPT was performed using 170 lb. hammer

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

Driller: Total Depth **Logger: PSI** **Organization: PSI**

T:\DES_GEOT\DRILLING CONTRACTS\2016 - 2018 Drilling Contracts\PSI\WA#5 Isseud 12-31-2019\WA#5-4 US287 Slope Failure at BNSF\Report\0303955-23 Statewide Bridge Contract Work Authorization 5-4 (REV3).

This sheet is a reproduction without alteration of drilling logs obtained by Intetek PSI, WA 5-4 under TxDOT Contract Number 88-7IDP5046 and performed under the supervision of Dexter Bacon, P.E. Texas seal No. 54560.

STATE OF TEXAS
CHUN HO LEE
124680
LICENSED PROFESSIONAL ENGINEER

12/07/2021

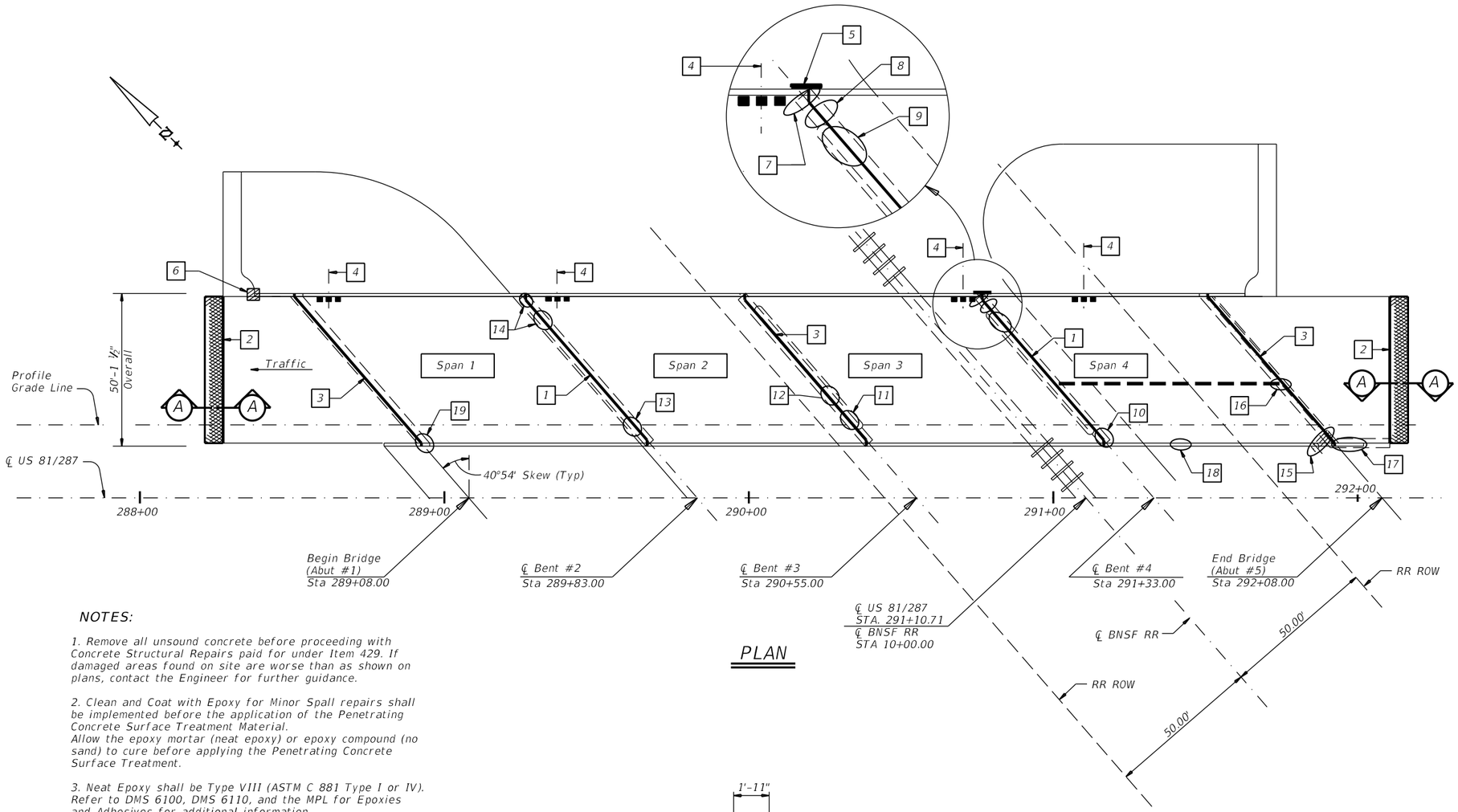
SHEET 1 OF 1

Texas Department of Transportation — Bridge Division

BORING LOG
US 81/287

FILE: US287 Boring Log.dgn	DN: MMF	CK: TBD	DW: JBS	CK: MMF		
©TxDOT December 2021	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0014	15	080	US 81/287		
	DIST	COUNTY		SHEET NO.		
	FTW	TARRANT		47		

DATE:
FILE:



PLAN

1 Joint to be repaired (See "Armor Joint Details" sheet for more information).

2 Joint to be repaired (See "Relief Joint Details" sheet for more information). (See "PHOTOS 1–3" on Sheet 2 of 8).

3 Joint to be repaired (See "Construction Joint Details" for more information).

4 Clean Curb Drain Inlet. (See "PHOTO 4" on Sheet 2 of 8).

5 Concrete Str Repair (Vertical & Overhead). (See "PHOTOS 5–7" on Sheet 3 of 8).

6 Flowable Backfill. (See "PHOTO 8" on Sheet 3 of 8).

7 Concrete Str Repair (Clean & Coat with Epoxy). (See "PHOTO 9" on Sheet 3 of 8).

8 Concrete Str Repair (Clean & Coat with Epoxy). (See "PHOTOS 10 & 11" on Sheet 4 of 8).

9 Concrete Str Repair (Clean & Coat with Epoxy) (See "PHOTOS 12 & 13" on Sheet 4 of 8).

10 Concrete Str Repair (Clean & Coat with Epoxy) (See "PHOTOS 14 & 15" on Sheet 4 of 8 & Sheet 5 of 8).

11 Concrete Str Repair (Clean & Coat with Epoxy). (See "PHOTO 16" on Sheet 5 of 8).

12 Concrete Str Repair (Clean & Coat with Epoxy). (See "PHOTOS 17–19" on Sheet 5 of 8).

13 Concrete Str Repair (Clean & Coat with Epoxy). (See "PHOTO 20" on Sheet 6 of 8).

14 Concrete Str Repair (Clean & Coat with Epoxy). (See "PHOTOS 21–24" on Sheet 7 of 8).

† 15 Concrete Str Repair (Standard). (See "PHOTO 25" on Sheet 7 of 8).

16 Concrete Str Repair (Clean & Coat with Epoxy). (See "PHOTO 26 on Sheet 7 of 8).

17 Concrete Str Repair (Standard). (See "PHOTOS 27 & 28" on Sheet 7 of 8).

18 Concrete Str Repair (Standard). (See "PHOTO 29" on Sheet 7 of 8).

19 Concrete Str Repair (Vertical & Overhead). (See "PHOTOS 30 & 31" on Sheet 8 of 8).

† Repair pier cap prior to commence slope repairs.

NOTES:

1. Remove all unsound concrete before proceeding with Concrete Structural Repairs paid for under Item 429. If damaged areas found on site are worse than as shown on plans, contact the Engineer for further guidance.

2. Clean and Coat with Epoxy for Minor Spall repairs shall be implemented before the application of the Penetrating Concrete Surface Treatment Material.
Allow the epoxy mortar (neat epoxy) or epoxy compound (no sand) to cure before applying the Penetrating Concrete Surface Treatment.

3. Neat Epoxy shall be Type VIII (ASTM C 881 Type I or IV). Refer to DMS 6100, DMS 6110, and the MPL for Epoxies and Adhesives for additional information.

4. Item 429, "Concrete Structure Repair" shall be implemented in accordance to the Concrete Repair Manual.

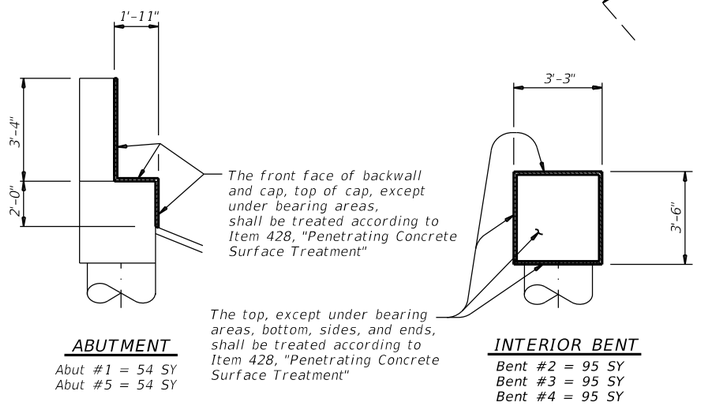
5. Refer to the CRM for more information and terminology.

6. For the slope repairs, refer to elsewhere on the plans.

ESTIMATED QUANTITIES

	Description		Total
0401-6001	Flowable Backfill	CY	5
0428-6001	Penetrating Concrete Surface Treatment	SY	393
0429-6001	Concrete Structure Repair (Clean & Coat with Epoxy)	SF	100
(1) 0429-6007	Concrete Structure Repair (Vertical & Overhead)	SF	28
0429-6009	Concrete Structure Repair (Standard)	SF	34
0438-6004	Cleaning & Sealing Existing Joints (Class 7)	LF	333
0454-6008	Header Type Expansion Joint	CF	24
0454-6009	Joint Sealant	LF	96
0764-6001	Drain Inlet Cleaning	EA	4

(1) For additional information and details, see "Concrete Structure Repair (Vertical & Overhead)" details sheet.



ABUTMENT
Abut #1 = 54 SY
Abut #5 = 54 SY

INTERIOR BENT
Bent #2 = 95 SY
Bent #3 = 95 SY
Bent #4 = 95 SY

CONCRETE SURFACE TREATMENT DETAIL

The caps shall be cleaned of debris or foreign materials before power washing and application of waterproofing treatment. Dumping removed materials onto the riprap is not allowed. Debris and materials removed from the caps shall be removed from the site.

NBI# 02-220-0-0014-15-331

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED PROFESSIONAL ENGINEER
12-20-2021

Fort Worth Bridge Design

MISCELLANEOUS BRIDGE REPAIRS

US 81/287 NB @ BNSF RR

	DN: MC	CK: CD	DW: KM/MC	CK: CD/MC
©TxDOT 12-06-21	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287
	DIST	COUNTY		SHEET NO.
	02	TARRANT		48

T:\BRIDGE\share\287bnsfRR.001415080\001415331.dgn

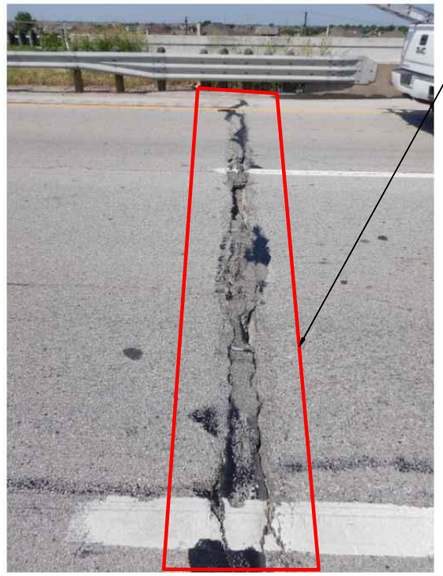


PHOTO 1

Showing Relief Joint at South End of Bridge

Header Type Exp Jt = 12 LF
Joint Sealant = 48 LF
(Photo 1& 2)

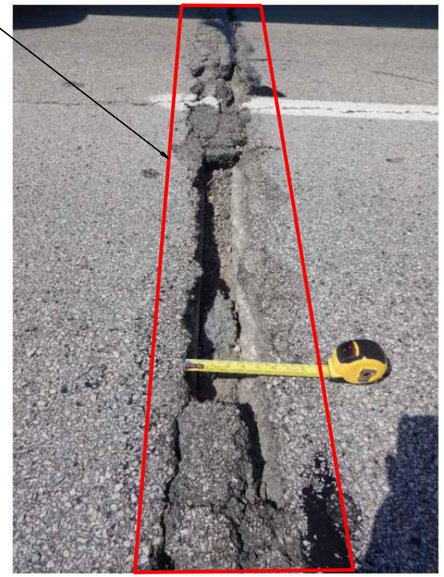


PHOTO 2

Showing Relief Joint at South End of Bridge

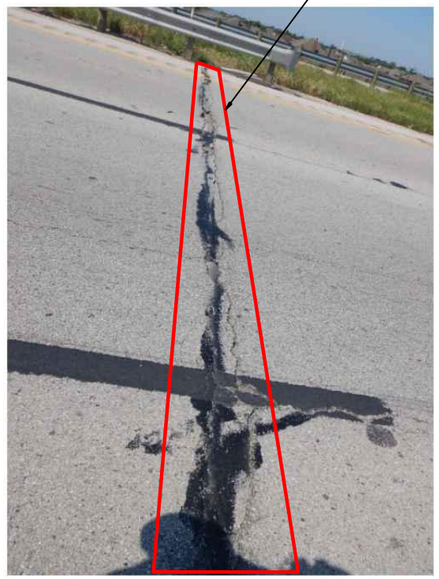


PHOTO 3

Showing Relief Joint at North End of Bridge

Header Type Exp Jt = 12 LF
Joint Sealant = 48 LF

Drain Inlet Cleaning
= 4 EA

PHOTO 4

Showing Drain Inlet
(4 Sets to be Cleaned)

T:\BRIDGE\share\287bnsfRR.001415080\.001415331.dgn

NBI# 02-220-0-0014-15-331

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED
PROFESSIONAL ENGINEER

Miguel Cortés

12-7-2021

Texas Department of Transportation

Fort Worth Bridge Design

MISCELLANEOUS BRIDGE REPAIRS

US 81/287 NB @ BNSF RR

		DN: MC	CK: CD	DW: GC/MC	CK: CD/MC
©TxDOT 12-06-21	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0014	15	080	US 287	
	DIST	COUNTY		SHEET NO.	
	02	TARRANT		49	

Concrete Str Repair
(Vertical & Overhead)
= 4 SF (Photos 5-7)

PHOTO 5

Showing Exterior Rail Spall at Bent #4

PHOTO 6

Showing Exterior Rail Spall at Bent #4

PHOTO 7

Showing Exterior Rail Spall at Bent #4

Flowable Backfill
= 5 CY

PHOTO 8

Showing Void at Northeast Corner at Wingwall

Concrete Str Repair
(Clean & Coat with Epoxy)
= 3 SF

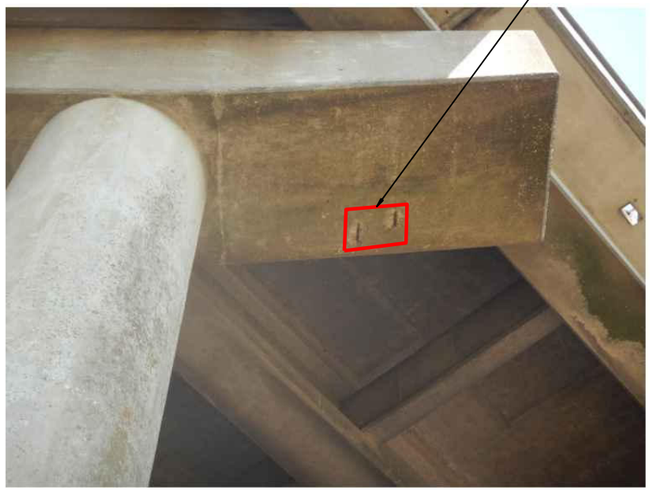


PHOTO 9

Showing Cap Spall at Bent #4
(North End of Cap)

T:\BRIDGE\share\287bnsfRR.001415080\.001415331.dgn

NBI# 02-220-0-0014-15-331

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED
PROFESSIONAL ENGINEER

Miguel Cortés

12-7-2021

Texas Department of Transportation

Fort Worth Bridge Design

MISCELLANEOUS BRIDGE REPAIRS

US 81/287 NB @ BNSF RR

DN: MC	CK: CD	DW: GC/MC	CK: CD/MC

CONT	SECT	JOB	HIGHWAY
0014	15	080	US 287

DIST	COUNTY	SHEET NO.
02	TARRANT	50

PHOTO 10

Showing Cap Spall at Bent #4

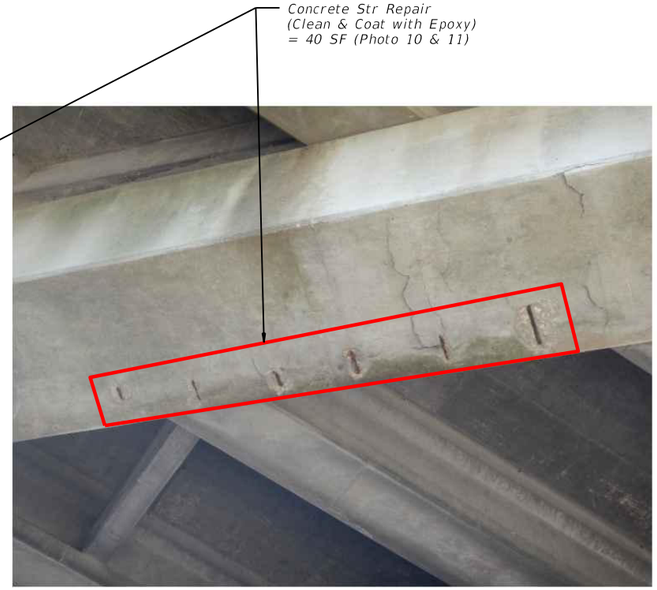


PHOTO 11

Showing Cap Spall at Bent #4

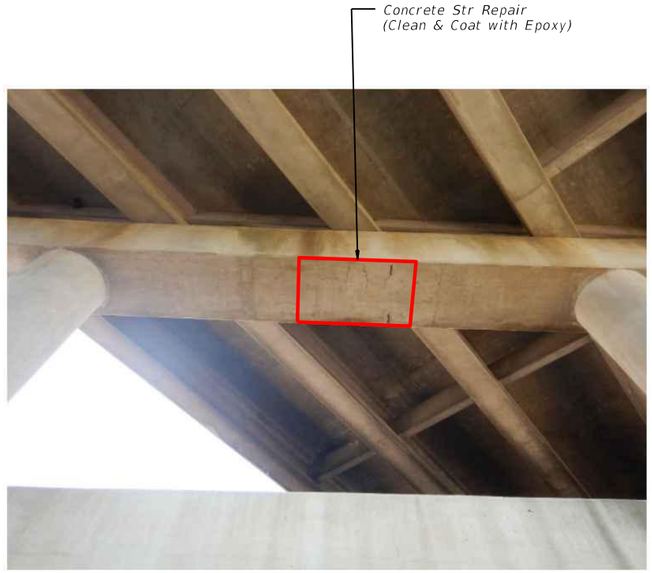


PHOTO 12

Showing Cap Spall at Bent #4

PHOTO 13

Showing Cap Spall at Bent #4

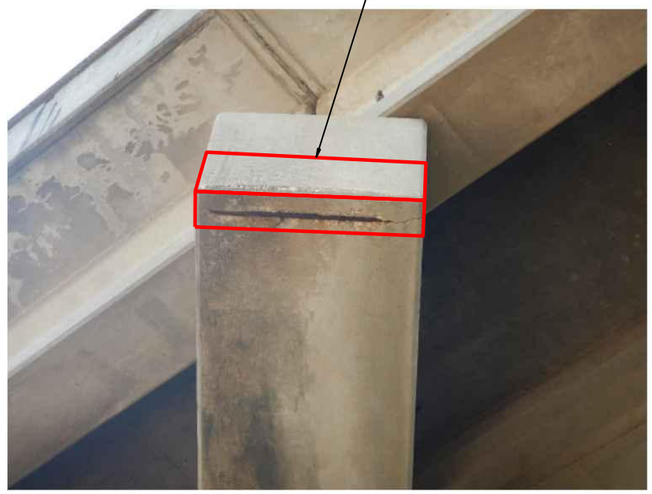


PHOTO 14

Showing Cap Spall at Bent #4
(South End of Cap)

