DESIGN	FED.RD. DIV.NO.	STATE AID PROJECT NO.			
DN	6	C 2374-3-98			
GRAPHICS	STATE	CONT	SECT	JOB	HIGHWAY NO.
DN	TEXAS	2374	03	098	IH 20
CHECK	CHECK	DIST	COUNTY		SHEET NO.
IS	NP	DAL	DALLAS		1

FINAL PLANS

NAME OF CONTRACTOR: ____________________

DATE OF LETTING: ____________________

DATE WORK BEGAN: ____________________

DATE WORK COMPLETED: ____________________

DATE WORK ACCEPTED: ____________________

SUMMARY OF CHANGE ORDERS:

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

STATE PROJECT
C 2374-3-98
CSJ: 2374-03-098

IH 20

DALLAS COUNTY

FUNCTIONAL CLASSIFICATION = URBAN INTERSTATE
DESIGN SPEEDS = N/A
ADT = 136,357 (2023)
188,802 (2043)

NOTE:

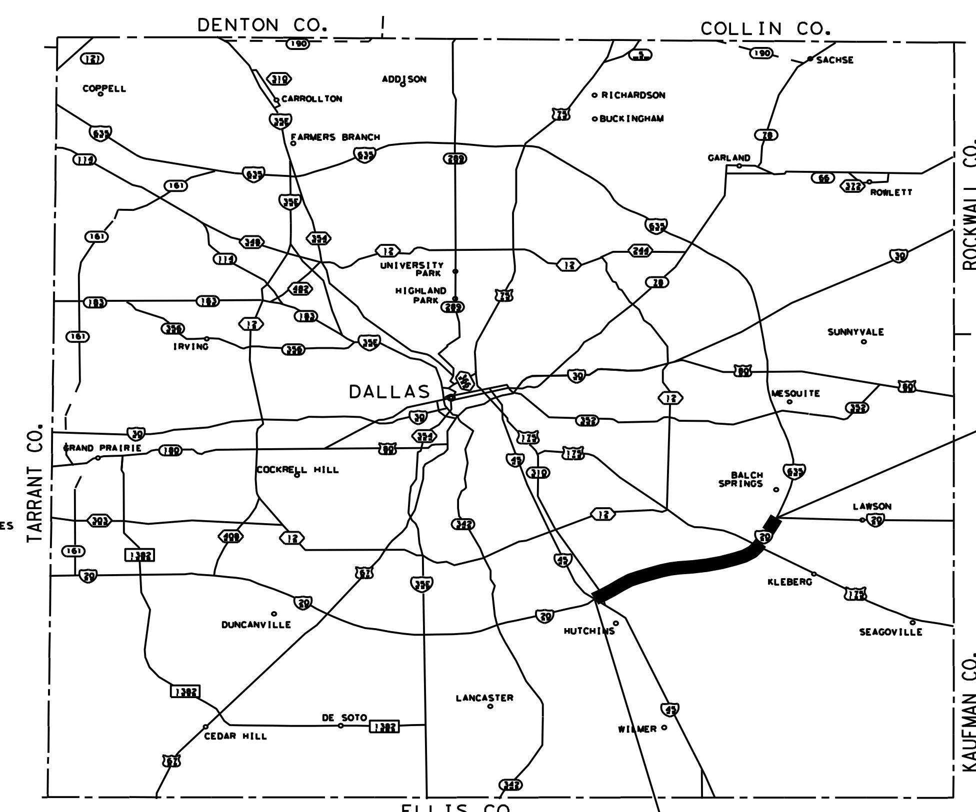
SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014, AND THE CONTRACT PROVISIONS LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THIS PROJECT: SPECIAL LABOR PROVISIONS FOR STATE PROJECTS (000-008)

LIMITS: FROM IH 45
TO IH 635

TOTAL LENGTH OF PROJECT =

ROADWAY	= 30,031.00	FT. =	5.688	MI.
BRIDGE	= 4,611.00	FT. =	0.873	MI.
TOTAL	= 34,642.00	FT. =	6.561	MI.

FOR THE CONSTRUCTION OF REHABILITATION OF EXISTING ROAD
CONSISTING OF PLANING, CONCRETE FULL DEPTH REPAIR, OVERLAY, & PAVEMENT MARKINGS



DALLAS COUNTY
SCALE 0 1 2 3 4 MILES
DALLAS DISTRICT

END PROJECT
CSJ 2374-03-098
STA 773+67
TRM 480+0.119

BEGIN PROJECT
CSJ 2374-03-098
STA 427+25
TRM 473+0.477

EQUATIONS: NONE
EXCEPTIONS: NONE
RAILROAD CROSSINGS: UPRR STA 447+15

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING 3/27/2023 , P.E. DESIGN ENGINEER

RECOMMENDED FOR LETTING 3/28/2023 DocuSigned by: , P.E. 98674E1... DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

RECOMMENDED FOR LETTING 3/28/2023 DocuSigned by: , P.E. 91B8F2112C2C4... AREA ENGINEER

APPROVED FOR LETTING 3/28/2023 DocuSigned by: Ceason Clemens , P.E. A879E0D10CD6464... DISTRICT ENGINEER

WORK WAS COMPLETED ACCORDING TO THE PLANS AND CONTRACT.