T:\BRIDGE\share\287bnsfRR.001415080\.001415331.dgn

NBI# 02-220-0-0014-15-331

SHEET 4 OF 8

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED
PROFESSIONAL ENGINEER

Miguel Cortés

12-7-2021

Texas Department of Transportation

Fort Worth Bridge Design

MISCELLANEOUS BRIDGE REPAIRS

US 81/287 NB @ BNSF RR

		DN: MC	CK: CD	DW: GC/MC	CK: CD/MC	
©TxDOT	12-06-21	CONT	SECT	JOB	HIGHWAY	
		0014	15	080	US 287	
		DIST	COUNTY		SHEET NO.	
		02	TARRANT		51	

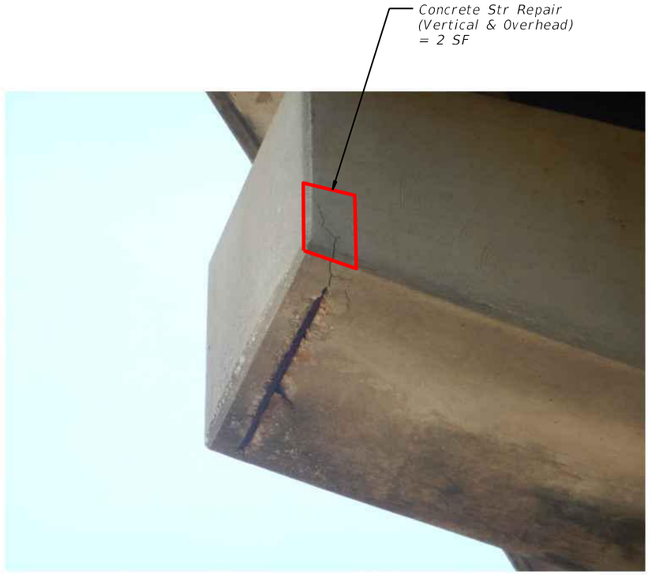


PHOTO 15

Showing Cap Spall at Bent #4
(South End of Cap)

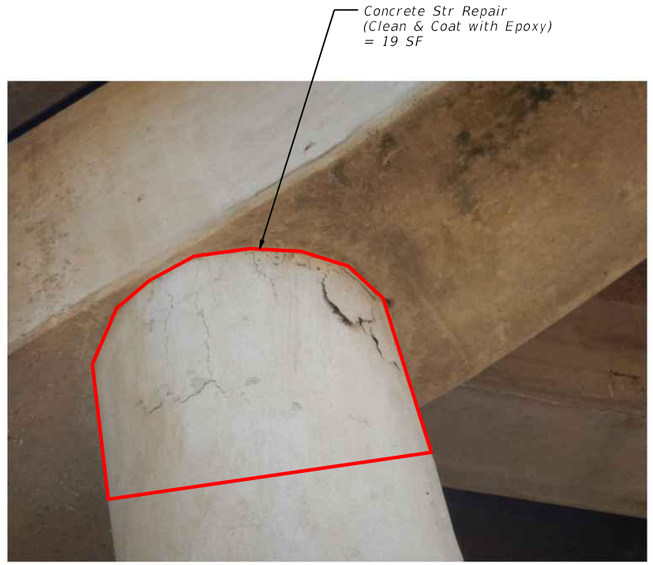


PHOTO 16

Showing Column Spall at Bent #3

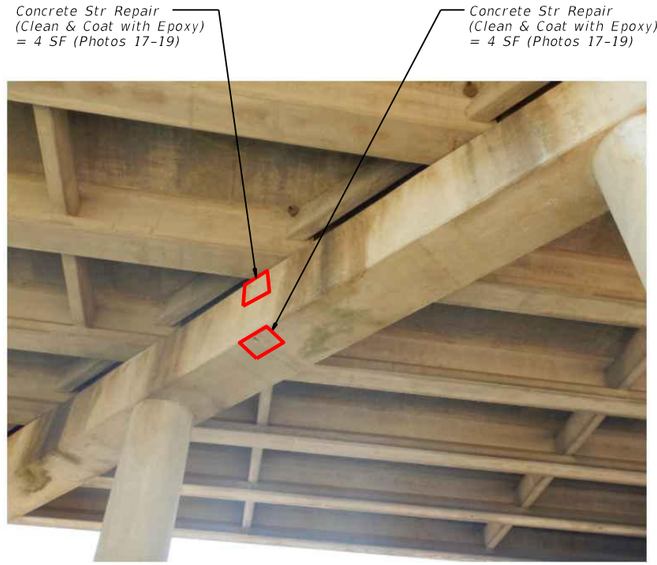


PHOTO 17

Showing Cap Spall at Bent #3

PHOTO 18

Showing Cap Spall at Bent #3

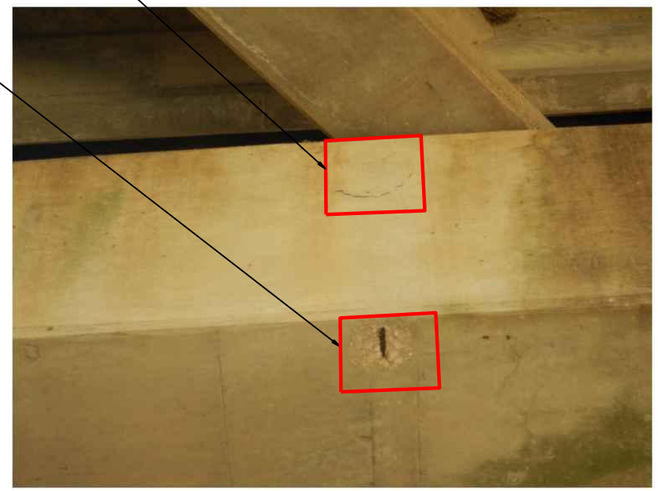


PHOTO 19

Showing Cap Spall at Bent #3

T:\BRIDGE\share\287bnsfRR.001415080\.001415331.dgn

NBI# 02-220-0-0014-15-331

SHEET 5 OF 8

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED
PROFESSIONAL ENGINEER

Miguel Cortés

12-7-2021

Texas Department of Transportation

Fort Worth Bridge Design

MISCELLANEOUS BRIDGE REPAIRS

US 81/287 NB @ BNSF RR

	DN: MC	CK: CD	DW: GC/MC	CK: CD/MC
©TxDOT 12-06-21	CONT	SECT	JOB	HIGHWAY
	0014	15	080	US 287
	DIST	COUNTY		SHEET NO.
	02	TARRANT		52

PHOTO 20

Showing Column Spall at Bent #2

PHOTO 21

Showing Cap Spall at Bent #2

PHOTO 22

Showing Cap Spall at Bent #2

PHOTO 23

Showing Cap Spall at Bent #2

PHOTO 24

Showing Cap Spall at Bent #2

T:\BRIDGE\share\287bnsfRR.001415080\.001415331.dgn

NBI# 02-220-0-0014-15-331

SHEET 6 OF 8

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED
PROFESSIONAL ENGINEER

Miguel Cortés

12-7-2021

Texas Department of Transportation

Fort Worth Bridge Design

MISCELLANEOUS BRIDGE REPAIRS

US 81/287 NB @ BNSF RR

	DN: MC	CK: CD	DW: GC/MC	CK: CD/MC	
©TxDOT 12-06-21	CONT	SECT	JOB	HIGHWAY	
	0014	15	080	US 287	
	DIST	COUNTY		SHEET NO.	
	02	TARRANT		53	

PHOTO 25

Showing Pier Cap Damage at Abutment #5

PHOTO 26

Showing Spall at Abutment #5
(End of Beam #5)

PHOTO 27

Showing Rail Damage
(Southwest Wingwall)

PHOTO 28

Showing Rail Damage
(Southwest Wingwall)

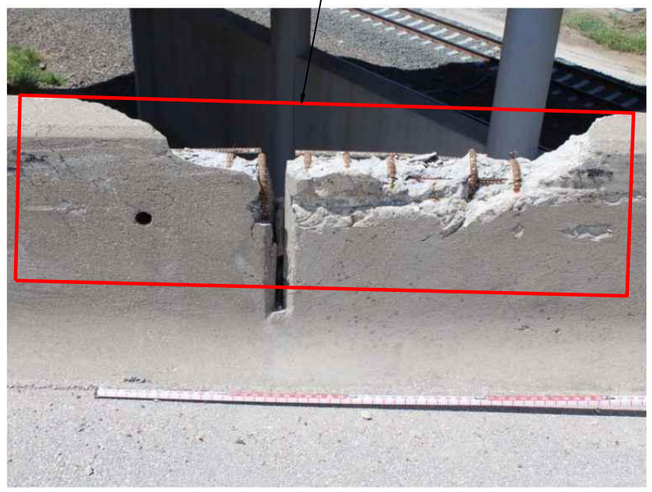


PHOTO 29

Showing Rail Damage
(Span #4)

NBI# 02-220-0-0014-15-331

SHEET 7 OF 8

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED
PROFESSIONAL ENGINEER

12-7-2021

Texas Department of Transportation

Fort Worth Bridge Design

MISCELLANEOUS BRIDGE REPAIRS

US 81/287 NB @ BNSF RR

	DN: MC	CK: CD	DW: GC/MC	CK: CD/MC
©TxDOT 12-06-21	CONT	SECT	JOB	HIGHWAY
	0014	15	080	US 287
	DIST	COUNTY		SHEET NO.
	02	TARRANT		54

T:\BRIDGE\share\287bnsfRR.001415080\.001415331.dgn

PHOTO 30

Showing Spall at Abutment #1
(West Corner of Backwall)

PHOTO 31

Showing Spall at Abutment #1
(West Corner of Backwall)

T:\BRIDGE\share\287bnsfRR.001415080\.001415331.dgn

NBI# 02-220-0-0014-15-331

SHEET 8 OF 8

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED PROFESSIONAL ENGINEER

Miguel Cortés

12-7-2021

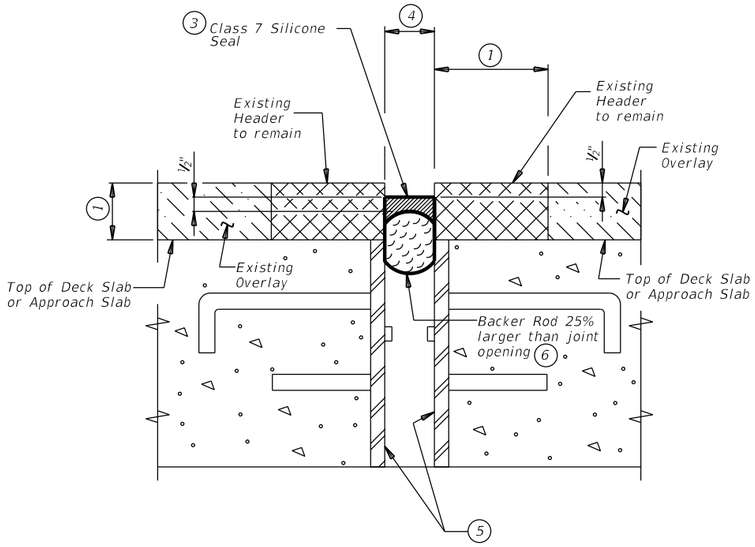
Texas Department of Transportation

Fort Worth Bridge Design

MISCELLANEOUS BRIDGE REPAIRS

US 81/287 NB @ BNSF RR

	DN: MC	CK: CD	DW: GC/MC	CK: CD/MC
©TxDOT 12-06-21	CONT	SECT	JOB	HIGHWAY
	0014	15	080	US 287
	DIST	COUNTY		SHEET NO.
	02	TARRANT		55



PROPOSED ARMOR JOINT

Notes:

Clean and seal joint in accordance with Item 438, "Cleaning & Sealing Existing Joint" (Class 7).

Measurement and payment shall be in accordance with Item 438, "Cleaning & Sealing Joints (Class 7".

Notify Engineer Of Record if existing condition does not match detail during repair. The sealant shall be "Class 7", per DMS-6310, "Joint Sealants and Fillers".

(1) Existing Header (Polymer Concrete) shall remain in place. If it's damaged during repairs, notify EOR. Repairs will be at the Contractor's expense.

(2) Remove existing ACP overlay where existing ACP is damaged adjacent to joint.

(3) Extend sealant up into rail or curb 3" on low side or sides of deck. Prepare surfaces where sealant is to be placed in accordance with manufacturer's specifications.

(4) Joint opening shall match existing.

(5) Clean and prepare existing armor joint faces as required by material supplier's specifications and Item 438.

(6) Set top of backer rod 1" below top of proposed header. 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.

SHEET 1 OF 1

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED PROFESSIONAL ENGINEER
Miguel Cortés
12-7-2021

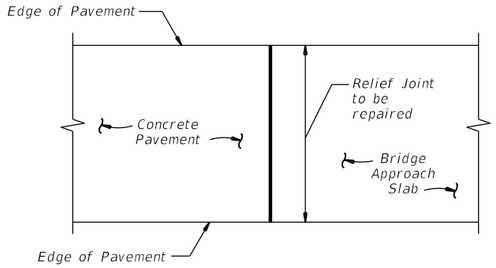
Texas Department of Transportation

Fort Worth Bridge Design

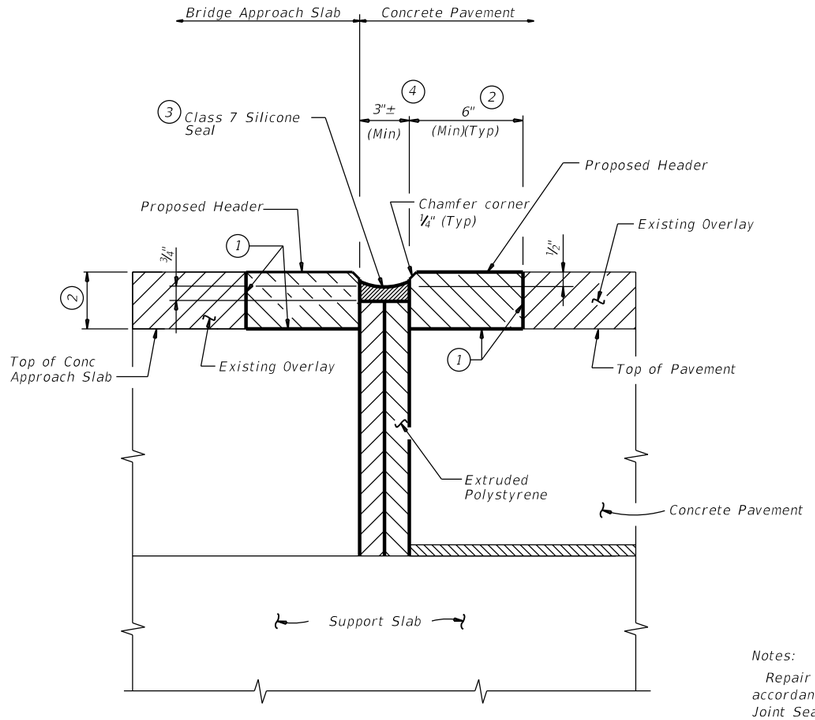
ARMOR JOINT DETAILS

	DN: MC	CK: CD	DW: GC/MC	CK: CD/MC
©TxDOT 12-06-21	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 81/287
	DIST	COUNTY		SHEET NO.
	02	TARRANT		56

T:\BRIDGE\share\287bnsfRR.001415080\Joint & Conc Details\Armor Joint.dgn



PLAN ~ SHOWING JOINT WITHOUT ASPHALT SHOULDER



SECTION THRU RELIEF JOINT

APPROACH SLAB RELIEF JOINT DETAIL

1. Surface where nosing/header material is to be placed shall be clean and dry in accordance with the manufacturer's specifications.
2. The thickness of the header shall match the thickness of the overlay. The thickness of the overlay is assumed to be 2". There will be no additional compensation for thickness in excess of 2". If the thickness of the overlay is not 2", the width of the header material shall be 2X the thickness of the existing overlay or 6", whichever is greater. Header Type Expansion Joint (Polymer Concrete) Material was calculated based on an average depth of 3" thickness HMAC.
3. Prepare surfaces where sealant is to be placed in accordance with manufacturer's specfications.
4. Field verify existing width of open joint (concrete to concrete).

Notes:

Repair and/or reseal bridge approach slab relief joints in accordance with Item 454, "Header Type Expansion Joint & Joint Sealant".
The purpose is to prevent the reinforced concrete pavement from pushing against the approach slab and prevent future damage to the bridge abutment backwall. Additionally, resetting and repairing relief joint will prevent further water infiltration into the approach backfill, preventing further erosion of soils.

If the minimum width of the joint is 1 ½" or more, reseal the joint as shown on the plans.

Both surfaces of the joint shall be thoroughly cleaned by sand blasting and airblasting, leaving a clean, newly exposed concrete surface. Fill the depth of the joint with extruded polystyrene to the width of the joint.

Cleaning and Sealing the Relief Joints shall conform with Item 438, but measurement and payment shall be subsidiary to Item 454. Extruded Polystyrene shall conform to Item 422, "Concrete Superstructures". (A minimum compressive strength of 25 psi is acceptable).

Prior to applying Class 7 Sealant, contractor shall fill all voids on top surface of extruded polystyrene with Class 4 Sealant, per DMS-6310, "Joint Sealants and Fillers".

Measurement and payment for placing new Header (Polymer Concrete) and Extruded Polystyrene material, shall be in accordance with Item 454 and shall be paid for by the cubic foot.

SHEET 1 OF 1

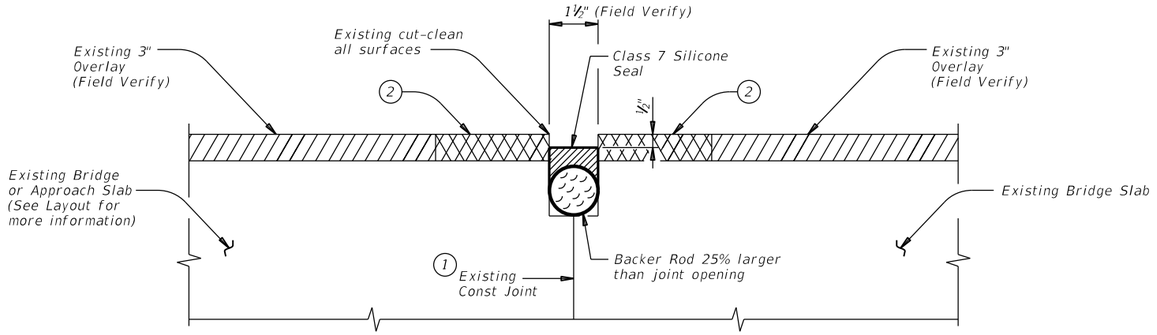
STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED PROFESSIONAL ENGINEER
Miguel Cortés
12-20-2021

Texas Department of Transportation
Fort Worth Bridge Design

RELIEF JOINT DETAILS

	DN: MC	CK: CD	DW: GC/MC	CK: CD/MC
©TxDOT 12-06-21 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0014	15	080	US 81/287
	DIST	COUNTY		SHEET NO.
	02	TARRANT		57

T:\BRIDGE\share\287bnsfRR.001415080\Joint & Conc Details\Relief Joint.dgn



EXISTING CONSTRUCTION JOINT WITH SEAL COAT

Notes:

Measurement and Payment shall be in accordance with Item 438, "Cleaning & Sealing Existing Joints (Class 7)", and shall be paid for by the linear foot.