________________ , P.E.
Signature of Registrant & Date

DATE: ____________

INDEX OF SHEETS

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED PROFESSIONAL ENGINEER

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

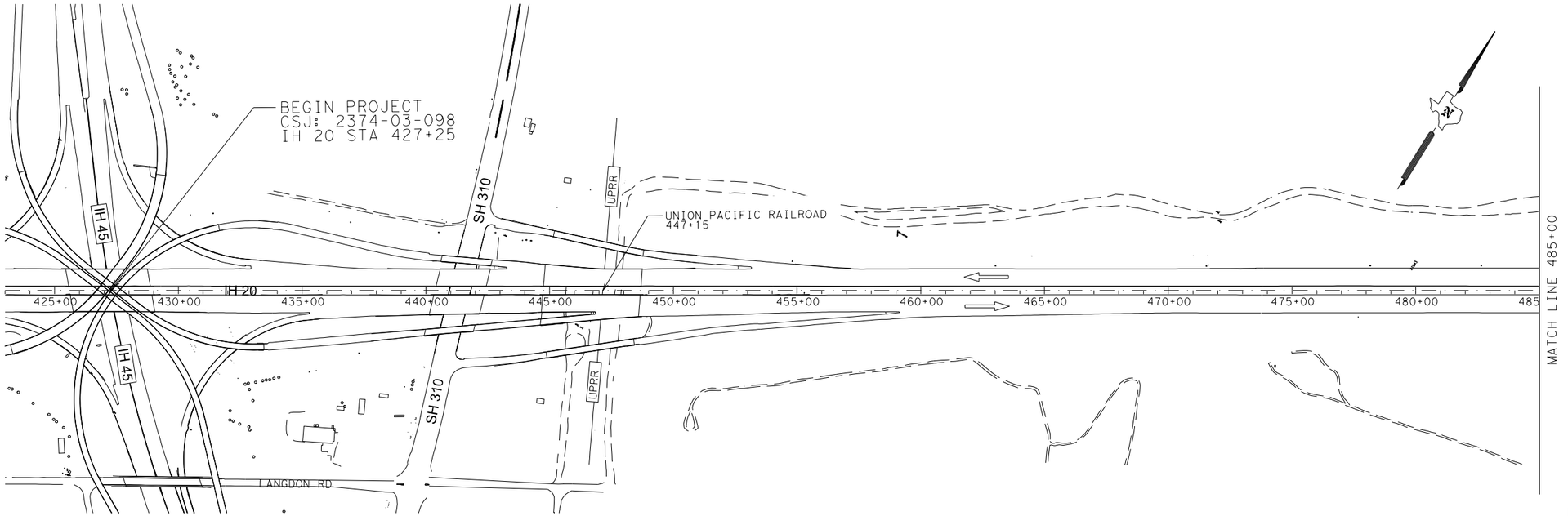
DocuSigned by:
AA914E3EC8AC415...
, P.E. 4/14/2023
ant & Date

IH 20

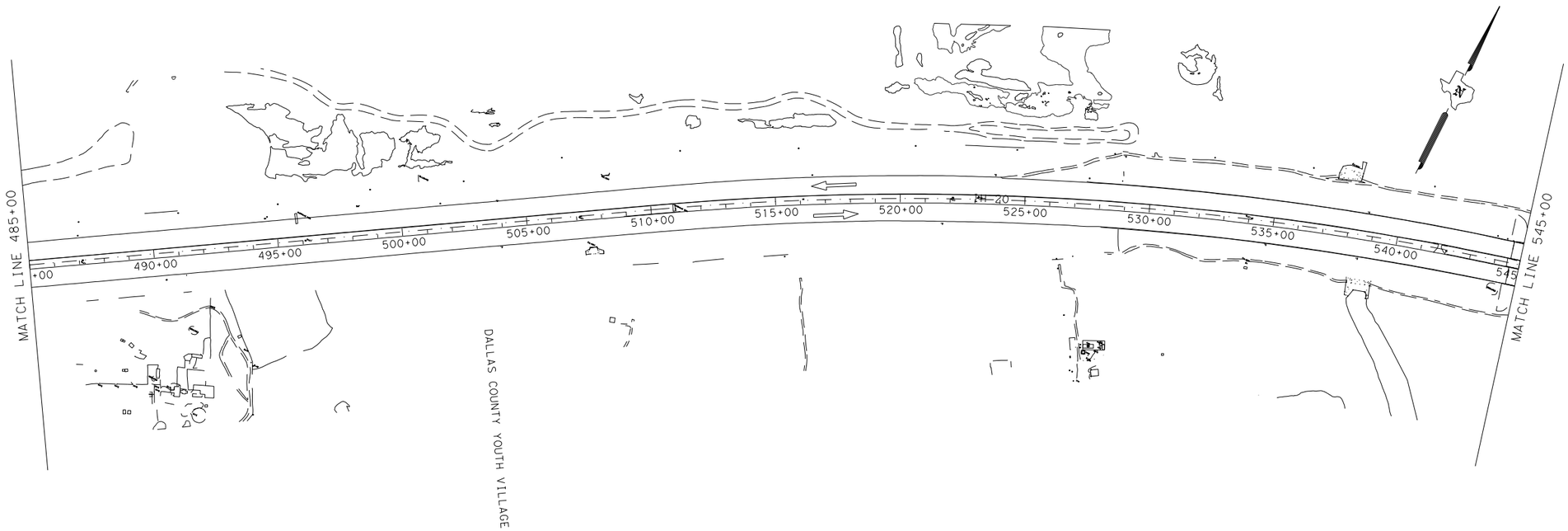
INDEX OF SHEETS

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	2
	2374	03	098	



NOTES:
1. PLACE ADVANCE WARNING SIGNS IN ACCORDANCE WITH THE BC, TCP AND WZ STANDARD SHEETS AND TMUTCD ON IH 20 MAIN LANES AND RAMPS.
2. REFER TO BC STANDARD SHEETS FOR LOCATION OF SIGNS.



STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED PROFESSIONAL ENGINEER

Signature of Registrant & P.E. 3/27/2023 Date

SL 12
PROJECT LAYOUT

SCALE: 1"=500' SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	3
	2374	03	098	

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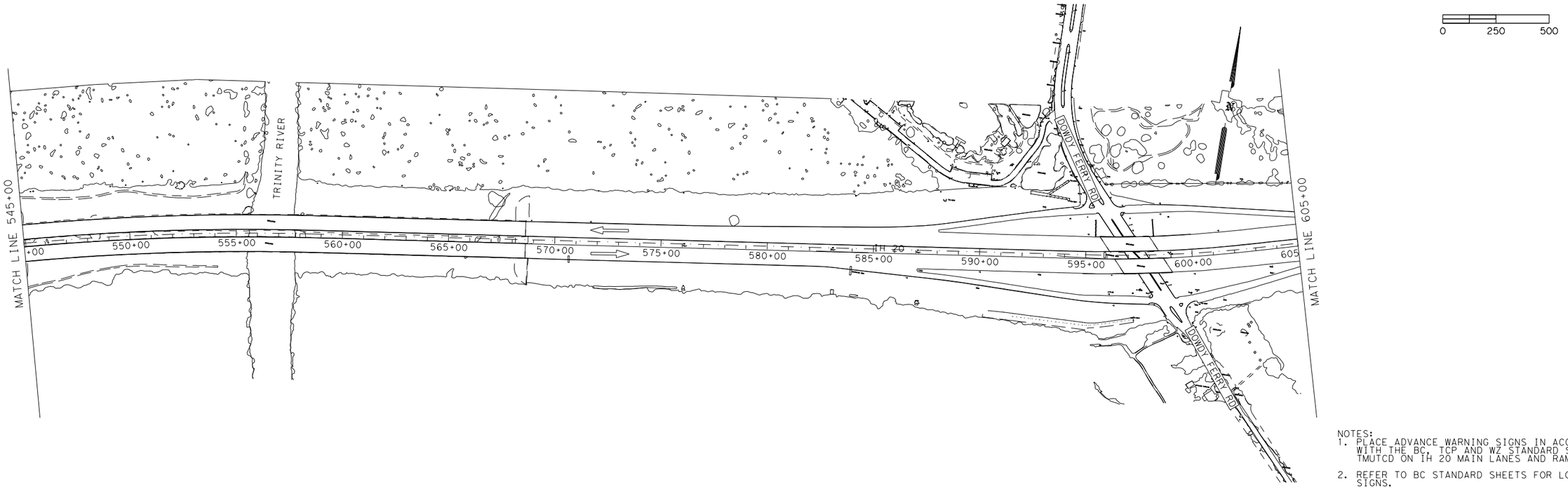

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STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

Signature of Registrant & P.E. 3/17/2023 Date

Texas Department of Transportation

SL 12

PROJECT LAYOUT

SCALE: 1"=500' SHEET 2 OF 3

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
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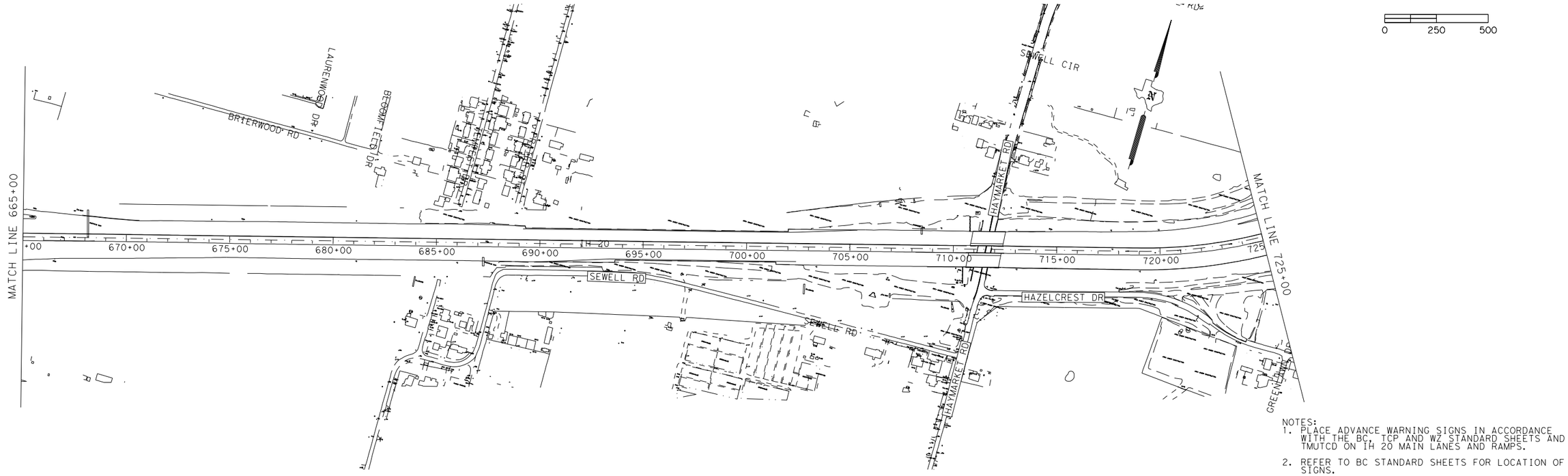

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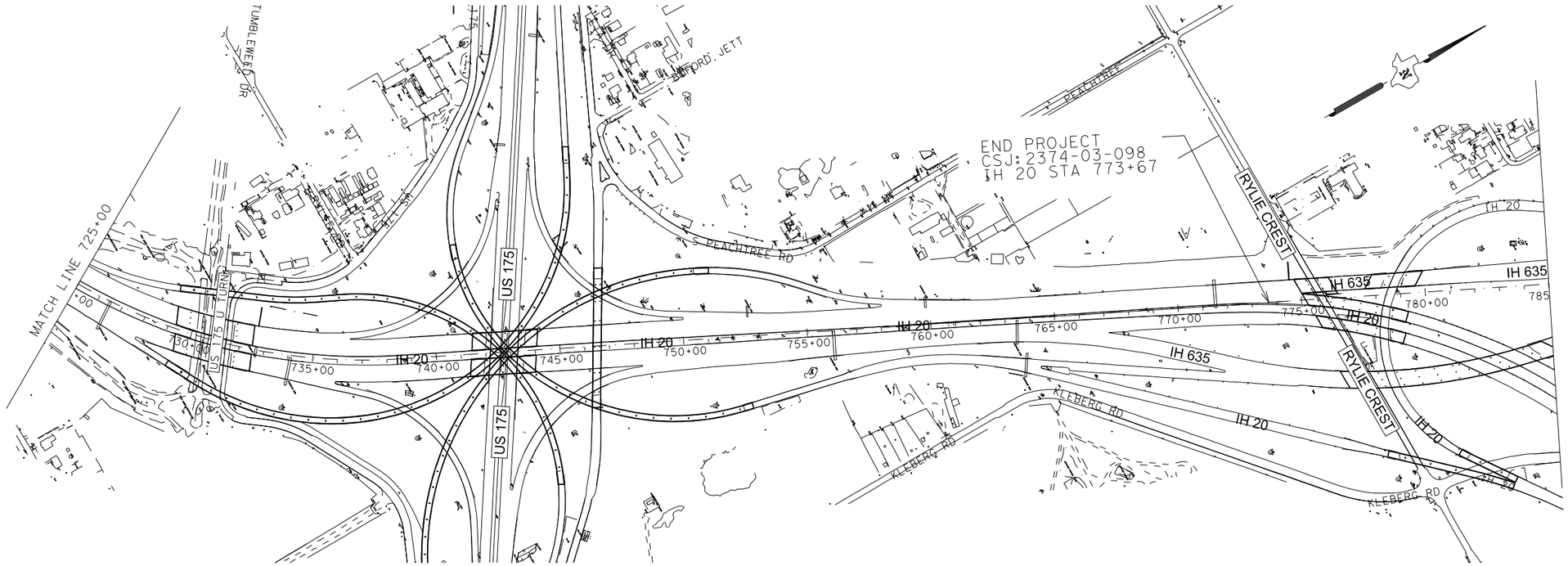