Clean and seal existing joints at locations shown on plan sheets in accordance with Item 438, "Cleaning & Sealing Existing Joints (Class 7)".

(1) Contractor will verify actual joint condition and bridge configuration prior to beginning work. The entire length of existing joint will be evaluated, and any portion determined to be unsound by the Engineer will be removed prior to placement of any backer rod. Existing seal, if applicable, will be removed and disposed of.

(2) Existing Header Polymer Concrete to remain in place. If it's damaged during the cleaning and sealing operation, notify the EOR.

SHEET 1 OF 1

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED
PROFESSIONAL ENGINEER

Miguel Cortés

12-7-2021

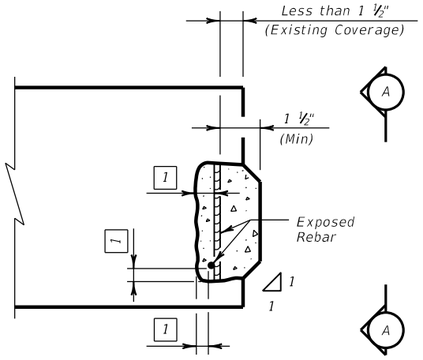
Texas Department of Transportation

Fort Worth Bridge Design

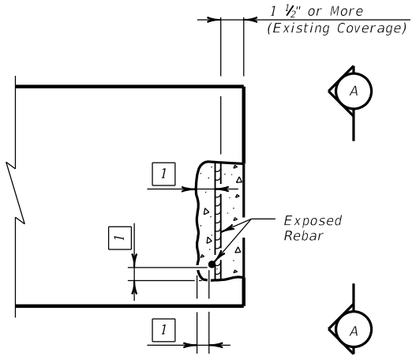
CONSTRUCTION JOINT DETAILS

	DN: MC	CK: CD	DW: GC/MC	CK: CD/MC
©TxDOT 12-06-21	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 81/287
	DIST	COUNTY		SHEET NO.
	02	TARRANT		58

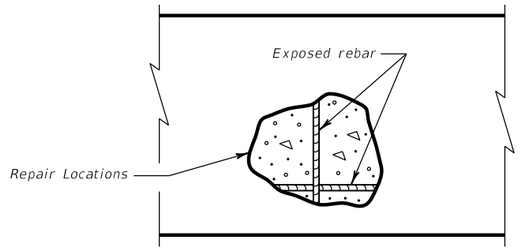
T:\BRIDGE\share\287bnsfRR.001415080\Joint & Conc Details\Const Joint Details.dgn



REPAIR AREAS WHERE EXISTING COVER IS LESS THAN 1 ½"



REPAIR AREAS WHERE EXISTING COVER IS 1 ½" OR MORE



VIEW A-A

THRU SECTION

TYPICAL CONCRETE STRUCTURE REPAIR DETAILS

1 Provide ¾" clearance or 1.5 times the largest sized aggregate in the repair material, whichever is greater, between the steel and surrounding concrete to permit adequate flow of the repair material. Perform repairs conforming to Item 429, "Concrete Structure Repair" and "Concrete Repair Manual".

SHEET 1 OF 1

STATE OF TEXAS
MIGUEL CORTES
121930
LICENSED
PROFESSIONAL ENGINEER
Miguel Cortés
12-7-2021

Texas Department of Transportation

Fort Worth Bridge Design

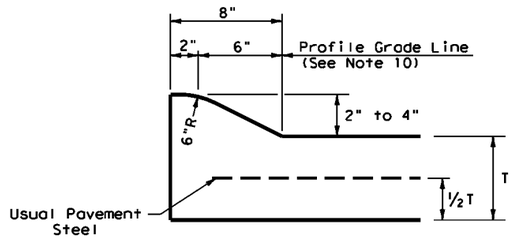
CONCRETE STRUCTURAL REPAIRS

(VERTICAL & OVERHEAD)

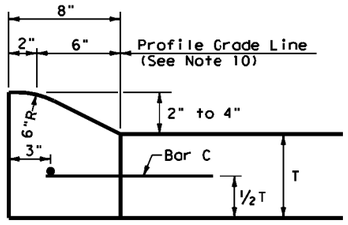
	DN: MC	CK: CD	DW: GC/MC	CK: CD/MC
©TxDOT 12-06-21	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 81/287
	DIST	COUNTY		SHEET NO.
	02	TARRANT		59

T:\BRIDGE\share\287bnsfRR.001415080\Joint & Conc Details\Conc Struct Repair.dgn

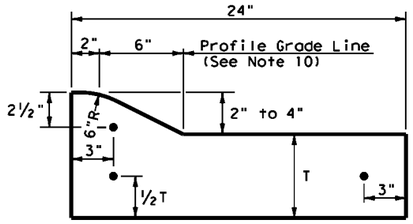
DATE:
FILE:



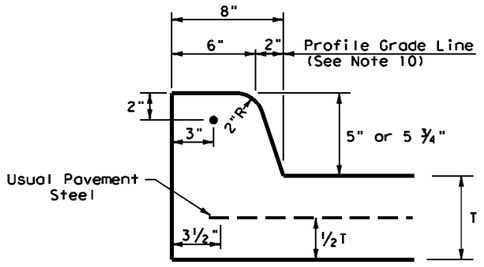
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



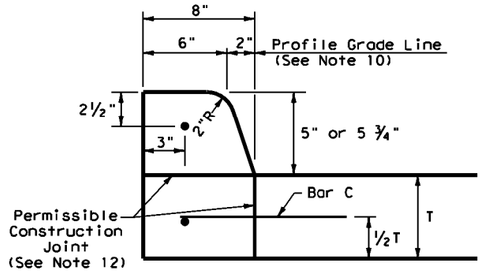
TYPE I CURB
2" - 4" HEIGHT



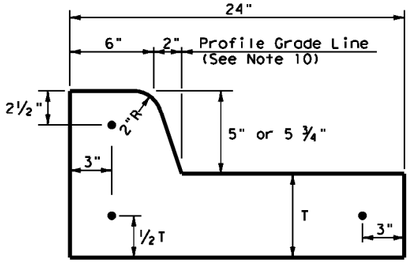
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



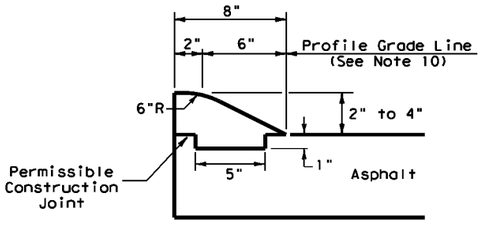
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



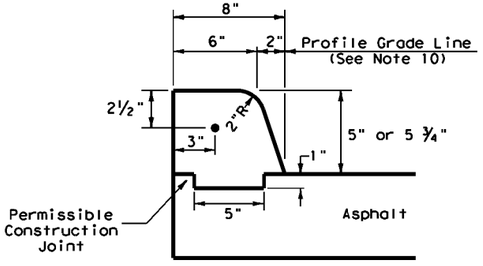
TYPE II CURB
5" - 5 ¾" HEIGHT



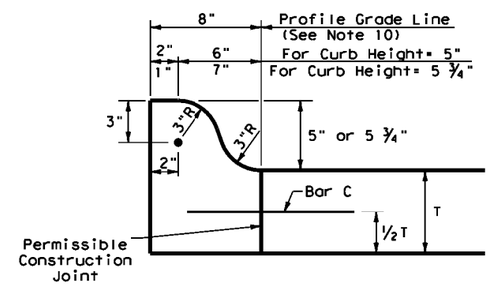
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



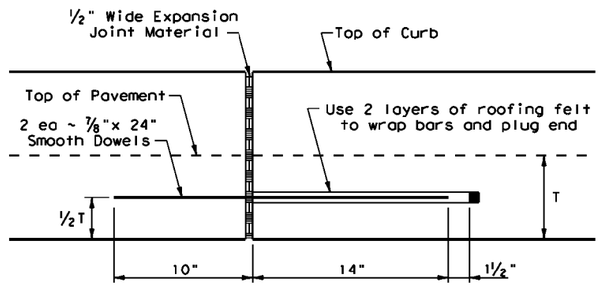
TYPE III CURB (KEYED)
2" - 4" HEIGHT



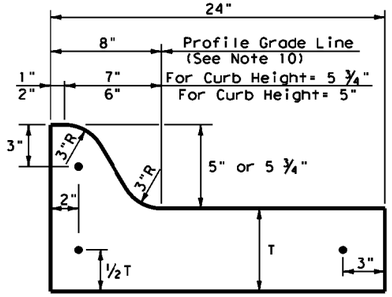
TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



TYPE IIa CURB
5" - 5 ¾" HEIGHT

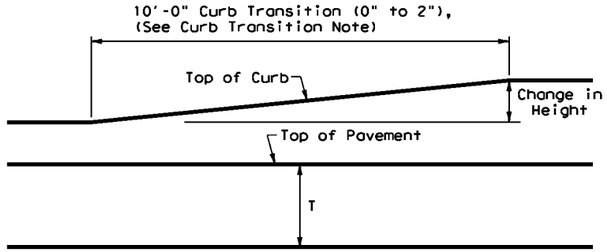


EXPANSION JOINT DETAIL



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

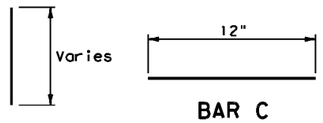
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

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



BAR B

BAR C

Texas Department of Transportation

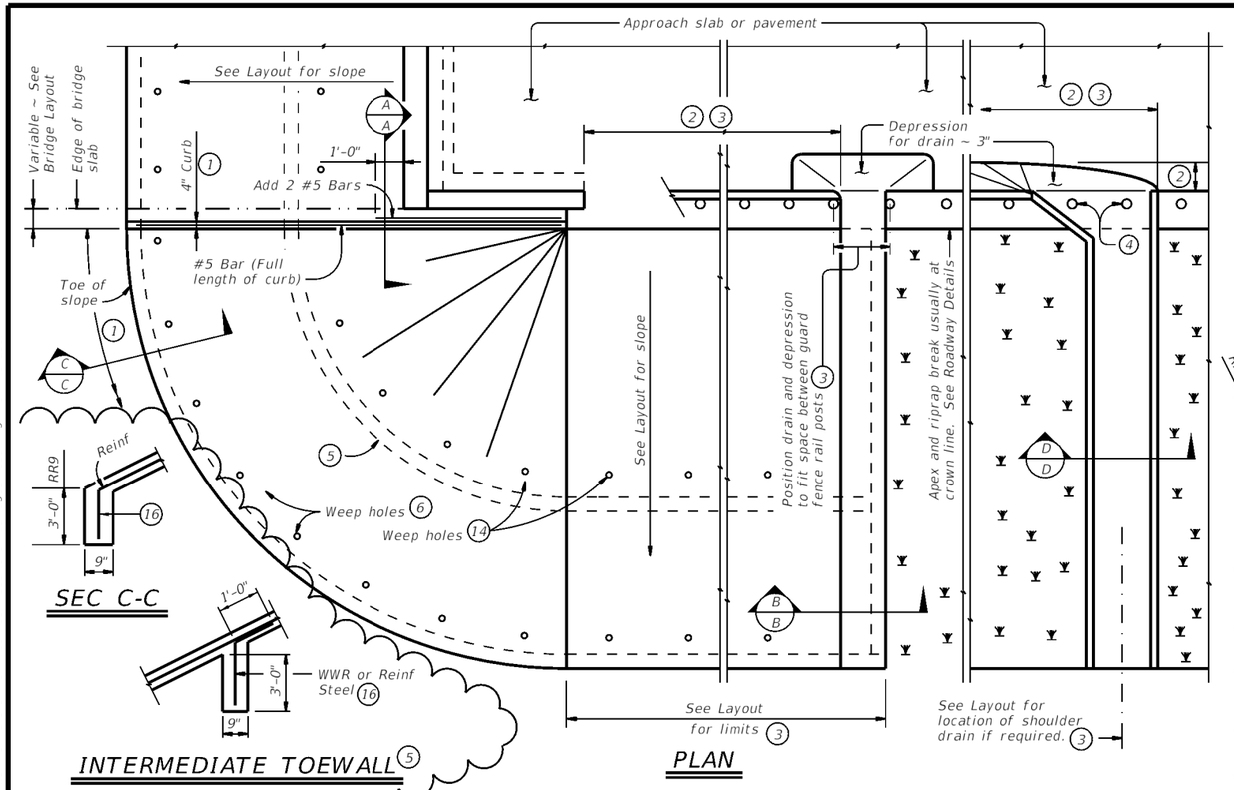
Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

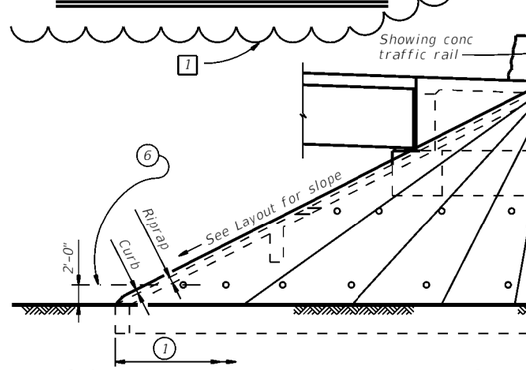
CCCG-21

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: SS	CK: KM
© TxDOT: FEBRUARY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 81/287
	DIST	COUNTY		SHEET NO.
	FTW	Tarrant		60

DATE:
FILE:



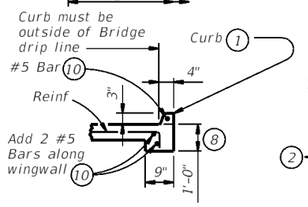
PLAN



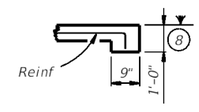
SEC C-C

INTERMEDIATE TOEWALL

ELEVATION

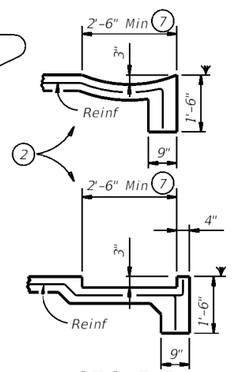


SEC A-A



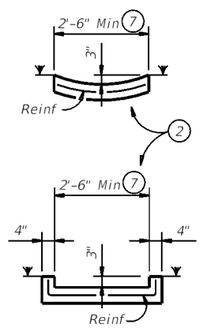
SEC B-B

(No drain)



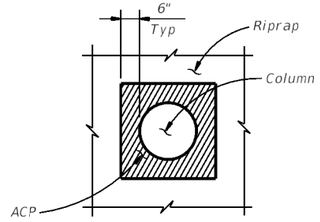
SEC B-B

(Shoulder drain integral with riprap)



SEC D-D

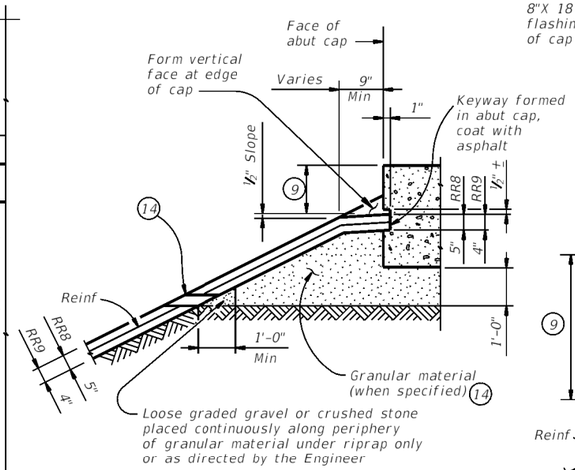
(Shoulder drain)



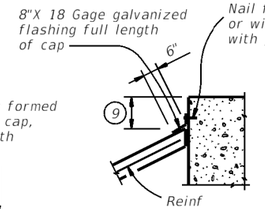
Riprap blockout to be filled with ACP. (Subsidiary to riprap)

RIPRAP DETAIL AT COLUMNS

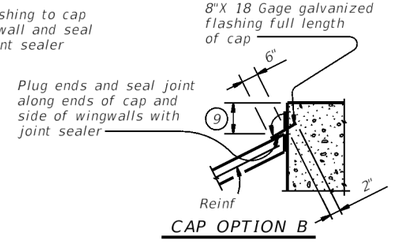
(As directed by the Engineer)



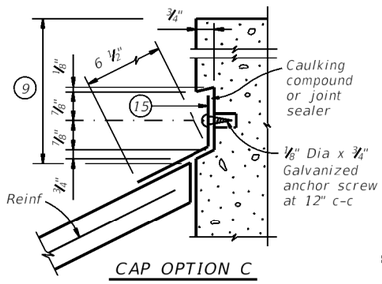
SHOWING KEYWAY OPTION



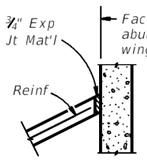
CAP OPTION A



CAP OPTION B



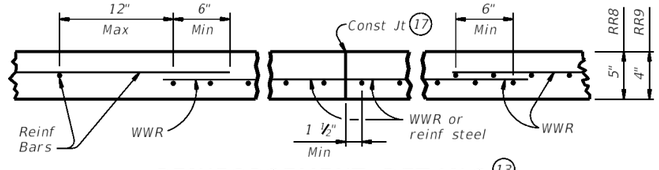
CAP OPTION C



SECT THRU RIPRAP AT WINGWALL (12)

SECTIONS THRU RIPRAP AT CAP (11)

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



REINFORCEMENT DETAILS (13)

See General Notes for optional synthetic fiber reinforcement.

GENERAL NOTES:

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

Provide Grade 60 reinforcing steel.

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

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

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

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

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

See Layout for limits of riprap.

RR8 is to be used on stream crossings.

RR9 is to be used on other embankments.

[1] Modified toe wall details

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

STATE OF TEXAS
CHUN HO LEE
124680
LICENSED
PROFESSIONAL ENGINEER

12/07/2021

Texas Department of Transportation

Bridge Division Standard

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

CRR (MOD)

FILE: crrstde1-19 (MOD).dgn	DN: AB	CK: CHL	DW: AB	CK: RLE
©TxDOT December 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 81/287
	DIST	COUNTY		SHEET NO.
	FTW	Tarrant		61

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

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

DOT #: 020-544C
Crossing Type:** RR UNDER CROSSINGS
RR Company Owning Track at Crossing: BNSF
Operating RR Company at Track: BNSF
RR MP: 358.670
RR Subdivision: FORT WORTH SUBDIVISION
City: FORT WORTH
County: TARRANT
CSJ at this Crossing: 0014-15-080
Highway/Roadway name crossing the railroad: US 81
# of regularly scheduled trains per day at this crossing: 39
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: 75.0%

Scope of Work at this Crossing to Be Performed by State Contractor:
Slope protection work at abutment 5 for SB and NB bridges at junction of US81/287 and BNSF Mains. Job to consist of removal of existing riprap, replace with new riprap, temporary special shoring and flowable backfill.

Scope of Work at this Crossing to Be Performed by Railroad Company:
None

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

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

None

III. FLAGGING & INSPECTION

of Days of Railroad Flagging Expected: 69

On this project, night or weekend flagging is:

☐ Expected
☒ Not Expected

Flagging services will be provided by:

☐ Railroad Company: TxDOT will pay flagging invoices
☒ Outside Party: Contractor will pay flagging invoices, to be reimbursed by TxDOT

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

Contact Information for Flagging:

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

☐ OTHERS _____

Contractor must incorporate Construction Inspection into anticipated construction schedule.