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

Signature of Registrant & P.E. 3/17/2023 Date

Texas Department of Transportation

SL 12

PROJECT LAYOUT

SCALE: 1"=500' SHEET 3 OF 3

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	5
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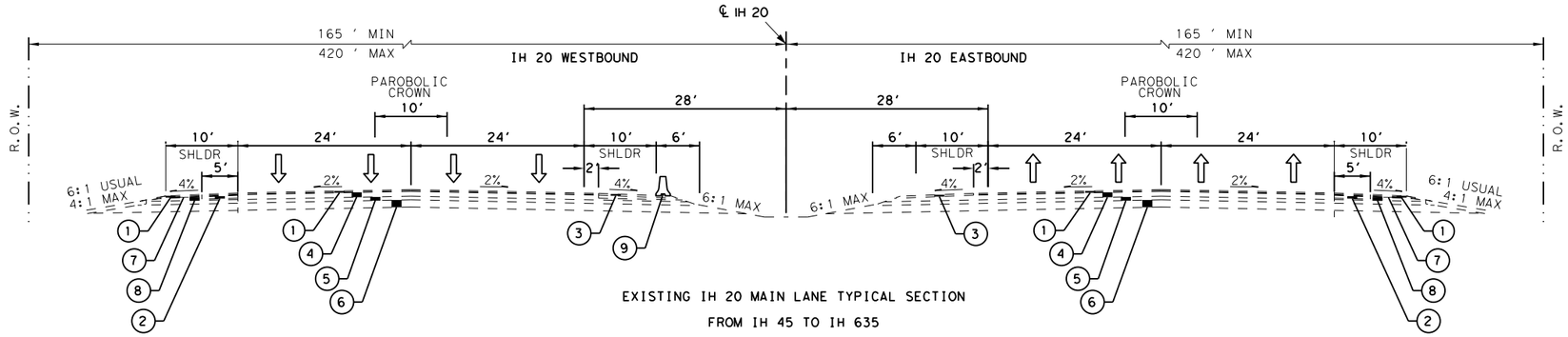
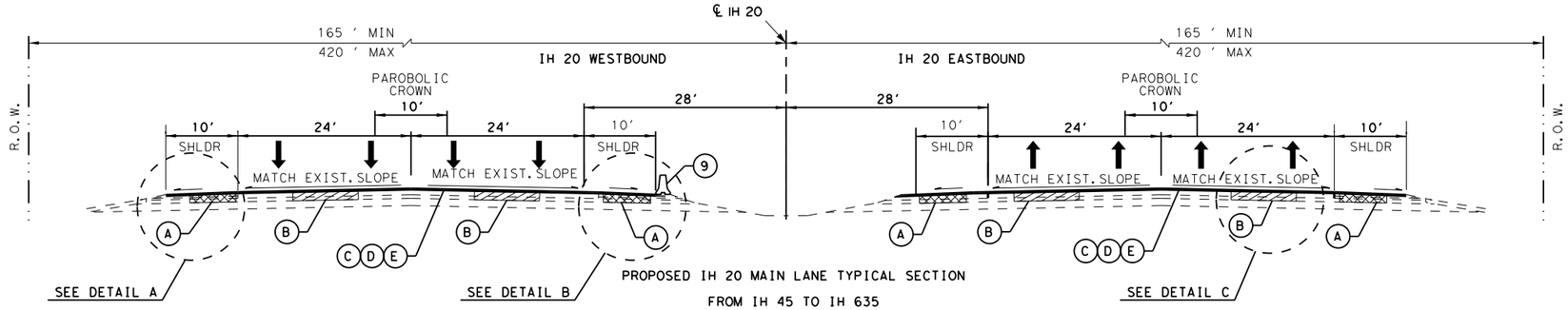


EXISTING IH 20 MAIN LANE TYPICAL SECTION

FROM IH 45 TO IH 635

STA 427+25 TO 773+67



PROPOSED IH 20 MAIN LANE TYPICAL SECTION

FROM IH 45 TO IH 635

STA 427+25 TO 773+67

LEGEND

1. EXIST 3" HMA
2. EXIST 4" HMAC (TY D) (SPOT)
3. EXIST 0"- 3" HMAC (TY D)
4. EXIST 9" CRCP
5. EXIST 6" SOIL CEMENT BASE
6. EXIST 12" BORROW WITH TOP 6" STABILIZED WITH 4% LIME
7. EXIST 1" 125 #/SY ACP
8. EXIST ASPHALT STABILIZED BASE (TY A)
9. EXIST CONCRETE TRAFFIC BARRIER, WB ONLY

A. 9" FLEX. PAVEMENT REPAIR (SUPERPAVE SP-B) (PG 64-22)

B. PROP.CONC. FULL DEPTH REPAIR 9" CRCP (SPOT)

(PROPOSED 4" HMA, SP-B PG 64-22 FOR REPAIR UNDERNEATH NEW CONC. (SPOT) WHERE APPLICABLE AND IDENTIFIED AT THE FIELD BY ENGINEER, IF NEEDED THEN WILL BE SUBSIDIARY TO FULL DEPTH REPAIR ITEM.)

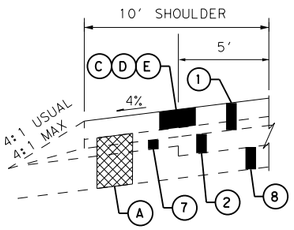
C. 2.25" STONE-MTRX-ASPH SMA-C SAC-A PG76-22

D. SPRAY APPLIED MEMBRANE UNDERSEAL

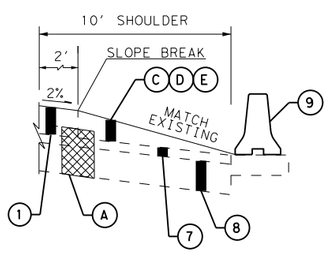
E. PLANE ASPHALT CONCRETE PAVEMENT (0" TO 2.25")

NOTES:

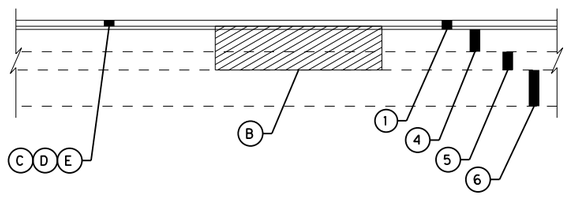
1. FULL DEPTH REPAIR LOCATIONS TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO MILL & OVERLAY OPERATION. THE ENGINEER WILL ASSESS THE CONDITION OF BASE MATERIAL IN THE FIELD TO DETERMINE DEPTH OF REPAIR. REPAIR OF BASE MATERIAL IS SUBSIDIARY TO ITEM 361.
2. THE ENGINEER RESERVES THE RIGHT TO EXTEND, REDUCE OR CHANGE THE PAVING LIMITS.
3. FLEX. PAVEMENT REPAIR AREAS TO BE IDENTIFIED IN THE FIELD BY THE ENGINEER.
4. ENSURE ADEQUATE DRAINAGE AT EXISTING INLETS.
5. A MINIMUM LENGTH OF FULL DEPTH REPAIR SHALL BE 6'x 6' OR HALF WIDTH OF LANE, OR FULL WIDTH OF LANE.



DETAIL A
TYP SHLDR TRANSITION



DETAIL B
SHLDR TRANSITION AT CONC BARRIER



DETAIL C
FULL DEPTH CONCRETE REPAIR

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED PROFESSIONAL ENGINEER

P.E. 3/27/2023
Signature of Registrant & Date

IH 20
TYPICAL SECTIONS

N.T.S.

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
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	2374	03	098	

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SPECIFICATION DATA

Table 1: Basis of Estimate for Permanent Construction					
Item	Description	Thickness	Rate		Quantity
161	Compost Manuf Topsoil	4”	N/A		1550 SY
162	Block Sod	N/A	See Specifications		1550 SY
166 *	Fertilizer (12-6-6)	N/A	500	Lbs./Ac	0.08 Ton
168	Vegetative Watering (Warm)**	N/A	12	MG/Ac/Day	231 MG

*For contractor’s information only
**Use Summer rate for calculation, adjust for actual field conditions/temperatures as necessary. See Vegetation Establishment Plan Sheet for estimated daily rates.

Table 2: Basis of Estimate for Permanent Construction					
Item	Description	Thickness	Rate		Quantity
3002	Membrane Underseal	N/A	0.20	Gal/SY	97,908 Gal
3080	STONE-MTRX-ASPH SMA-C SAC-A PG76-22	2.25”	110	Lbs./SY/In	66,639 Ton

Note: (1) Asphalt weight based on 110 Lbs./SY/In

GENERAL

The construction, operation and maintenance of the proposed project will be consistent with the state implementation plan as prepared by the Texas Commission on Environmental Quality.

The disturbed area for this project, as shown on the plans is 2.44 acres. However, the Total Disturbed Area (TDA) will establish the required authorization for storm water discharges. The TDA of this project will be determined by the sum of the disturbed area in all project locations in the contract, and all disturbed area on all Project-Specific Locations (PSL) located in the project limits and/or within 1 mile of the project limits. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction site as shown on the plans, according to the TDA of the project. The contractor will obtain any required authorization from the TCEQ for the discharge of storm water from any PSL for construction support activities on or off of the project row according to the TDA of the project. When the TDA for the project exceeds 1 acre, provide a copy of the appropriate application of permit (NOI, or Construction Site Notice) to the engineer, for any PSL located in the project limits or within 1 mile of the project limits. Follow the directives and adhere to all requirements

set forth in the TCEQ, Texas Pollution Discharge Elimination System, Construction General Permit (TPDES, CGP).

This project requires permitting with environmental resources agencies. There is a high probability that an environmentally sensitive area could be encountered on the contractor designated Project-Specific Locations (PSL) for this project (haul roads, equipment staging areas, borrow pits, disposal sites, field offices, storage areas, parking areas, etc.). Item 7.6 “Project-Specific Locations”, provides a listing of regulatory agencies that may need to be contacted regarding this project.

Leave all right of way areas undisturbed until actual construction is to be performed in said areas.

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:
https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors

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

Nathan Petter: Nathan.Petter@txdot.gov
Dung Nguyen: Dung.Nguyen@txdot.gov

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

All contractor questions will be reviewed by the Engineer. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page.

The Letting Pre-Bid Q&A web page for each project can be accessed by using the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

Item 5:
Underground utilities owned by the Texas Department of Transportation may be present within the Right-Of-Way on this project. For signal, illumination, surveillance, and communications & control maintained by TxDOT, call the TxDOT Traffic Signal Office (214-320-6682) for locates a minimum of 48 hours in advance of excavation. For irrigation systems, call TxDOT Landscape Office (214-320-6205) for locates a minimum of 48 hours in advance of excavation. If city or town owned irrigation facilities are present, call the appropriate department of the local city or town a minimum of 48 hours in advance of excavation. The Contractor is liable for all damages when utilities are damaged due to Contractor’s negligence including, but not limited to, repair or replacement at the Contractor’s expense.

For the project to be deemed complete, permanently stabilize all unpaved disturbed areas of the project with a vegetative cover at a minimum of 70% density for the control of erosion.

Submit all shop drawings, working drawings, or other documents which require review sufficiently in advance of scheduled construction to allow no less than thirty (30) calendar days for review and response.

Item 7:
Repair or replace any structures and utilities that might have been damaged by negligence or a failure to have utility locates performed.

Patrol vehicles must be clearly marked to correspond with the officer's agency and equipped with appropriate lights to identify them as law enforcement. For patrol vehicles not owned by a law enforcement agency, markings will be retroreflective and legible from 100 ft. from both sides and the rear of the vehicle. Lights will be high intensity and visible from all angles.

Holiday restrictions – The Engineer may decide that no lane closures or construction operations shall be allowed during the restricted periods listed in the following holiday schedule. TxDOT has the right to lengthen, shorten, or otherwise modify these restricted periods as actual, or expected, traffic conditions may warrant. Working days will not be charged for these restricted periods. No additional compensation will be allowed for these closures (i.e., overhead, delays, stand-by, barricades or any other associated cost impacts).

- New Year's Eve and Day (5 am on December 31 thru 10:00 pm January 1)
- Easter Holiday weekend (5 am on Friday thru 10:00 pm Sunday)
- Memorial Day weekend (5 am on Friday thru 10:00pm Monday)
- Independence Day (5 am on July 3 thru 10:00 pm on July 5)
- Labor Day weekend (5 am on Friday thru 10:00 pm Monday)
- Thanksgiving Holiday (5 am on Wednesday thru 10:00 pm Sunday)
- Christmas Holiday (5 am on December 23 thru 10:00 pm December 26)

No significant traffic generator events identified.

Item 8:
This Project will be a Standard Workweek.

Nighttime work is allowed in accordance with Article 8.3.3.

Meet weekly with the engineer to notify him or her of planned work for the upcoming week.

Provide the engineer with a daily work schedule of planned work.