☒ Not Required
☐ Required: Contact Information for Construction Inspection:

IV. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

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

☐ Required
☒ Not Required

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

V. RAILROAD INSURANCE REQUIREMENTS

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

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

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

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

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

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

On this project, an ROE agreement is:

☐ Not Required
☐ Required: TxDOT CST to assist in obtaining with the UPRR (see Item 5, Article 8.3)
☒ Required: Contractor to obtain (see Item 5, Article 8.4)
With the following railroad companies: BNSF

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

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

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

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

VII. RAILROAD COORDINATION MEETING

On this project, a Railroad Coordination Meeting is:

☒ Not Required
☐ Required

See Item 5, Article 8.1 for more details.

VIII. SUBCONTRACTORS

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

IX. EMERGENCY NOTIFICATION

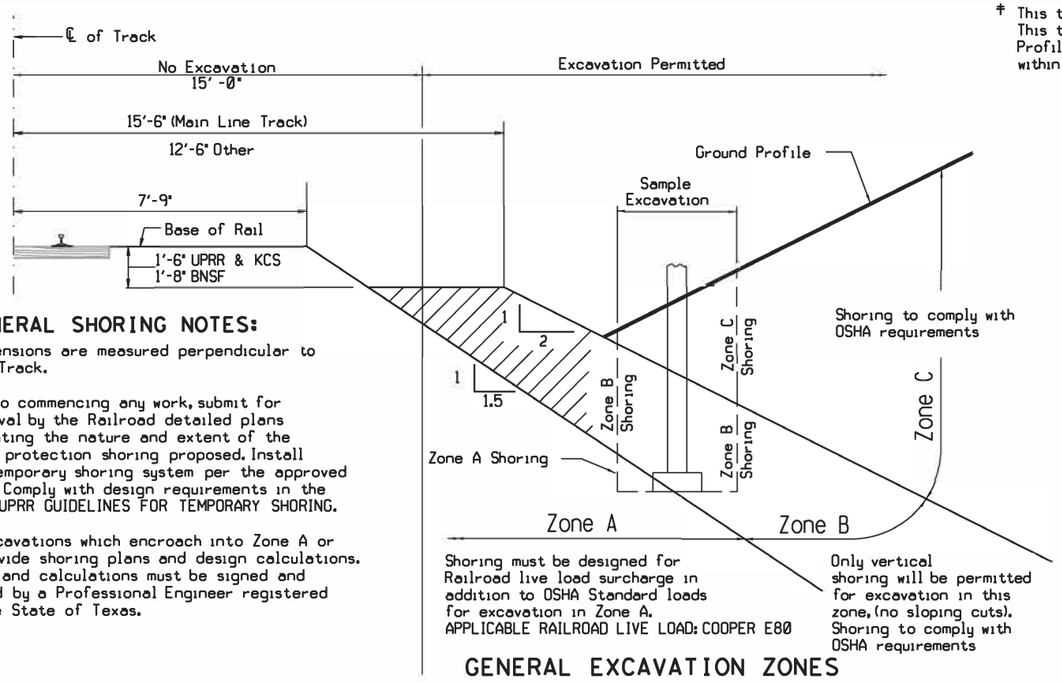
In Case of Railroad Emergency
Call BNSF Railroad Emergency Line
at 1(800)832-5452
Location: DOT# 020-544C
RR Milepost 358.670, Fort Worth Sub.

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 3/2020	0014	15	080	US 81
	DIST	COUNTY		SHEET NO.
	2	TARRANT		62



GENERAL EXCAVATION ZONES

GENERAL SHORING NOTES:

1. All dimensions are measured perpendicular to ℄ of Track.
2. Prior to commencing any work, submit for approval by the Railroad detailed plans indicating the nature and extent of the track protection shoring proposed. Install the temporary shoring system per the approved plans. Comply with design requirements in the BNSF/UPRR GUIDELINES FOR TEMPORARY SHORING.
3. For excavations which encroach into Zone A or B, provide shoring plans and design calculations. Plans and calculations must be signed and sealed by a Professional Engineer registered in the State of Texas.

GENERAL SHORING REQUIREMENTS ‡

RAILROAD GENERAL NOTES:

1. Railroad review and approval of shoring, erection, demolition, and falsework is required. Allow a minimum of four weeks for the review and approval of each submittal.
2. The proposed grade separation project shall not increase the quantity and/or characteristics of the flow in the Railroad's ditches and/or drainage structures. In the rare event that a grade separation project will increase the quantity and/or characteristics of flow in such elements, such a design must be reviewed and approved by the Railroad.
3. Verify the elevation of the existing top-of-rail profile before beginning construction. Bring all discrepancies to the attention of the Railroad prior to construction.
4. Submit a proposed method of erosion and sediment control for approval by the Railroad.
5. Design and construct all shoring systems that impact the Railroad's operations and/or support the Railroad's embankment per current Railroad Guidelines for Temporary Shoring.
6. Comply with Railroad Demolition Guidelines for all demolitions within the Railroad's right of way and/or demolition that may impact the Railroad's tracks or operations.
7. Design erection methods over the Railroad's right of way to cause no interruption to the Railroad's operation, enabling the track(s) to remain open to traffic per the Railroad's requirements. Coordinate construction work windows with the Railroad's Designated Representative.
8. Design all construction phasing that may impact the Railroad operations to cause no interruption to the Railroad's operations, enabling the track(s) to remain open to traffic per the Railroad's requirements. Coordinate construction work windows with the Railroad's Designated Representative.
9. Comply with minimum construction clearances for falsework outlined in the Railroad's Guidelines.
10. Verify all permanent clearances before project closing.
11. For Railroad coordination please refer to Sheets 2 and 3 and the TxDOT Standard Specifications.

For shoring/excavations in Zone A or B, TxDOT requires a predesigned and approved shoring design in the PS&E. If this is the case no Contractor submittal is required.

‡ This table is primarily required for overpass projects. This table is not required for underpass projects if the provided Plan and Profile sheets indicate this information at a minimum of every 100 ft and within bounds including 1500 ft before and after the limits of trackwork.

TABLE OF TOP OF RAIL PROFILE ‡

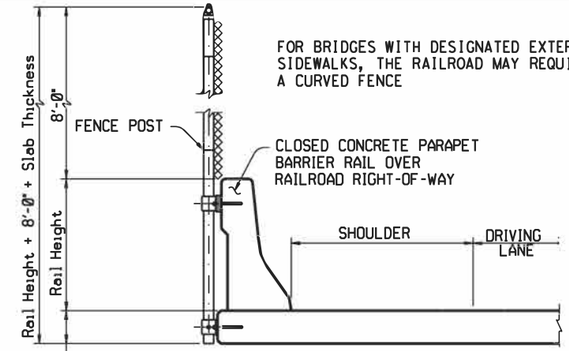
(STATIONS INCREASE WITH MILEPOST INCREASE)

	MAIN LINE			
	ALIGNMENT: LEFT RAIL 100' STATIONS	ELEVATION	ALIGNMENT: RIGHT RAIL 100' STATIONS	ELEVATION
1000' PRIOR TO PROJECT	0+00	DATA FLD	0+00	DATA FLD
	1+00	DATA FLD	1+00	DATA FLD
	2+00	DATA FLD	2+00	DATA FLD
	3+00	DATA FLD	3+00	DATA FLD
	4+00	DATA FLD	4+00	DATA FLD
	5+00	DATA FLD	5+00	DATA FLD
	6+00	DATA FLD	6+00	DATA FLD
	7+00	DATA FLD	7+00	DATA FLD
	8+00	DATA FLD	8+00	DATA FLD
	9+00	DATA FLD	9+00	DATA FLD
WITHIN PROJECT	0+00	DATA FLD	0+00	DATA FLD
	0+00	DATA FLD	0+00	DATA FLD
	0+00	DATA FLD	0+00	DATA FLD
	0+00	DATA FLD	0+00	DATA FLD
	0+00	DATA FLD	0+00	DATA FLD
	0+00	DATA FLD	0+00	DATA FLD
	0+00	DATA FLD	0+00	DATA FLD
	0+00	DATA FLD	0+00	DATA FLD
	0+00	DATA FLD	0+00	DATA FLD
	0+00	DATA FLD	0+00	DATA FLD
1000' AFTER PROJECT	■ 10+00	DATA FLD	■ 10+00	DATA FLD
	11+00	DATA FLD	11+00	DATA FLD
	12+00	DATA FLD	12+00	DATA FLD
	13+00	DATA FLD	13+00	DATA FLD
	14+00	DATA FLD	14+00	DATA FLD
	15+00	DATA FLD	15+00	DATA FLD
	16+00	DATA FLD	16+00	DATA FLD
	17+00	DATA FLD	17+00	DATA FLD
	18+00	DATA FLD	18+00	DATA FLD
	19+00	DATA FLD	19+00	DATA FLD
	20+00	DATA FLD	20+00	DATA FLD

■ ± EXISTING TRACK STA. 10+00
= ± CONSTRUCTION STA. XX+XX

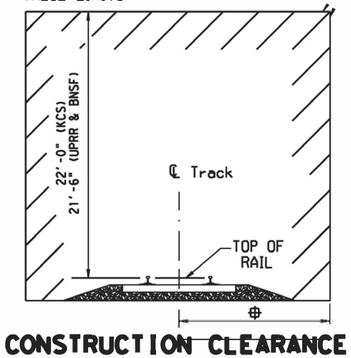
FOR THE FOLLOWING INFORMATION PLEASE REFER TO THE PLAN AND ELEVATION DRAWINGS OF THE BRIDGE PLANS. THE PLAN AND ELEVATION DRAWINGS SHALL SHOW ALL REQUIRED INFORMATION PER BNSF/UPRR GUIDELINES FOR RAILROAD GRADE SEPARATION PROJECT PLAN NO. 711100 SHEET 2.

1. Centerline of bridge and/or centerline of project.
2. Track layout and limits of Railroad right of way with respect to centerline of main lines.
3. Future tracks, access roadways and existing tracks as main line, siding, spur, etc.
4. Point of minumum vertical clearance and distance, Measured perpendicular, from the centerline of nearest track.
5. Horizontal clearance at right angle from centerline of nearest existing or future track to the face of obstruction such as substructure above grade.
6. Horizontal clearance at right angle from centerline of nearest existing or future track to the face of nearest foundation below grade.
7. Horizontal spacing at right angle between centerlines of existing and/or future tracks.
8. Limits of shoring and minimum distance at right angle from centerline of nearest track.
9. All existing facilities and utilities and their proposed relocation, if required.
10. Toe of riprap or earth slope and/or limits of retaining wall.
11. Existing and proposed contours. (not required if the existing groundlines or drainage characteristics in Railroad ROW will not be altered).
12. Railroad Milepost and direction of increasing Milepost.
13. Direction of flow for all drainage systems within project limits.
14. Limits of barrier rail and fence with respect to centerline of track.
15. Depth of foundation below bottom of tie. (for footings only)
16. Top and bottom of pier protection wall elevation relative to top of rail elevation.
17. Controlling dimensions of drainage ditches and/or drainage structures.
18. Top of rail elevations for all tracks.
19. Minimum permanent vertical clearance above top of high rail to the lowest point under the bridge.
20. Existing and proposed groundline & roadway profile.
21. Type of riprap slope paving.
22. Location of deck drains.
23. Total width of superstructure.
24. Width of shoulder and/or sidewalk.



TYPICAL FENCE ON BARRIER DETAIL

ONLY REQUIRED ON OVERPASSES IF SHOWN ON BRIDGE LAYOUT. (AREAS WITH PEDESTRIANS ON BRIDGE, RAIL YARDS, OR HISTORY OF VANDALISM)



MINIMUM CONSTRUCTION CLEARANCE ENVELOPE

(NORMAL TO RAILROAD)
15'-0" (UPRR), (BNSF) and 14'-0" (KCS)

GENERAL NOTES:

Design and Construction for Railroad Projects shall be in accordance with the AREMA Manual for Railway Engineering and BNSF/UPRR Guidelines for Railroad Grade Separation Projects or Kansas City Southern Guidelines for the Design and Construction of Overpasses and Underpasses, or DART Light Rail Project Design Criteria Manual, and the TxDOT Standard Specifications for Construction and Maintenance of Highways, Streets and Bridges AS APPLICABLE TO THE RAILROAD COMPANY INVOLVED.

See BNSF/UPRR Guidelines for Grade Seperation Projects Plan No. 711100 and TxDOT Railroad Fence Details Sheet for additional information. A curved top fence extending 8'-0" above top of sidewalk is acceptable only where there is a traffic rail between roadway and sidewalk.

See Kansas City Southern Guidelines for the Design and Construction of Overpasses and Underpasses for corresponding BNSF/UPRR sheets referenced.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR BRIDGE CONSTRUCTION

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0014	15	080	US287/81
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		63

DATE:
FILE:

RAILROAD REQUIREMENTS FOR BRIDGE CONSTRUCTION.dgn

PART 1 - GENERAL

1.01 DESCRIPTION

This project includes construction work within the right of way and/or properties of the Railroad Company 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's website or by contacting the Railroad Designated Representative.

PART 3 - CONSTRUCTION

3.01 GENERAL

A. Perform all work in compliance with all applicable Railroad, FRA (Federal Railway Administration) 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's 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's 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.

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's 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. A railroad flag person 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 3.18 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's course "Orientation for Contractor's Safety", and maintain current registration prior to working on the Railroad's 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 each Railroad's 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' - 0" (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 until 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 FOR BRIDGE CONSTRUCTION

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0014	15	080	US 287/81
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		64

DATE:
FILE:

RAILROAD REQUIREMENTS FOR BRIDGE CONSTRUCTION.dgn

3.09 CONSTRUCTION AND AS-BUILT SUBMITTALS

A. Provide TxDOT submittals for construction materials and procedures as outlined below and indicated in TxDOT Standard Specifications. A summary of most TxDOT submittal requirements can be found at: www.dot.state.tx.us/publications/bridge/items reviewed.pdf

B. The tables below provide the Railroad's minimum submittal requirements for the construction items noted. Submittal requirements are in addition to those specified elsewhere in these bid documents. The review times indicated below represent the total time, including the Railroad's required four (4) weeks.

C. TxDOT will forward relevant submittals to the Railroad Manager of Industry and Public Projects unless otherwise directed by the Railroad. TxDOT and the Engineer of Record will review and include comments prior to forwarding to the Railroad. Submit items in Table 1 for both railroad overpass and underpass projects, as applicable. Submit items in Table 2 for railroad underpass projects only.

TABLE 1 - RAILROAD SUBMITTAL REQUIREMENTS FOR OVERPASS & UNDERPASS PROJECTS

ITEM	DESCRIPTION	SETS	REVIEW TIME
1	Shoring design and details	6	6 weeks
2	Falsework design and details	6	6 weeks
3	Drainage design provisions	6	6 weeks
4	Erection diagrams and sequence	6	6 weeks
5	Demolition diagram and sequence	6	6 weeks

TABLE 2 - RAILROAD SUBMITTAL REQUIREMENTS FOR UNDERPASS PROJECTS

ITEM	DESCRIPTION	SETS	NOTES	REVIEW TIME
1	Shop drawings	6	Steel and Concrete members	6 weeks
2	Bearings	6	For all structures	6 weeks
3	Concrete Mix Designs	6	For all structures	6 weeks
4	Rebar & Strand certifications	6	For superstructure only	6 weeks
5	28 day concrete strength	6	For superstructure only	6 weeks
6	Waterproofing material certifications and installation procedure	6	Waterproofing & protective boards	6 weeks
7	Structural steel certifications	6	All fracture critical members & other members requiring improved notch toughness	6 weeks
8	Fabrication and Test reports	6	All fracture critical members & other members requiring improved notch toughness	6 weeks
9	Welding Procedures and Welder Certification	6	AWS requirements	6 weeks
10	Foundation Construction Reports or Notes	6	Pile driving, drilled shaft construction, bearing pressure test reports for spread footings	6 weeks
11	Compaction testing reports for backfill at abutments	6	Must meet 95% maximum dry density, Modified Procter ASTM D1557	6 weeks

D. TxDOT shall submit As-Built Records to the Railroad when TxDOT has processed the final project plans. These records shall consist of the following items:

Overpass Projects

1. Electronic files of all structure design drawings with as constructed modifications shown, in Microstation J or Acrobat .PDF format.
2. Hard copies of all structure design drawings with as constructed modifications shown.

Underpass Projects

1. Electronic files of all structure design drawings with as constructed modifications shown, in Microstation J or Acrobat .PDF format.
2. Hard copies of all structure design drawings with as constructed modifications shown.
3. Final approved copies of shop drawings for concrete and steel members.
4. Foundation Construction Reports
5. Compaction testing reports for backfill at abutments

3.10 APPROVAL OF DETAILS

Submit details of the construction affecting Railroad's tracks and property not already included in the Contract Plans to the Railroad Designated Representative through TxDOT for the Railroad's review and written approval before such work is undertaken. Allow a total six (6) weeks for review and approval of these submittals, which includes the Railroad's four (4) week review time.

3.11 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 Contractor'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.

3.12 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.

3.13 RAILROAD REPRESENTATIVES

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad, at expense of TxDOT, to protect Railroad's 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's 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.

3.14 WALKWAYS REQUIRED

Maintain along the outer side of each exterior track of multiple operated track, and on each side of single operated track, an unobstructed continuous space suitable for trainman's use in walking along trains, extending to a line not less than twelve feet (12') from centerline of track. Remove any temporary impediments to walkways and track drainage encroachments or obstructions allowed during work hours before the close of each work day. Construct walkways with railings over open excavation areas when in close proximity of track. Do not violate allowable clearances of these railings to centerline of track: 8' - 6" horizontally for tangent track or 9' - 6" horizontally for curved track.

3.15 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.

3.16 TRAFFIC CONTROL

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

3.17 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's 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 ¼inch vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

3.18 RAILROAD FLAGGING

Per the RIGHT OF ENTRY agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor work and at least 30 working days in advance of any Contractor 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).