Per Special Provision 008-045, this contract includes Lane Closure Assessment Fees for lane closures that remain in place and impeding traffic on the mainlanes of IH 20 after the specified closure time has elapsed. Lane closure times are addressed under item 502. Lane Closure Assessment Fees are outlined in table 8-1.

Table 8-1 – IH 20 General Purpose Lane Closure Assessment Fees.
(Fees will be charged in 15 min increments)

Liquidated Damages (Per Hour)	
1 Lane Closed	$3,500
2 or more Lanes Closed	$50,000

Item 104:
Sawing of concrete is not paid for directly, but is considered subsidiary to this item.

Item 160:
Sequence construction operations to salvage topsoil from one location and spread on areas ready to receive topsoil. Keep stockpiling of topsoil to a minimum.

Use fertile clay or loam from the project site not more than six inches below natural grade as topsoil.

Item 161:
Provide tickets representing quantity of compost delivered to site.

Item 301:
Provide liquid antistripping agents unless otherwise directed. Add the minimum dosage determined by the manufacturer or higher dosage determined by design requirement and try subsequent trials at 0.25% increments.

Item 320:
Use a self-propelled wheel mounted MTV capable of receiving mix from the haul trucks, separate from the paver. It shall have a minimum storage capacity of approximately 25 tons. It shall be equipped with a pivoting discharge conveyor and shall completely and thoroughly remix the material prior to placement. The effectiveness of the MTV's remixing ability is subject to the approval of the Engineer. In addition, the paver shall have a surge storage insert with a minimum capacity of 20 tons.

Item 354:
Remove the loose material from the roadway before opening to traffic.

Patch pavement cut to excessive depth by equipment failure with an approved epoxy material. Re-plane patched area to an acceptable approved ride quality. Payment for these corrections is subsidiary to this item.

Take possession of recycled asphalt pavement from the project and recycle the material.

Item 361:
Provide Class HES concrete designed to attain a minimum average flexural strength of 255 psi or a minimum average compressive strength of 1,800 psi within the allowed lane closure times.

All permanent pavement markings which are removed during the removal of the existing concrete pavement are to be replaced as directed by the Engineer. These pavement markings will not be paid for directly, but will be considered subsidiary to this bid item.

Tining will be required as described in Item 360.4.8.3 unless otherwise directed by the Engineer. Surface Test Type A utilizing a 10' straight edge as described under Item 585 will be required unless otherwise directed by the Engineer.

Item 421:
Furnish mix designs to the Engineer in a format compatible to the latest version of the Department's Construction Management System (Site Manager). Mix Design templates will be provided by the Engineer.

Supply the Engineer with a list of certified personnel and copies of their current ACI certificates before beginning production and when personnel changes are made. Supply hard copies of calibration reports for testing equipment when required by the Engineer.

Item 500:
Material On Hand (MOH) will not be used in calculating partial payments for Mobilization.

Item 502:
The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Access will be provided to all business and residences at all times. Where turning radii are limited during phased construction at intersections, provide all weather surfaces such as RAP or base in turning movements to accommodate and to protect the traffic from edge drop-offs. Materials, labor, maintenance and removal for these temporary accesses and radii will not be paid for directly but will be considered subsidiary to the various bid items.

Provide written proposed lane closure information by 1:00 pm on the business day prior to the proposed closures. Do not close lanes when this requirement is not met.

When excavation is required next to a pavement lane carrying traffic and the widening is not completed by the end of the work day, backfill against the edge of the pavement with at least a 3:1 slope using an acceptable material to support vehicular traffic. Carefully remove and dispose of this material when work resumes. Backfilling pavement edges, and the materials required for the work will be subsidiary to this item.

Place barricades and signs in locations that do not obstruct the sight distance of drivers entering the highway from driveways or side streets.

Provide rectangular shape (CW12-2a) Temporary Clearance Signs on all bridges where the existing vertical clearance has changed. Install Signs to the satisfaction of the Engineer prior to opening to traffic. Plywood sign blanks will have minimum dimensions of 84" X 24". Work performed and materials are subsidiary to this item.

Do not operate or park any equipment/machinery closer than 30 feet from the traveled roadway after sunset unless authorized by the engineer.

When moving unlicensed equipment on or across any pavement or public highways, protect the pavement from all damage using an acceptable method.

As approved by the Engineer, provide uniformed off duty police officers and squad cars during lane or ramp closures, night time work or other situations that indicate a need for additional traffic control to protect the traveling public or the construction workforce. Provide documentation such as payroll, log sheets with signatures and badge number, or invoices from the government entity providing the officers for reimbursement. Complete the weekly tracking form provided by the department and submit invoices that agree with the tracking form for payment at the end of each month approved services were provided. Reimbursement will not be made for coordination fees charged by any party.

Lane closures Monday thru Sunday from 5:00 AM to 9:00 PM are not allowed. In the event that lanes are to be closed due to construction activities, liquidated damages will be charged. Additional lanes may be closed with the Engineer's approval. Liquidated damages are addressed under Item 8 and the hourly fee is outlined in table 8-1.

Traffic Control Plans with Lane Closures causing backups of 20 minutes or greater in duration will be modified by the Engineer up to and including removal of the lane closure and adjustment of lane closure times.

Work in other areas of the project is not restricted to this time frame

Additional lanes may be closed, started earlier, or extended later with written permission of the Engineer.

Item 506:
Take all practicable precautions to prevent debris from being discharged into the Waters of Texas or a designated wetland. Install Best Management Practices before demolition begins and maintain them during the demolition. Remove any debris or construction material that escapes containment devices and are discharged into the restricted areas, before the next rain event or within 24 hours of the discharge.

If temporary construction stream crossings are allowed under a Nationwide Permit, submit in writing for approval the type and location of each temporary stream crossing. Use temporary bridges, timber mats, or other structurally sound and non-eroding material for temporary stream crossings. A temporary culvert crossing will consist of storm sewer pipes and 4- to 8-inch nominal size rock. Temporary stream crossings must not cause more than minimal changes to the hydraulic flow characteristics of the stream, increase flooding, or cause more than minimal

degradation of water quality. Remove the temporary stream crossings in their entirety and return the affected areas to their pre-existing elevation. All work and materials use for temporary construction stream crossings will not be paid for directly but are subsidiary to pertinent Items.