3.19 CLEANING OF RIGHT-OF-WAY

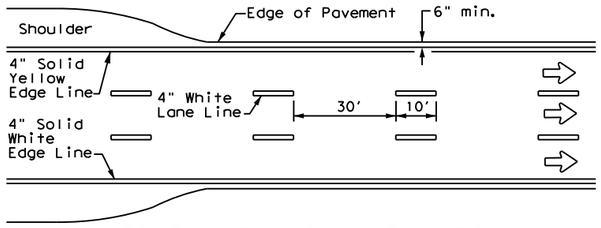
When work is complete, remove all tools, implements, and other materials brought into Railroad Right of Way and leave the Right of Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

Texas Department of Transportation | Rail Division

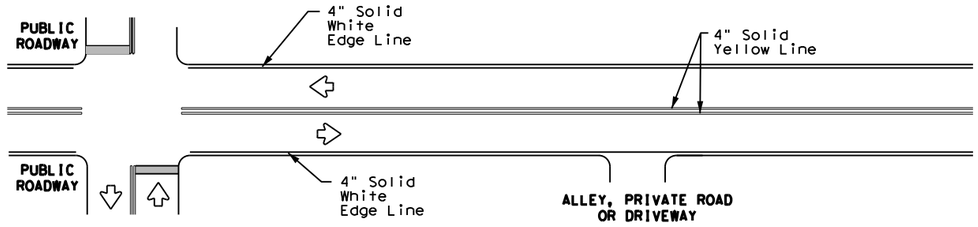
RAILROAD REQUIREMENTS FOR BRIDGE CONSTRUCTION

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0014	15	080	US 287/81
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		65

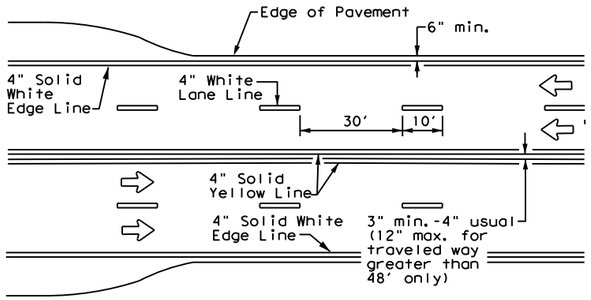
DATE:
FILE: RAILROAD REQUIREMENTS FOR BRIDGE CONSTRUCTION.dgn



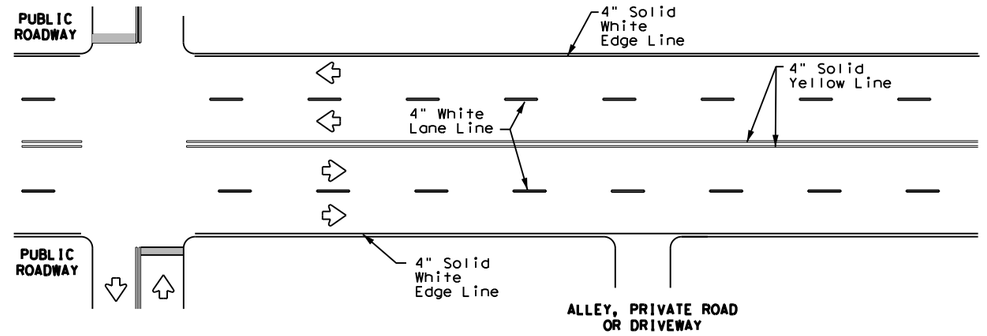
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



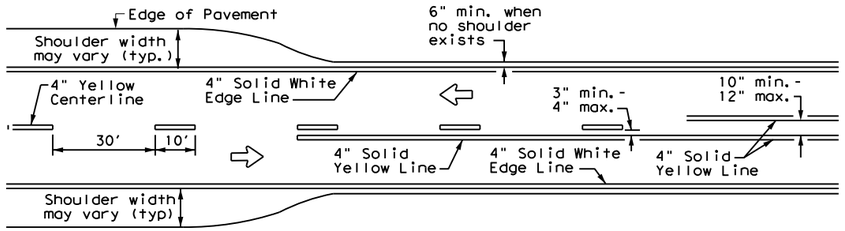
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



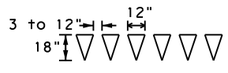
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



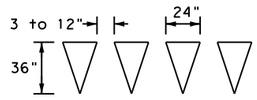
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

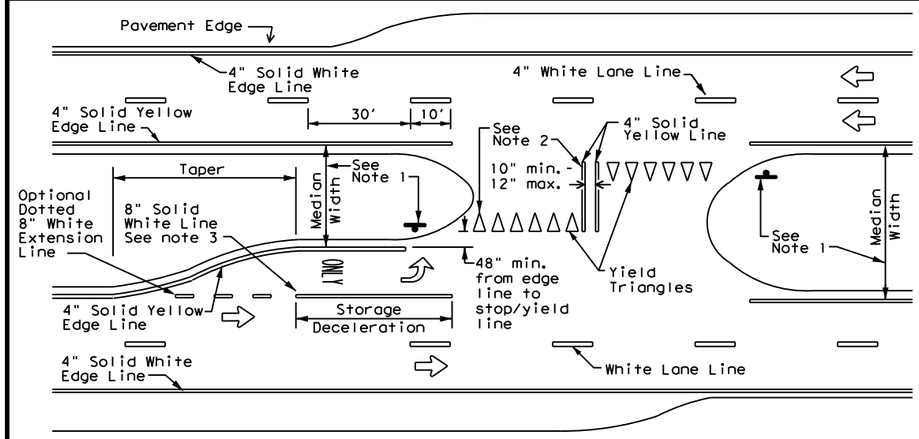


For posted speed on road being marked equal to or less than 40 MPH.



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

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

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

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

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

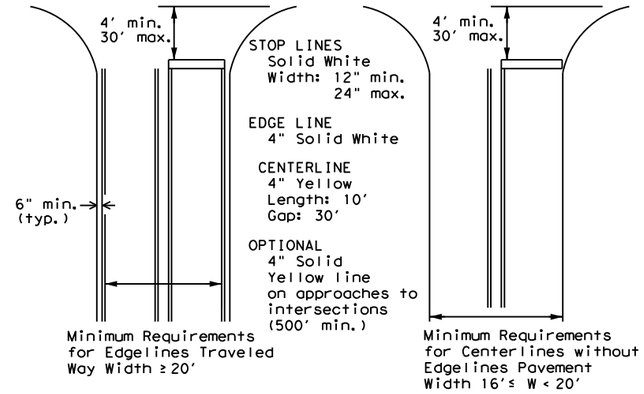
GENERAL NOTES

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

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

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

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



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

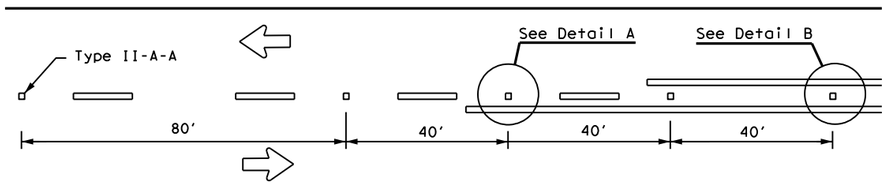
PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0014	15	080	US 287/81
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	FTW	TARRANT		66

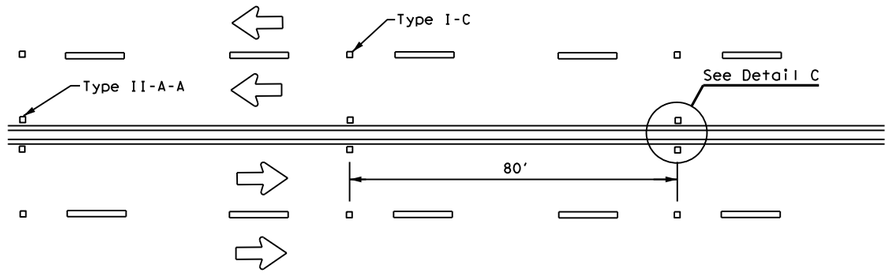
22A

DATE:
FILE:

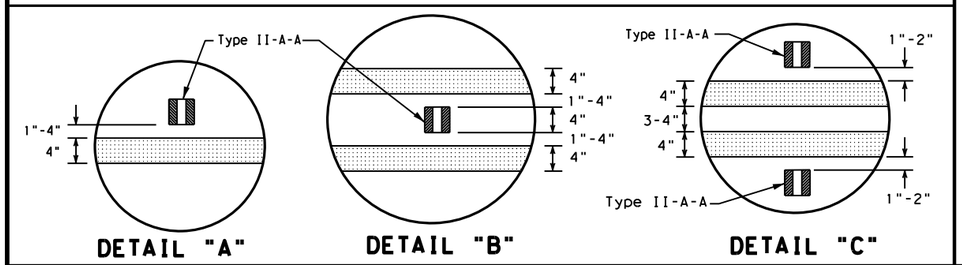
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



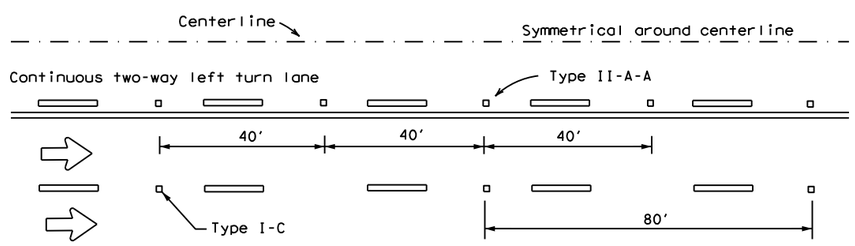
CENTERLINE FOR ALL TWO LANE ROADWAYS



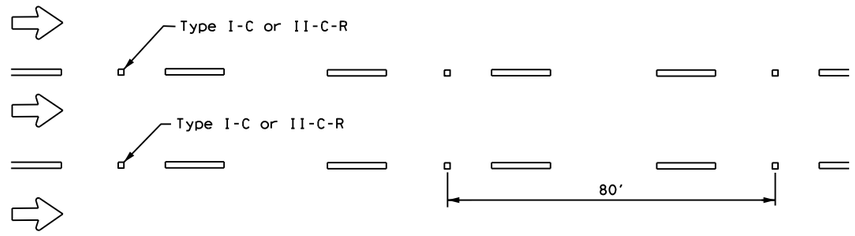
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



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

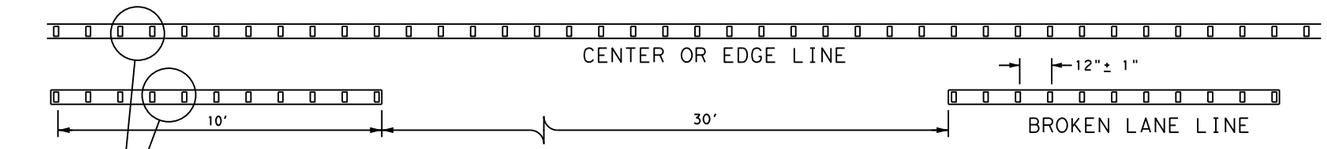


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



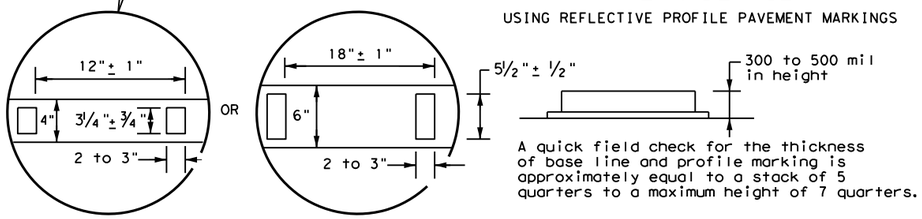
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

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

NOTE

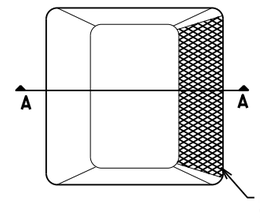
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

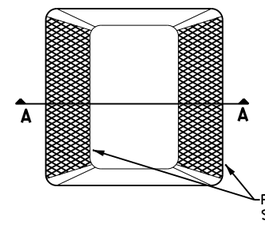
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

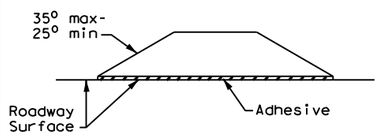
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

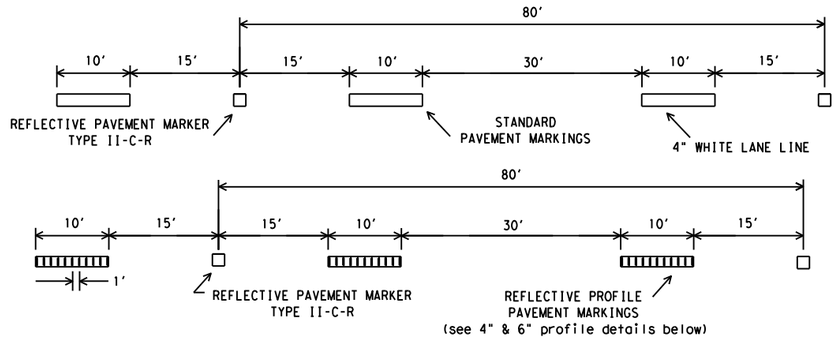
Traffic Safety Division Standard

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

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10 5-00 2-12 8-00 6-20	0014	15	080	US 287/81
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		67

22B

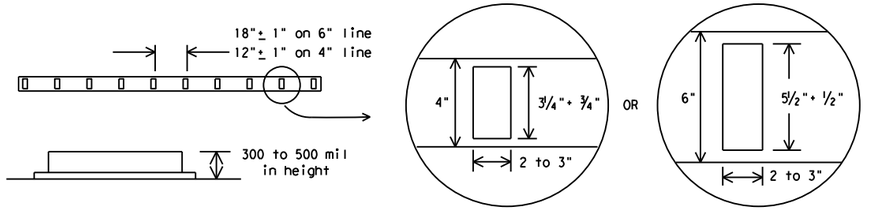
DATE:
FILE:



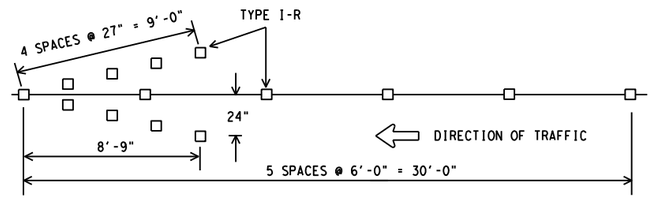
PAVEMENT MARKERS (REFL) TYPE II-C-R SHALL BE SPACED ON 80' CENTERS WITH THE CLEAR FACE TOWARD NORMAL TRAFFIC AND THE RED FACE TOWARD WRONG WAY TRAFFIC.

TRAFFIC LANE LINES PAVEMENT MARKING DETAILS

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



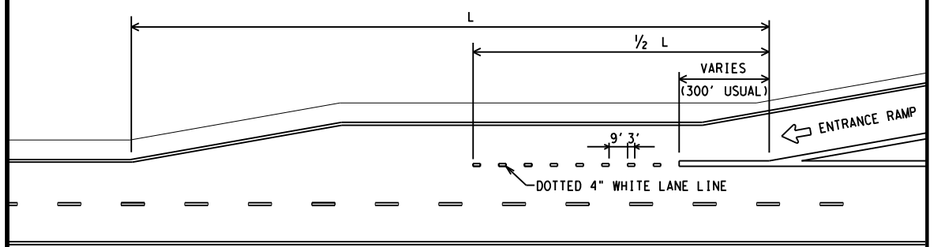
EDGELINE PAVEMENT MARKINGS



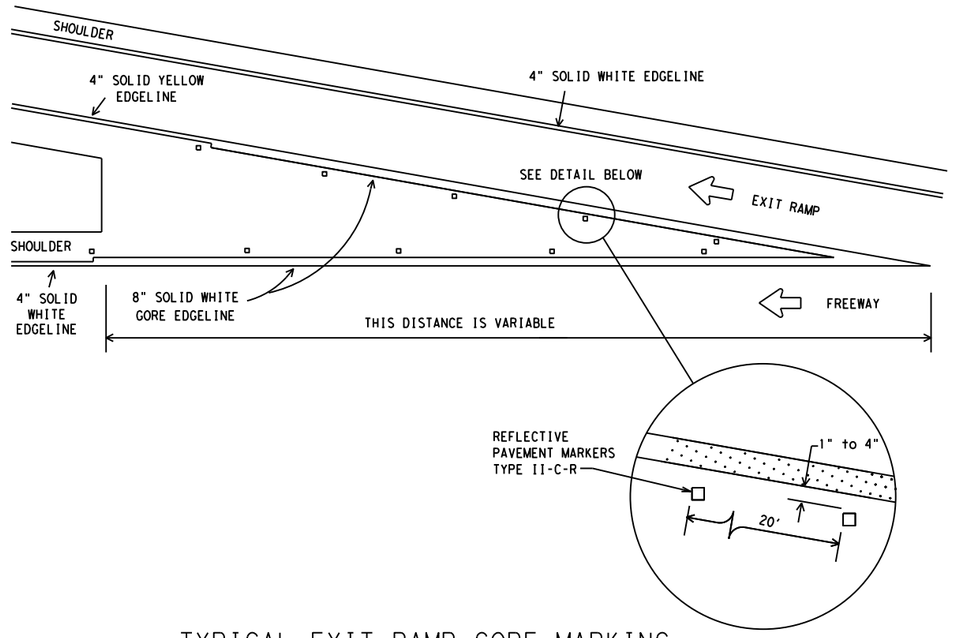
ALL RAISED MARKERS IN THE WRONG WAY ARROW SHALL BE TYPE I-R REFLECTORIZED PAVEMENT MARKERS WITH THE REFLECTORIZED SURFACE FACING THE WRONG WAY TRAFFIC. TYPE II-C-R SHALL NOT BE USED.

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

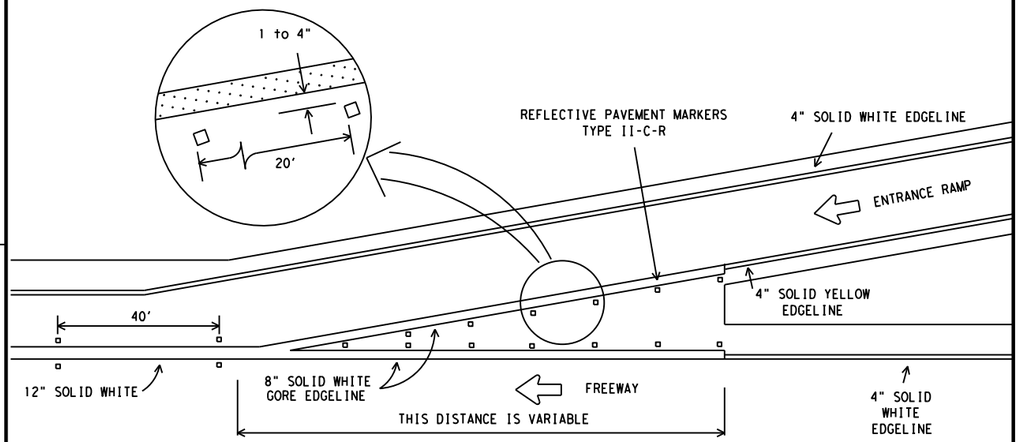
WRONG WAY ARROW DETAIL



PARALLEL ACCELERATION LANE

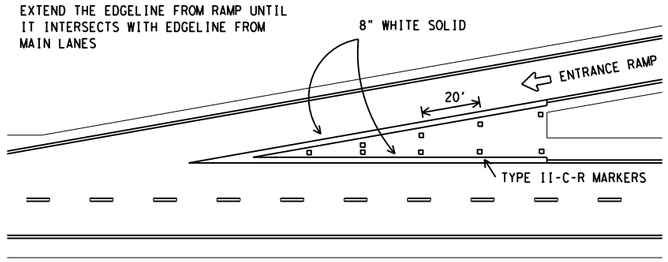


TYPICAL EXIT RAMP GORE MARKING



TYPICAL ENTRANCE RAMP GORE MARKING

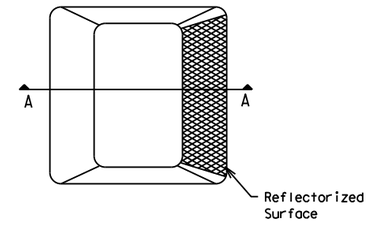
EXTEND THE EDGELINE FROM RAMP UNTIL IT INTERSECTS WITH EDGELINE FROM MAIN LANES



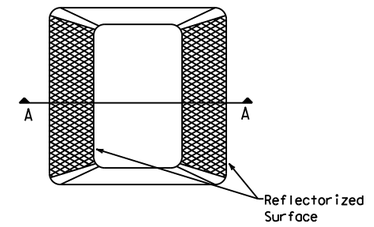
TAPERED ACCELERATION LANE

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

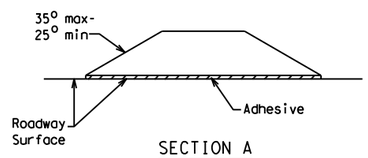
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS

FPM(1)-12

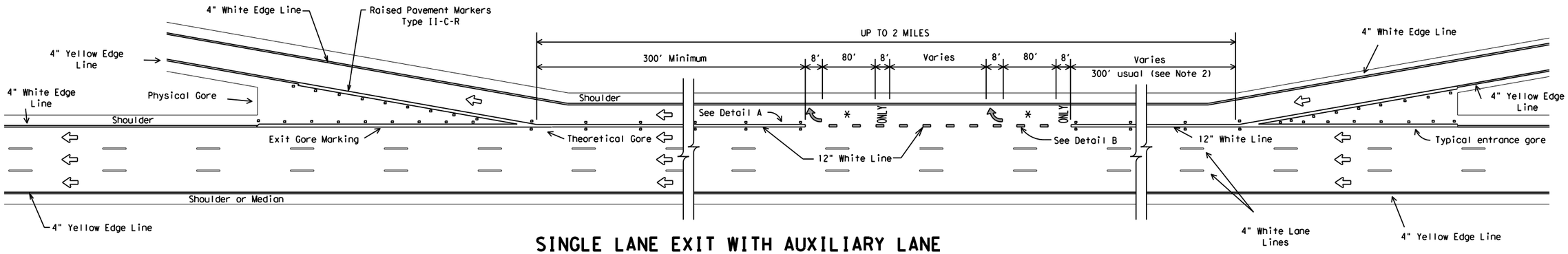
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS		CONT	SECT	JOB	HIGHWAY
4-92	2-10	0014	15	080	US 287/81
5-00	2-12	DIST	COUNTY		SHEET NO.
8-00		FTW	TARRANT		68
2-08					

23A

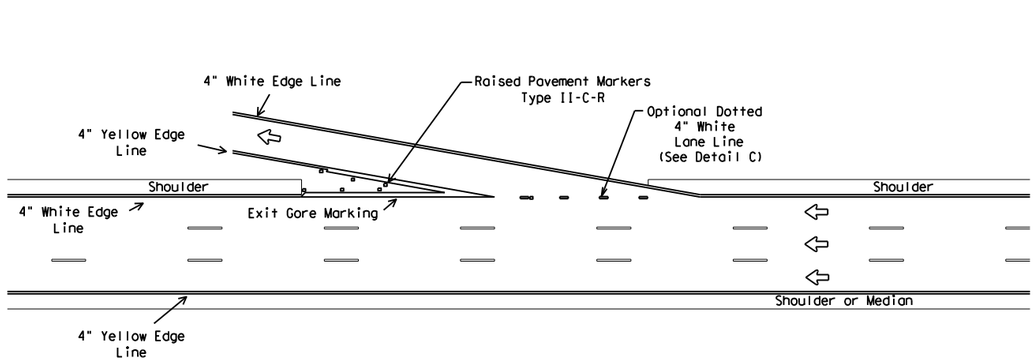
DATE:
FILE:

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

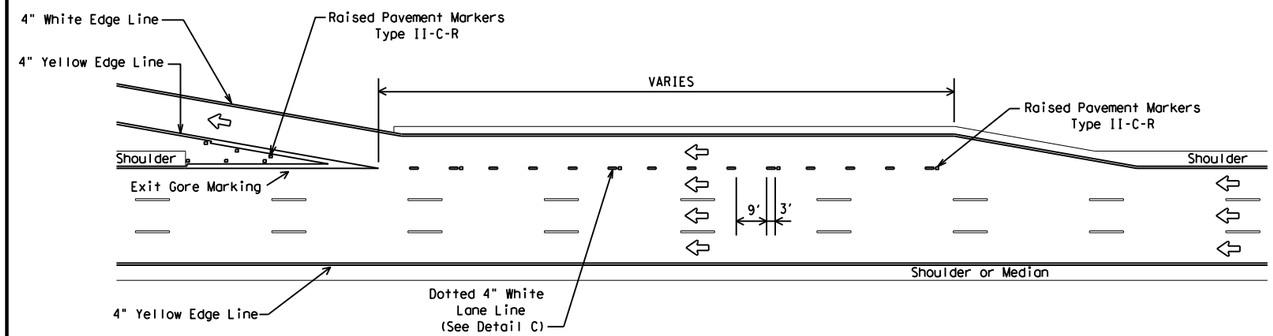


SINGLE LANE EXIT WITH AUXILIARY LANE

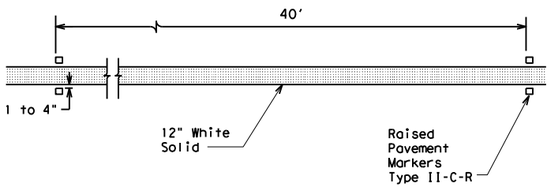
(See Note 2)



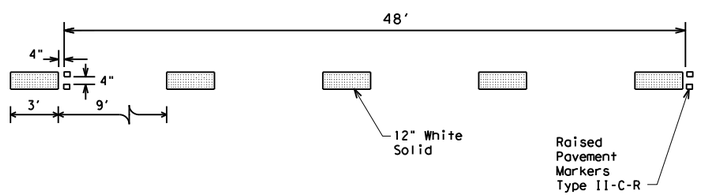
TAPERED DECELERATION LANE



PARALLEL DECELERATION LANE

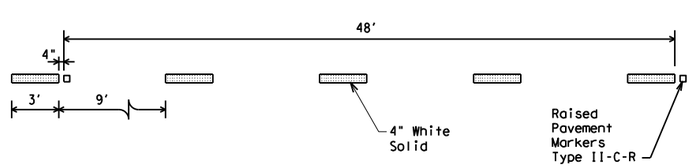


DETAIL A



DETAIL B

Wide (12") Dotted Lane Line (See Note 3)



DETAIL C

Normal (4") Dotted Lane Line (See Note 4)

GENERAL NOTES

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") Dotted Lane Line (See Detail B) is used to separate a through lane from a lane drop at normal exit ramp and from an auxiliary lane between an entrance and exit ramp.
4. Normal (4") Dotted Lane Line (See Detail C) is used at parallel acceleration and deceleration lanes.

LEGEND	
⇦	Denotes direction of traffic.
↱	Pavement marking arrows (white)
✳	Arrow markings are optional, however "ONLY" is required if arrow is used

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

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

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMPS

FPM(2)-12

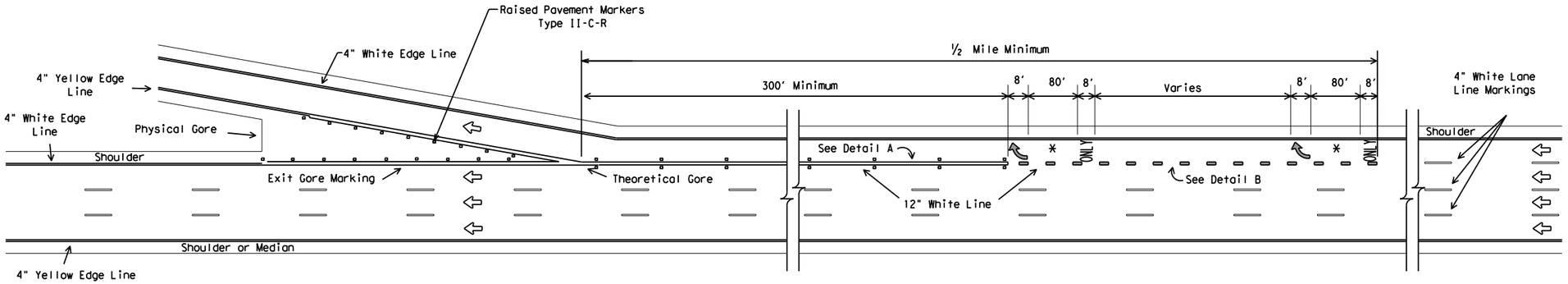
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
4-92 2-10
8-95 2-12
5-00
8-00

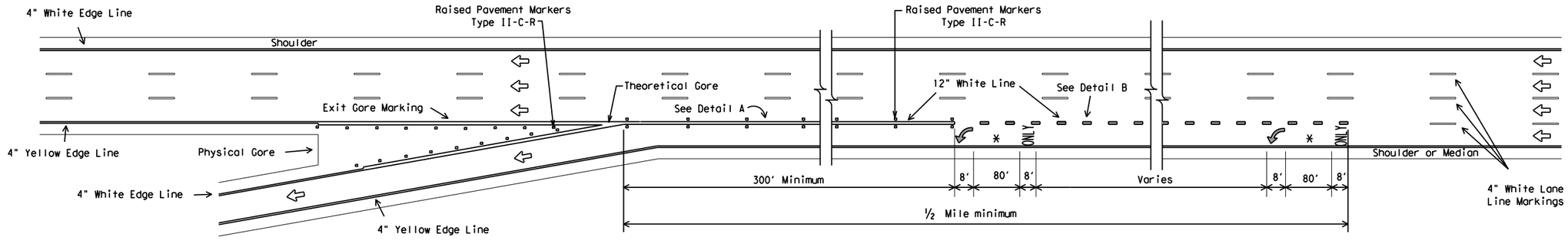
CONT	SECT	JOB	HIGHWAY
0014	15	080	US 287/81
DIST	COUNTY		SHEET NO.
FTW	TARRANT		69

23B

DATE:
FILE:



SINGLE LANE EXIT - LANE DROP OR EXIT ONLY

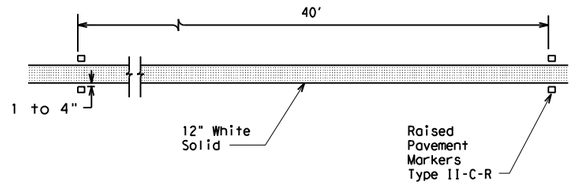


SINGLE LANE EXIT - LANE DROP OR EXIT ONLY (LEFTHAND)

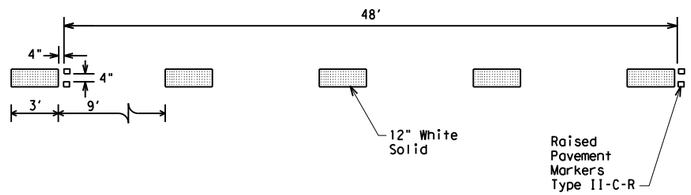
LEGEND	
⇦	Denotes direction of traffic.
↱	Pavement marking arrows (white)
*	Arrow markings are optional, however "ONLY" is required if arrow is used

GENERAL NOTES

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") Dotted Lane Line (See Detail B) is used to separate a through lane from a lane drop at normal exit ramp and from an auxiliary lane between an entrance and exit ramp.



DETAIL A



DETAIL B

Wide (12") Dotted Lane Line (See Note 3)

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

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

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS LANE DROP (EXIT ONLY) EXIT RAMPS

FPM(3)-12

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

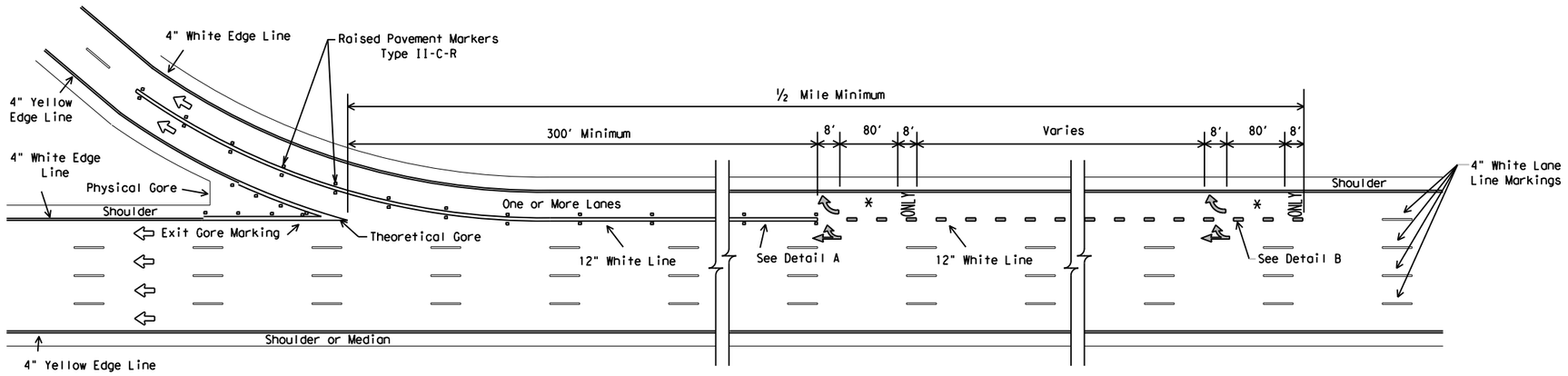
REVISIONS
5-00
8-00
2-10
2-12

CONT	SECT	JOB	HIGHWAY
0014	15	080	US 287/81

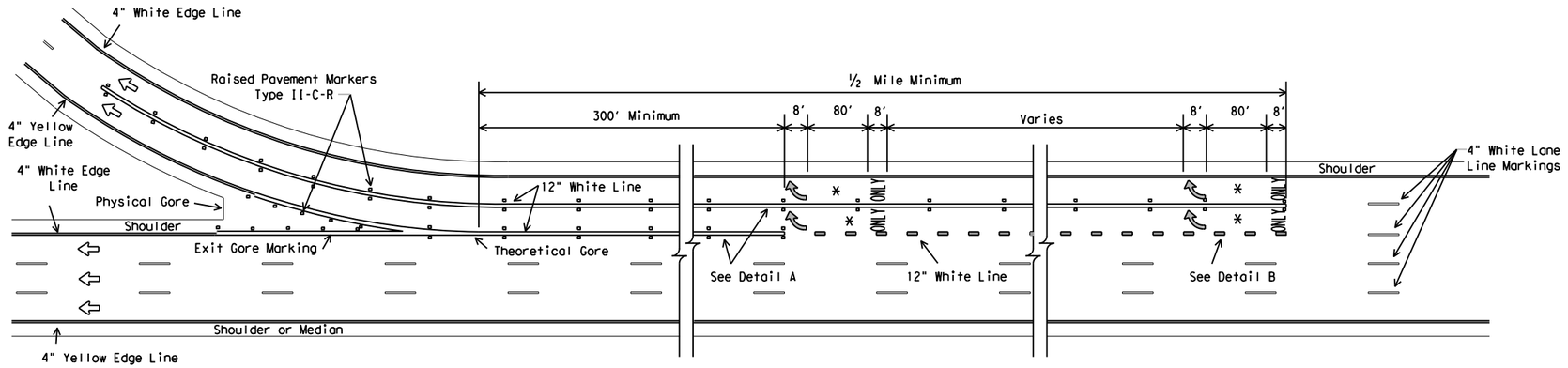
DIST	COUNTY	SHEET NO.
FTW	TARRANT	70

23C

DATE:
FILE:



MULTIPLE LANE EXIT - EXIT ONLY WITH OPTION LANE

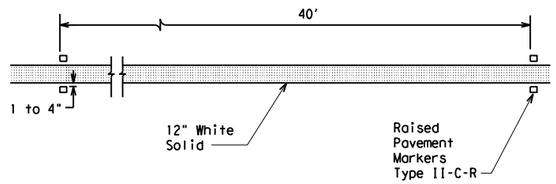


MULTIPLE LANE EXIT ONLY

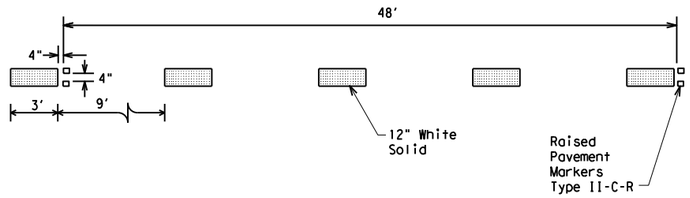
LEGEND	
⇦	Denotes direction of traffic
	Pavement marking arrow (white)
	Optional Pavement Marking Arrows (white)
✳	Arrow markings are optional, however "ONLY" is required if arrow is used

GENERAL NOTES

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") Dotted Lane Line (See Detail B) is used to separate a through lane from a lane drop at normal exit ramp and from an auxiliary lane between an entrance and exit ramp.



DETAIL A



DETAIL B

Wide (12") Dotted Lane Line (See Note 3)

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

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

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS LANE DROP (EXIT ONLY) DETAILS

FPM(4)-12

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

REVISIONS
5-00
8-00
2-10
2-12

CONT	SECT	JOB	HIGHWAY
0014	15	080	US 287/81
DIST	COUNTY		SHEET NO.
FTW	TARRANT		71

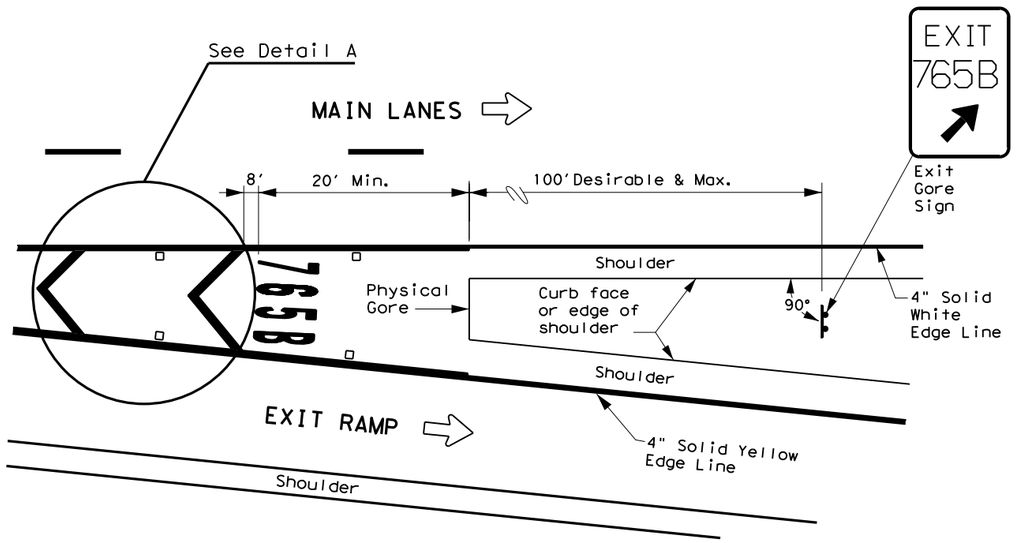
23D

DATE:
FILE:

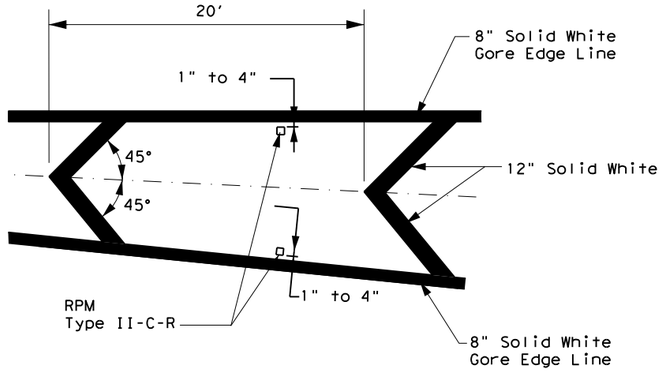
DATE:
FILE:

EXIT NUMBER PAVEMENT MARKING NOTES

1. Minimum 8 foot white markings should be used, unless otherwise noted.
2. Spacing between letters and numbers should be approximately 4 inches.
3. Pavement markings are to be located as specified elsewhere in the plans.
4. All pavement marking materials shall meet the required Departmental Material Specifications or as specified in these plans.
5. Numbers and Letters details can be found in the Standard Highway Design for Texas (SHSD) Chapter 12 at http://www.txdot.gov



MARKINGS WITH EXIT NUMBER



NOTES

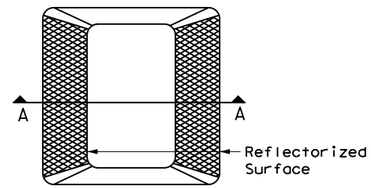
1. Raised pavement markers shall be centered between chevron or gore lines.
2. For more information, see Reflectorized Raised Pavement Marker Detail.