Provide SW3P Signs. Obtain from the Engineer a copy of the project's completed TPDES Storm Water Program Construction Site Notice and Contractor Site Notice. Laminate the sheets and bond with adhesive to 36" X 36" plywood sign blanks. Ensure the sheets remain dry. Apply Type C Blue reflective sheeting as the background and add the text "SW3P" in 5" white lettering, centered at the top. Attach the signs to approved temporary mounts and locate at each of the project limits just inside the right of way line at a readable height or as directed by the Engineer. If the sign cannot be placed outside the clear zone, it must adhere to the TMUTCD. SW3P signs, maintenance, and reposting (for replacement or as needed to ensure readability) will be subsidiary to Item 502.

Concrete Washouts are required per the CGP. The Concrete Washout Area(s) structural controls must consist of temporary berms, temporary shallow pits, and/or temporary storage tanks to prevent contaminated runoff and must be lined as to prevent contamination of underlying soil. Ensure pits properly maintained including removal of concrete as not to allow over flow. The location(s) of washout area will be approved by the Engineer. When washout pits are no longer needed, they will be removed and area will be restored to original condition. This work, materials and labor will not be measured or paid for directly but will be subsidiary to Item 506, "Temporary Erosion, Sedimentation, and Environmental Controls."

Item 512:
The contractor will furnish pre-cast F Shape Barriers for traffic control, and remove and retain possession of non-permanent barriers at the end of the project. Pre-cast F Shape Barriers must have drainage slots as detailed on the Concrete Safety Barrier Standards. Submit for approval the type of barrier joint connection proposed for the project.

Item 540:
Furnish one type of post throughout the project except as specifically noted in the plans.

Item 542:
Metal beam guard fence removed from this project is to be retained and disposed of by the contractor.

Item 585:
Use Surface Test Type B pay adjustment schedule 3 on the travel lanes.

Use Surface Test Type B pay adjustment schedule 3 on the ramps.

Items 662 and 672:
Black adhesive will be used on asphalt pavements and white adhesive will be used on concrete pavements.

Item 677:
A water blasting method approved by the Engineer will be the only method allowed for the removal of permanent and temporary pavement markings except on a sealcoat surface. A 2 foot wide sealcoat will be required on sealcoat surfaces to eliminate permanent and temporary pavement markings.

Item 721:
Black patching material must be used for repairs on hotmix asphalt pavement sections. Gray patching material must be used for repairs on concrete pavement sections.

Item 3080:
Use aggregate that meets the Surface Aggregate Classification (SAC) requirement of Class A.

Provide PG binder 76-22 in Type D mixture.

Item 6185:
The total number of truck mounted attenuators (TMAs) or trailer attenuators (TAs) required when utilizing the traffic control standards are shown in the tables below.

TCP 3 Series	Scenario			Required TMA/TA
(3-3)-14	A	B	D	2
	C			3

TCP 5 Series	Scenario		Required TMA/TA
(5-1)-18	A	B	1

TCP 6 Series	Scenario		Required TMA/TA	
(6-1)-12	A	B	1	2
(6-2)-12 / (6-3)-12	All		1	
(6-4)-12	A	B	1	2
(6-5)-12	A	B	1	2
(6-8)-14	All		1	

The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMAs/TAs needed for the project. Additional TMAs/TAs used that are not specified in the plans in which the contractor expects compensation will require prior approval from the Engineer.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 2374-03-098 **DISTRICT** Dallas **COUNTY** Dallas
HIGHWAY IH 20

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**2374-03-098**			
		PROJECT ID		**A00141251**			
		COUNTY		**Dallas**			
		HIGHWAY		**IH 20**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	104-6009	REMOVING CONC (RIPRAP)	SY	503.000		503.000	
	161-6017	COMPOST MANUF TOPSOIL (4")	SY	1,550.000		1,550.000	
	162-6002	BLOCK SODDING	SY	1,550.000		1,550.000	
	168-6001	VEGETATIVE WATERING	MG	231.000		231.000	
	351-6005	FLEXIBLE PAVEMENT STRUCTURE REPAIR(9")	SY	1,766.000		1,766.000	
	354-6067	PLAN ASPH CONC PAV(0" TO 2.25")	SY	489,540.000		489,540.000	
	361-6003	FULL - DEPTH REPAIR CRCP (9")	SY	3,134.000		3,134.000	
	401-6001	FLOWABLE BACKFILL	CY	49.000		49.000	
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	588.000		588.000	
	429-6009	CONC STR REPAIR (STANDARD)	SF	10.000		10.000	
	432-6008	RIPRAP (CONC)(CL B)(RR8&RR9)	CY	99.000		99.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	84.000		84.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	1,113.000		1,113.000	
	438-6008	CLEANING AND SEALING JOINTS (CL 7)	LF	1,511.000		1,511.000	
	451-6024	RETROFIT RAIL (TY SSTR)	LF	2,218.000		2,218.000	
	454-6008	HEADER TYPE EXPANSION JOINT	CF	460.000		460.000	
	454-6009	JOINT SEALANT	LF	2,740.000		2,740.000	
	495-6001	RAISING EXIST STRUCT	LS	1.000		1.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	13.000		13.000	
	506-6003	ROCK FILTER DAMS (INSTALL) (TY 3)	LF	330.000		330.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	330.000		330.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	468.000		468.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	468.000		468.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	3,000.000		3,000.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	3,000.000		3,000.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	1,000.000		1,000.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	1,000.000		1,000.000	
	512-6094	PTB (FUR & INST)(STEEL)	LF	500.000		500.000	
	512-6095	PTB (MOVE)(STEEL)	LF	1,800.000		1,800.000	
	512-6096	PTB (REMOVE)(STEEL)	LF	500.000		500.000	
	529-6036	CONCRETE CURB (SPECIAL)	LF	200.000		200.000	
	533-6003	RUMBLE STRIPS (SHOULDER) ASPHALT	LF	120,124.000		120,124.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	20,718.000		20,718.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	47.000		47.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	35.000		35.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	22,149.000		22,149.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 2374-03-098 **DISTRICT** Dallas **COUNTY** Dallas
HIGHWAY IH 20