DETAIL A

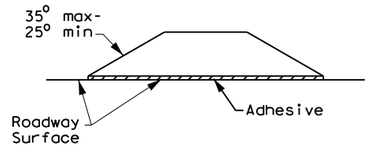
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

LEGEND	
⇦	Traffic flow
▫	Reflectorized Raised Markers (RPM) Type II-C-R

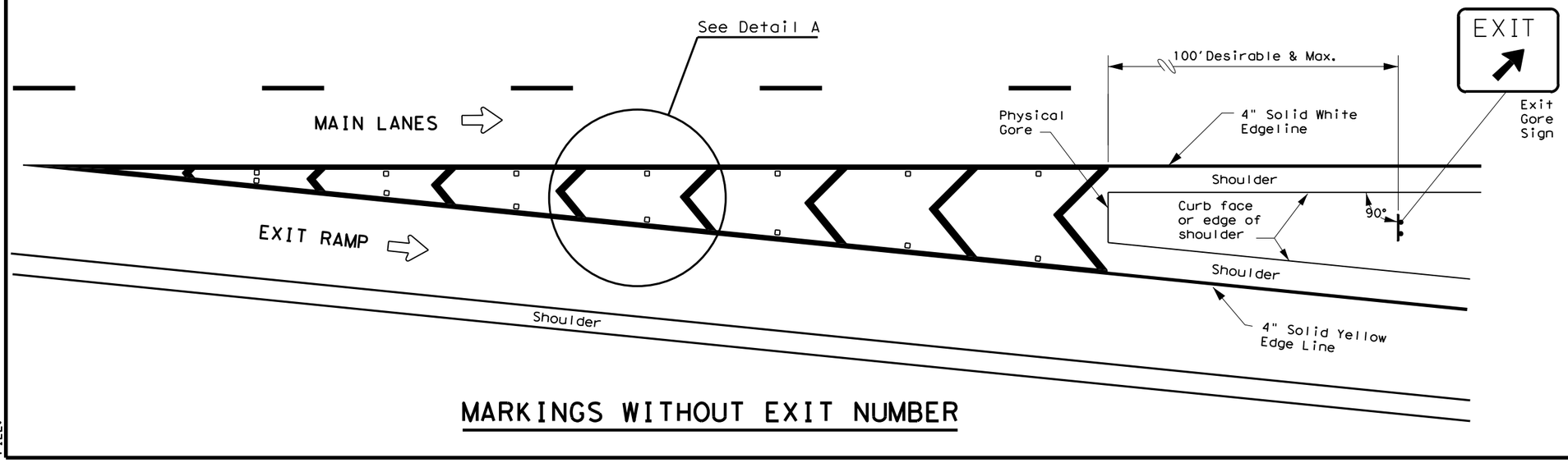


Type II (Top View)



SECTION A

REFLECTORIZED RAISED PAVEMENT MARKER (RPM)



MARKINGS WITHOUT EXIT NUMBER

Texas Department of Transportation

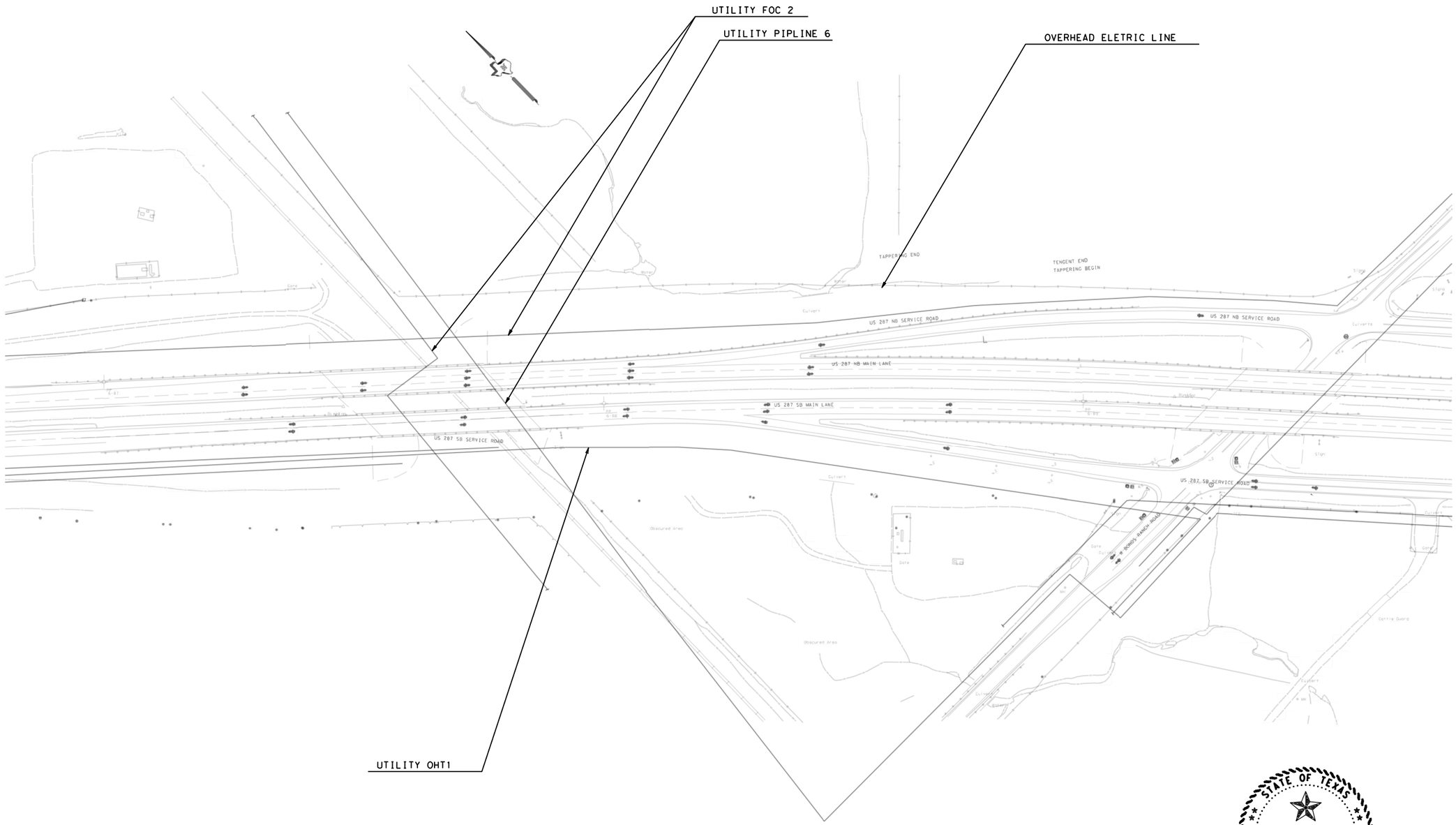
Traffic Safety Division Standard

EXIT GORE PAVEMENT MARKINGS

FPM(5)-19

FILE: fpm(5)-19.dgn	DN:	CK:	DW:	CK:
© TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		72

23F



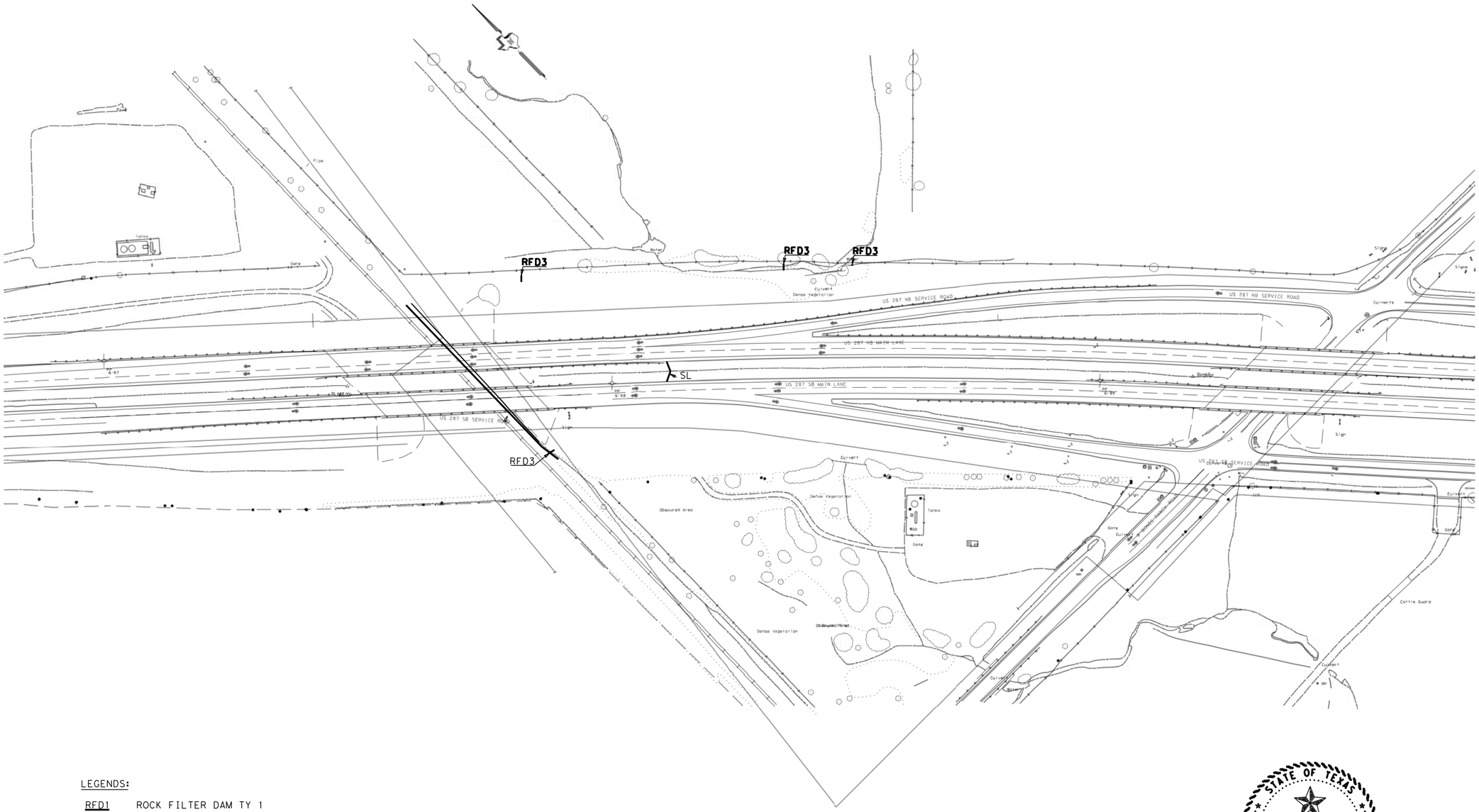
VANRAJSINH MAHIDA
137833
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

Vanrajsinh Mahida
12/14/21

US 81/287

EXISTING UTILITY LAYOUTS

CONT	SECT	JOB	HIGHWAY
0014	15	080	US 81/287
DIST	COUNTY		SHEET NO.
FTW	TARRANT		73



LEGENDS:

RFD1	ROCK FILTER DAM TY 1
RFD3	RFD3 AT CHANNEL SECTION
SL	SILT FENCE

NOTES:

(1) LOCATION OF CONSTRUCTION EXIST AS APPROVED BY THE ENGINEER.

(2) LIMITS OF PREPARING OF R.O.W ITEM AS DIRECTED BY THE ENGINEER.

STATE OF TEXAS
VANRAJSINH MAHIDA
137833
LICENSED PROFESSIONAL ENGINEER

Vanrajsinh Mahida
12/14/21

US 81/287

Texas Department of Transportation

SW3P LAYOUTS

CONT	SECT	JOB	HIGHWAY
0014	15	080	US 81/287
DIST	COUNTY		SHEET NO.
FTW	TARRANT		74

A. GENERAL SITE DATA

1. PROJECT LIMITS: *Highway: US81/ 287*
FROM: 0.911 MI NORTH OF FM 156 ON US 81
TO: 1.094 MI NORTH OF FM 156 ON US 81

LATTITUDE: 32.92756591 LONGITUDE: -97.36118585

2. PROJECT SITE MAPS:

- *Project Location Map: Title Sheet (Sheet 1)*
- *Drainage Patterns: Drainage Area Maps*
- *Approx. Slopes Anticipated After Major Gradings and Areas of Soil Disturbance: Typical Sections*
- *Major Controls and Locations of Stabilization Practices: SW3P Site Map Sheets*
- *Project Specific Locations:*
  To be specified by Project Field Office and located in the Project SW3P File
- *Surface Waters and Discharge Locations: Drainage and Culvert Layout Sheets*
  (N/A)

3. PROJECT DESCRIPTION:
(Same description as stated on Title Sheet)

4. MAJOR SOIL DISTURBING ACTIVITIES:
(1) Construction entrance/s
(2) Removing of Riprap and slope failure
(3) construction of New riprap on slope and midean area
(4) Diployment of curb along with EOP

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

THE EXISTING SOIL IS SANDY LOAM

THE SITE IS RURAL 90% COVER AND IN GOOD CONDITION

6. TOTAL PROJECT AREA: *7.764* Acres

7. TOTAL AREA TO BE DISTURBED: *0.64* Acres *(8.21%* OF TOTAL PROJECT AREA)

8. WEIGHTED RUNOFF COEFFICIENT

BEFORE CONSTRUCTION: *0.90*
AFTER CONSTRUCTION: *0.90*

9. NAME OF RECEIVING WATERS:

(Local stream to Fossil creek)

10. ENDANGERED SPECIES, DESIGNATED CRITICAL HABITAT AND HISTORIC PROPERTY:

No Endangered Species, Designated Critical Habitat or Historic Property has been found on this project site.

Note: Designer shall supply applicable statement.

The documentation satisfying TPDES Construction General Permit eligibility pertaining to the existence or of any protective action taken with regards to endangered species or designated critical habitat or historical property in this project area is contained in the project's Enviromental document (EA or EIS) and can be viewed under the State Open Records Act at the address shown below:

TEXAS DEPARTMENT OF TRANSPORTATION
FORT WORTH DISTRICT HEADQUARTERS
DISTRICT DESIGN SECTION
2501 SW LOOP
FORT WORTH, TX 76133
PHONE: 817-370-6500

B. EROSION AND SEDIMENT CONTROLS

1. SOIL STABILIZATION PRACTICES:

(Select T = Temporary or P = Permanent, as applicable)

___	TEMPORARY SEEDING	___	PRESERVATION OF NATURAL RESOURCES
___	MULCHING (Hay or Straw)	___	FLEXIBLE CHANNEL LINER
___	BUFFER ZONES	___	RIGID CHANNEL LINER
___	PLANTING	___	SOIL RETENTION BLANKET
___	SEEDING	___	COMPOST MANUFACTURED TOPSOIL
P	SODDING	___	OTHER: (Specify Practice)

2. STRUCTURAL PRACTICES:

(Select T = Temporary or P = Permanent, as applicable)

T	SILT FENCES	___	DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
___	HAY BALES	___	DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
T	ROCK FILTER DAMS	___	DIVERSION DIKE AND SWALE COMBINATIONS
___	PIPE SLOPE DRAINS	T	ROCK BEDDING AT CONSTRUCTION EXIT
P	PAVED FLUMES	___	TIMBER MATTING AT CONSTRUCTION EXIT
___	CHANNEL LINERS	___	STONE OUTLET STRUCTURES
___	SEDIMENT TRAPS	___	VELOCITY CONTROL DEVICES
___	SEDIMENT BASINS	P	CURBS AND GUTTERS
___	STORM SEWERS	___	STORM INLET SEDIMENT TRAP
___	OTHER: *(Specify Practice)*		
___			
___			
___			
___			
___			

3. STORM WATER MANAGEMENT: *(Example Below - May be used as applicable, revised or expanded)*

1. Storm water drainage will be provided by the ditches, inlets and storm water systems that will carry drainage within the R.O.W. to the low points within the roadway and project site which drain to natural facilities.

2. Other permanent erosion controls include hydraulic design to limit structure outlet velocities and grading design generally consisting of 4:1 or flatter slopes with permanent vegetative cover.

4. STORM WATER MANAGEMENT ACTIVITIES: (Sequence of Construction)

(Describe Storm Water Management Activities by Phases)

5. NON-STORM WATER DISCHARGES:
Non-storm water discharges should be filtered, or held in retention basins, before being allowed to mix with storm water. These discharges consist of non-polluted ground water, spring water, foundation and/or footing drain water, and water used for dust control, pavement washing and vehicle washwater containing no detergents.

STATE OF TEXAS
VANRAJSINH MAHIDA
137833
LICENSED PROFESSIONAL ENGINEER

Vanrajsinh Mahida
12/14/21
, P.E.
Signature Date

Design Consultant Logo here - delete block if not applicable

Texas Department of Transportation

Fort Worth District Standard

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

SHEET 1 OF 2 SHEETS

ORIGINAL DRAWING: 09/2002	sw3p-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DATE	REVISIONS	6	C 14-15-80	75
09/2008	NPDES TO TPDES	STATE	STATE DIST.NO.	COUNTY
01/2012	CLARIFY NOTE C.2.	TEXAS	FTW	TARRANT
08/2013	ADDED SIGN	CONT.	SECT.	JOB / HIGHWAY NO.
05/2019	2-SHEET FORMAT	0014	15	US 81/287

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:

All erosion and sediment controls shall be maintained in good working order. If a repair is necessary, it shall be performed 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. Disturbed areas on which construction activities have ceased, temporarily or permanently, shall be stabilized within 14 calendar days unless they are scheduled to and do resume within 21 calendar days. The areas adjacent to creeks and drainageways shall have priority followed by devices protecting storm sewer inlets.

2. INSPECTION:

An inspection shall be performed by a TxDOT inspector every 14 calendar days as well as within 24 hours after any rainfall of one-half inch or more is recorded on a non-freezing rain gauge to be located at the project site, or every 7 calendar days. An Inspection and Maintenance Report shall be filed for each inspection. Based on the inspection results, the controls shall be revised in accordance with the inspection report.

3. WASTE MATERIALS:

Except as noted below, all waste materials shall be collected in a metal dumpster having a secure cover. The dumpster shall meet all state and local solid waste management regulations. All trash and debris from construction shall be deposited in the dumpster. The dumpster shall be emptied, as necessary or as required by local regulation, and hauled to a local approved land fill site. The burying of construction waste on the project site shall not be permitted.

Concrete washout areas shall be required and shall consist of a pit, lined with an impervious material, of sufficient size to contain, until evaporation, all water used and washout material produced during concrete washout operations. The concrete washout locations shall be as directed by the engineer.

Lime slaking tanks shall be surrounded by an earthen berm, capable of containing any overflow.

4. HAZARDOUS WASTE (INCLUDING SPILL REPORTING):

As a minimum, any products in the following categories are considered to be hazardous: paints, acids, solvents, asphalt products, chemical additives for soil stabilization, and concrete curing compounds or additives. In the event of a spill which may be hazardous, the spill coordinator shall be contacted immediately.

5. SANITARY WASTE:

All sanitary waste shall be collected from the portable units, as necessary or as required by local regulation, by a licensed sanitary waste management contractor.

6. OFFSITE VEHICLE TRACKING:

The Contractor shall be required, on a regular basis or as may be directed by the Engineer, to dampen haul roads for dust control, stabilize construction entrances and to remove excess dirt from the roadway.

7. MANAGEMENT PRACTICES: *(Example Below - May be used as applicable, revised or expanded)*

1. Disposal areas, stockpiles and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, waterbody or streambed.

2. Construction staging areas and vehicle maintenance areas shall be constructed by the Contractor in a manner to minimize the runoff of pollutants.

3. All temporary fills placed in waterways shall be built of erosion resistant material. (NWP 14)

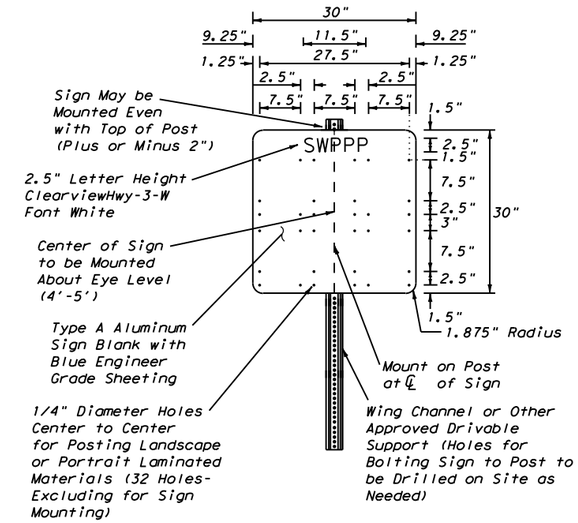
4. All waterways shall be cleared as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.

8. OTHER:

1. Listing of construction materials stored on site to be provided by Project Field Office.

2. The Project SW3P File located at the project field office shall contain the N.O.I., CGP Coverage Notice, TCEQ TPDES Form, Signature Authorization, Certification/Qualification Statements, Inspection Reports, Required Maps, and a copy of the TPDES General Permit No. TXR150000.

STORM WATER POLLUTION PREVENTION PLAN PERMIT POSTING



No Permanent Installation Allowed.
Sign to be Removed After Project Completion.

STATE OF TEXAS
VANRAJSINH MAHIDA
137833
LICENSED PROFESSIONAL ENGINEER

Vanrajsinh Mahida
12/14/21
, P.E.
Signature Date

Design Consultant Logo here - delete block if not applicable

Texas Department of Transportation

Fort Worth District Standard

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

SHEET 2 OF 2 SHEETS

ORIGINAL DRAWING: 09/2002	sw3p-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DATE	REVISIONS	6	C 14-15-80	76
09/2008	NPDES TO TPDES	STATE	STATE DIST.NO.	COUNTY
01/2012	CLARIFY NOTE C.2.	TEXAS	FTW	TARRANT
08/2013	ADDED SIGN	CONT.	SECT.	JOB / HIGHWAY NO.
05/2019	2-SHEET FORMAT			080 / US 81/287

DATE: DATE TIME
FILE: DOCUMENT NAME

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1.

2.

☒ No Action Required ☐ Required Action

Action No.

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

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

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

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

☒ No Permit Required

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

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

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

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

1.

2.

3.

4.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

IV. VEGETATION RESOURCES

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

☐ No Action Required ☒ Required Action

During construction, efforts would be taken to avoid and minimize disturbance of vegetation and soils. Areas within the existing ROW, but outside the limits of construction, would not be disturbed. Every effort would be made to preserve trees where they would neither compromise safety nor substantially interfere with the proposed projects.

No landscaping would be a part of the proposed project activities. Re-vegetation of disturbed areas would be in compliance with the Executive Memorandum on Beneficial Landscaping (26Apr94) and the Executive Order on Invasive Species (EO 13112). Regionally native and non-invasive plants would be used to the extent practicable in landscaping and re-vegetation.

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

☐ No Action Required ☒ Required Action

No disturbing, destroying, or removing active nests of Bald Eagles, including ground nesting birds, during the nesting season. Avoid the removal of unoccupied, inactive nests as practicable. Prevent the establishment of active nests during the nesting season on TxDOT owned and operated facilities and structures proposed for replacement or repair. No collecting, capturing, relocating or transporting birds, eggs, young or active nests without a permit. The Eagle Protection Act prohibits the taking or possession of and commerce in eagles, parts, feathers, nests, or eggs with limited exceptions. The definition of take includes pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb. Eagles may not be taken for any purpose unless a permit is issued prior to the taking.

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

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

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

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

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

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

☐ Yes ☒ No

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

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

☐ Yes ☐ No

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

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

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

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

STATE OF TEXAS
VANRAJSINH MAHIDA
137833
LICENSED PROFESSIONAL ENGINEER

Vanrajsinh Mahida
12/14/21

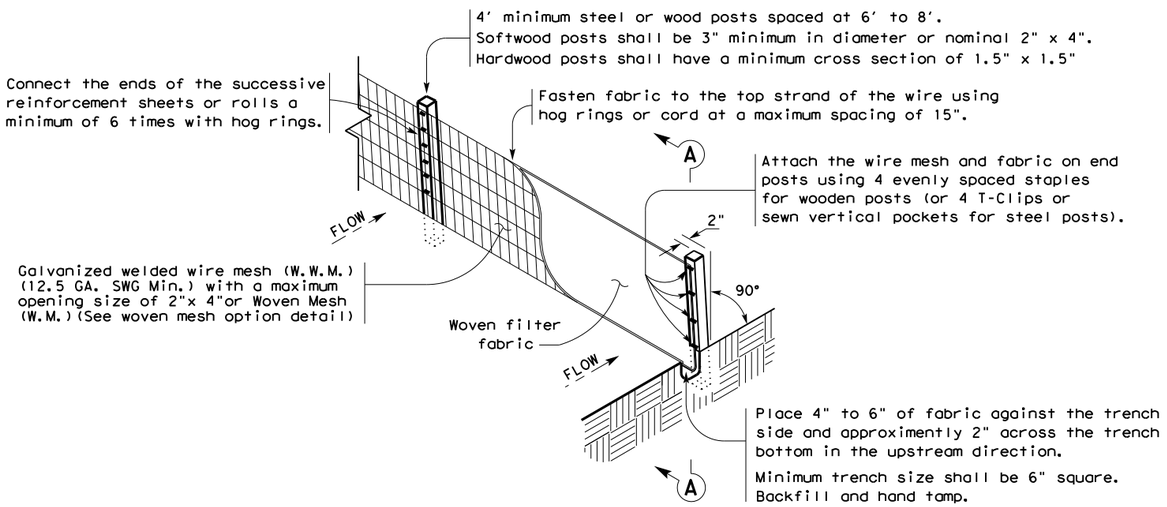
Texas Department of Transportation

Design Division Standard

ENVIRONMENTAL_PERMITS, ISSUES_AND_COMMITMENTS

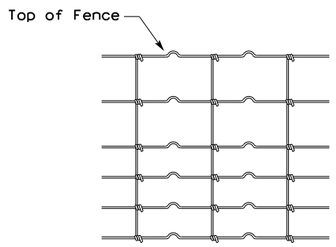
EPIC

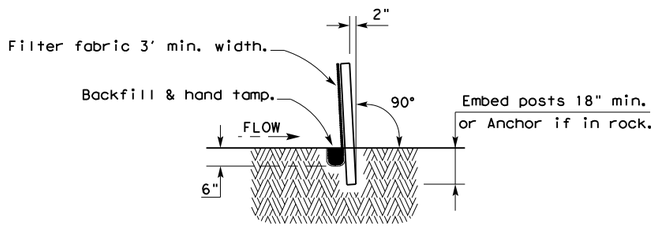
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0014	15	080	US 81/287
	DIST	COUNTY		SHEET NO.
	02	TARRANT		77



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

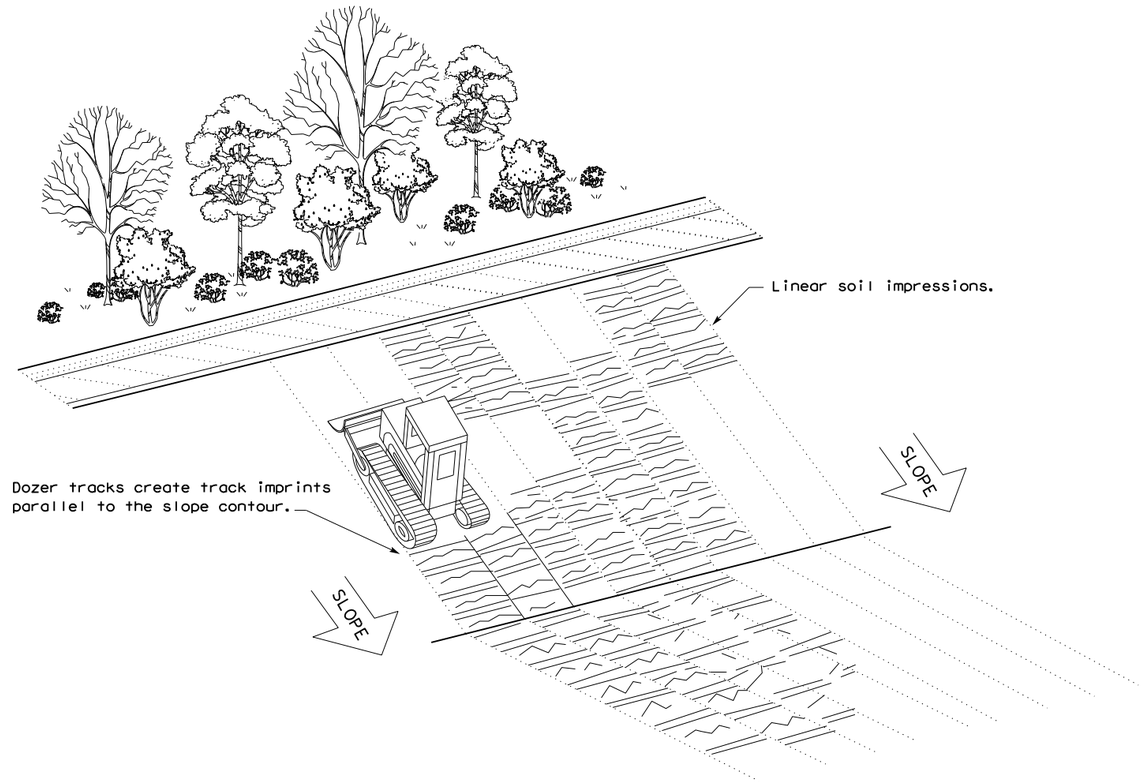
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

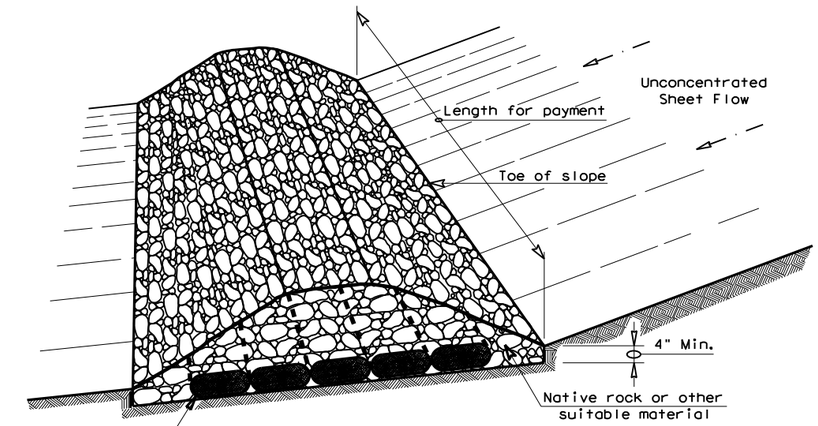
FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0014	15	080		US 287/81	
	DIST	COUNTY			SHEET NO.	
	FTW	TARRANT			78	

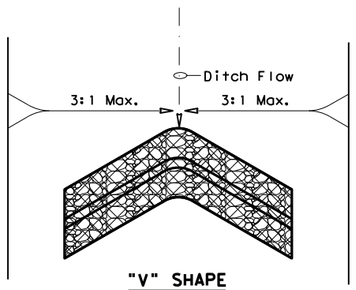
DATE
FILE

DATE:
FILE:

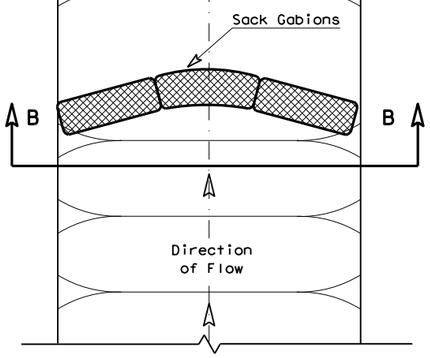


FILTER DAM AT TOE OF SLOPE

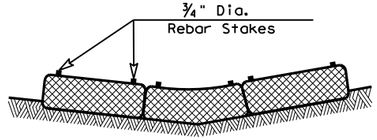
RFD1



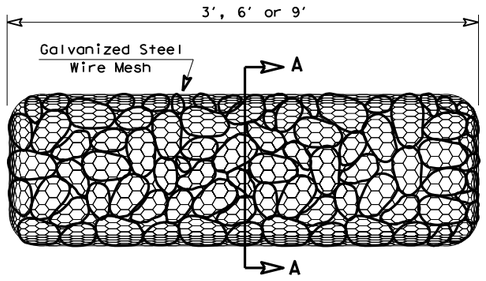
"V" SHAPE PLAN VIEW



PLAN VIEW

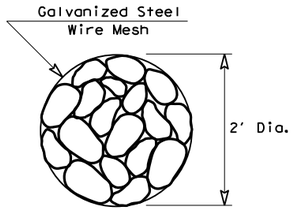


SECTION B-B

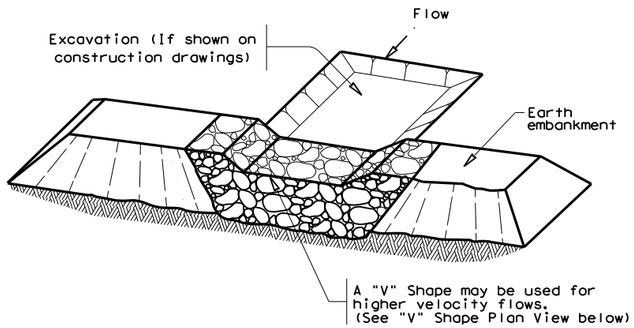


TYPE 4 (SACK GABIONS)

RFD4

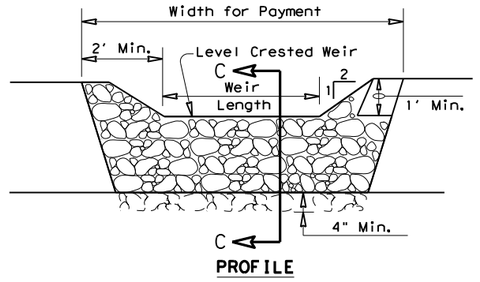


SECTION A-A

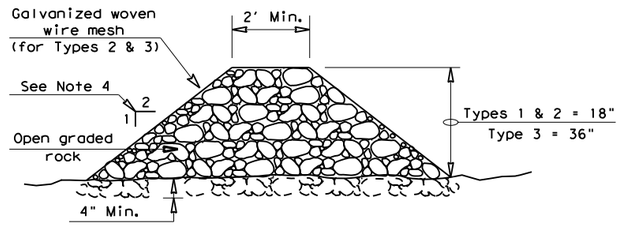


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

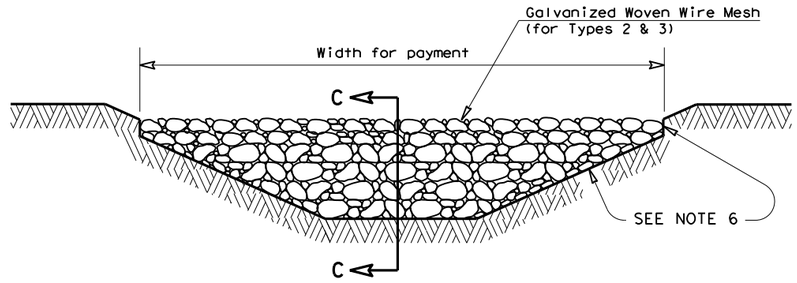
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation

Design Division Standard

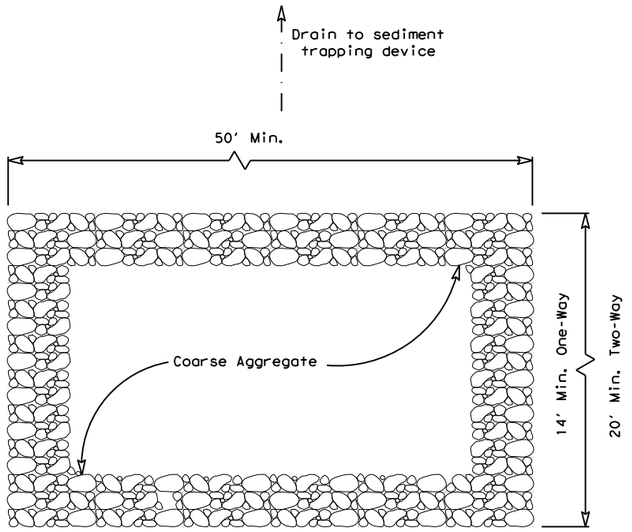
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

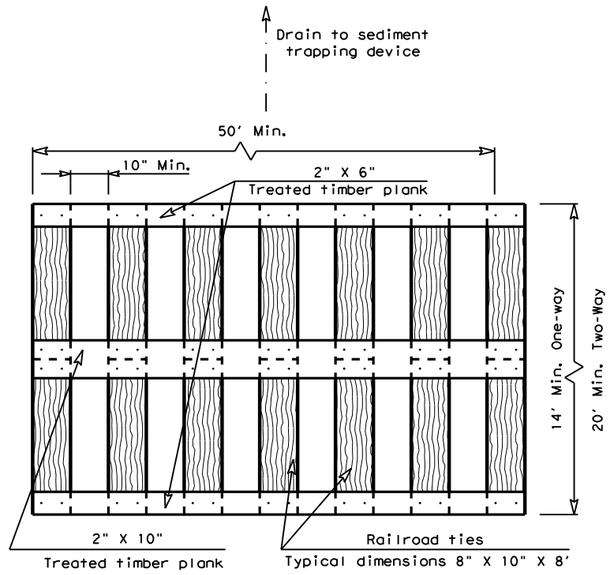
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0014	15	080	US 287/81
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		79

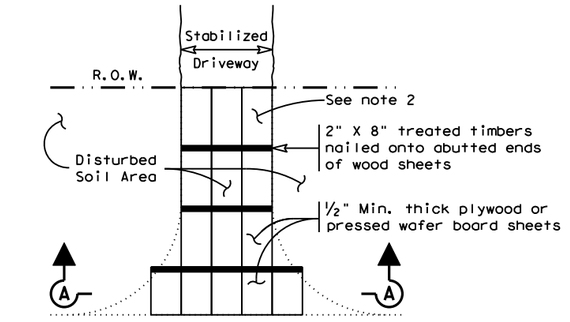
DATE:
FILE:



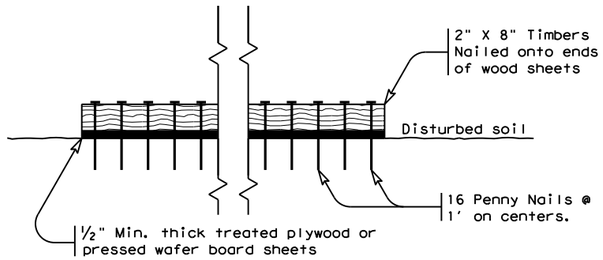
PLAN VIEW



PLAN VIEW



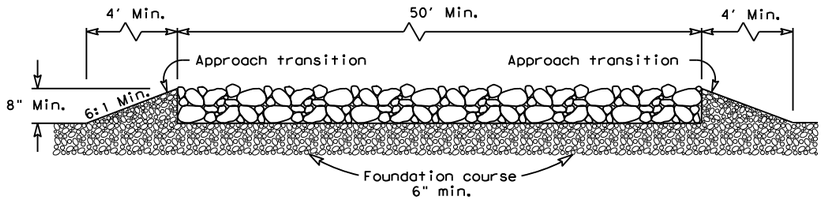
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

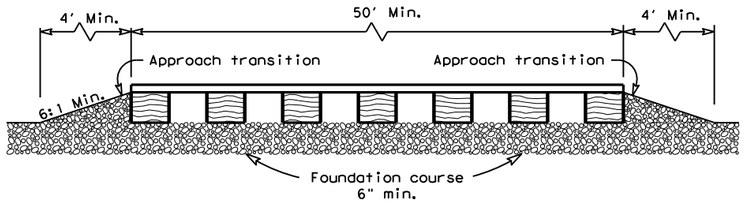
SHORT TERM



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	0014	15	080	US 287/81
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		80