		CONTROL SECTION JOB		**2374-03-098**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00141251**			
		COUNTY		**Dallas**			
		HIGHWAY		**IH 20**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA	16.000		16.000	
	542-6003	REMOVE DOWNSTREAM ANCHOR TERMINAL	EA	19.000		19.000	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	7.000		7.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	39.000		39.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	41.000		41.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	3.000		3.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA	2.000		2.000	
	545-6010	CRASH CUSH ATTEN (INSTL)(L)(W)(TL3)	EA	1.000		1.000	
	545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	1.000		1.000	
	658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA	100.000		100.000	
	658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	100.000		100.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	452.000		452.000	
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	26,892.000		26,892.000	
	666-6081	REFL PAV MRK TY I(W)(ENTR GORE)(100MIL)	EA	12.000		12.000	
	666-6084	REFL PAV MRK TY I(W)(EXIT GORE)(100MIL)	EA	13.000		13.000	
	666-6162	RE PV MRK TY I(BLACK)6"(SHADOW)(100MIL)	LF	52,020.000		52,020.000	
	666-6225	PAVEMENT SEALER 6"	LF	31,760.000		31,760.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	52,020.000		52,020.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	69,286.000		69,286.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	69,286.000		69,286.000	
	668-6115	PREFAB PAV MRK TY C (MULTI) (SHIELD)	EA	9.000		9.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	2,598.000		2,598.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	18,080.000		18,080.000	
	677-6002	ELIM EXT PAV MRK & MRKS (6")	LF	13,680.000		13,680.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	31,760.000		31,760.000	
	721-6002	FIBER REINFORCED POLYMER PATCHING MATLS	LB	14,558.000		14,558.000	
	780-6004	CNC CRCK REPAR(DISCRETE)(ROUT AND SEAL)	LF	35.000		35.000	
	785-6004	BRIDGE JOINT REPAIR (ARMOR)	LF	354.000		354.000	
	785-6010	BRIDGE JOINT REPLACEMENT (ARMOR)	LF	82.000		82.000	
	3002-6001	MEMBRANE UNDERSEAL	GAL	97,908.000		97,908.000	
	3080-6001	STONE-MTRX-ASPH SMA-C SAC-A PG76-22	TON	66,639.000		66,639.000	
	4171-6001	INSTALL BRIDGE IDENTIFICATION NUMBERS	EA	2.000		2.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	438.000		438.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	219.000		219.000	
	7000-6002	REML & DISPL DRIFTWOOD & DEBRIS	LS	1.000		1.000	
	08	CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)	LS	1.000		1.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 2374-03-098 **DISTRICT** Dallas **COUNTY** Dallas
HIGHWAY IH 20

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**2374-03-098**			
		PROJECT ID		**A00141251**			
		COUNTY		**Dallas**			
		HIGHWAY		**IH 20**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	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	

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SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

LOCATION	512 6094	512 6095	512 6096	545 6003	545 6005	545 6019	662 6109
	PTB (FUR & INST)(STEEL)	PTB (MOVE)(STEEL)	PTB (REMOVE)(STEEL)	CRASH CUSH ATTEN (MOVE & RESET)	CRASH CUSH ATTEN (REMOVE)	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	WK ZN PAV MRK SHT TERM (TAB)TYW
	LF	LF	LF	EA	EA	EA	EA
IH 20 EB	500	825		1			13,446
IH 20 WB		975	500	2	2	1	13,446
PROJECT TOTALS	**500**	**1,800**	**500**	**3**	**2**	**1**	**26,892**

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	161 6017	162 6002	168 6001	506 6003	506 6011	506 6020	506 6024	506 6038	506 6039	506 6041	506 6043
	COMPOST MANUF TOPSOIL (4")	BLOCK SODDING	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 3)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
	SY	SY	MG	LF	LF	SY	SY	LF	LF	LF	LF
IH 20 EB	600	600	231	150	150	234	234	1500	1500	500	500
IH 20 WB	950	950		180	180	234	234	1500	1500	500	500
PROJECT TOTALS	**1550**	**1550**	**231**	**330**	**330**	**468**	**468**	**3000**	**3000**	**1000**	**1000**

SUMMARY OF ROADWAY ITEMS

LOCATION	351 6005	354 6067	361 6003	432 6045	454 6008	454 6009	502 6001	533 6003	540 6001	540 6006	540 6016	542 6001	542 6002	542 6003	542 6004
	FLEXIBLE PAVEMENT STRUCTURE REPAIR(9")	PLAN ASPH CONC PAV(0" TO 2.25")	FULL - DEPTH REPAIR CRCP (9")	RIPRAP (MOW STRIP)(4 IN)	HEADER TYPE EXPANSION JOINT	JOINT SEALANT	BARRICADES, SIGNS AND TRAFFIC HANDLING	RUMBLE STRIPS (SHOULDER) ASPHALT	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	DOWNSTREAM ANCHOR TERMINAL SECTION	REMOVE METAL BEAM GUARD FENCE	REMOVE TERMINAL ANCHOR SECTION	REMOVE DOWNSTREAM ANCHOR TERMINAL	RM MTL BM GD FENCE TRANS (THRIE-BEAM)
	SY	SY	SY	CY	CF	LF	MO	LF	LF	EA	EA	LF	EA	EA	EA
IH 20 EB	870	241,175	1,544	672	230	1370	13	60,062	12,425	33	21	13,189	8	10	5
IH 20 WB	896	248,365	1,590	441	230	1370		60,062	8,293	14	14	8,960	8	9	2
PROJECT TOTALS	**1,766**	**489,540**	**3,134**	**1,113**	**460**	**2,740**	**13**	**120,124**	**20,718**	**47**	**35**	**22,149**	**16**	**19**	**7**

SUMMARY OF ROADWAY ITEMS

LOCATION	544 6001	544 6003	545 6010	658 6013	658 6026	658 6061	721 6002	3002 6001	3080 6001	6001 6002	6185 6002	6185 6005	7000 6002
	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)	CRASH CUSH ATTEN (INSTL)(L)(W)(TL3)	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	FIBER REINFORCED POLYMER PATCHING MATLS	MEMBRANE UNDERSEAL	STONE-MTRX-ASPH SMA-C SAC-A PG76-22	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)	REML & DISPL DRIFTWOOD & DEBRIS
	EA	EA	EA	EA	EA	EA	LB	GAL	TON	EA	DAY	DAY	LS
IH 20 EB	23	24		50	50	270	7,173	48,235	32,830	1	438	219	1 *
IH 20 WB	16	17	1	50	50	182	7,385	49,673	33,809	1			
PROJECT TOTALS	**39**	**41**	**1**	**100**	**100**	**452**	**14,558**	**97,908**	**66,639**	**2**	**438**	**219**	**1 ***

* REFER TO BRIDGE SHEET 80 FOR LOCATIONS

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	666 6081	666 6084	666 6162	666 6225	666 6306	666 6309	666 6321	668 6115	672 6010	677 6001	677 6002	678 6002
	REFL PAV MRK TY I(W)(ENTR GORE)(100MIL)	REFL PAV MRK TY I(W)(EXIT GORE)(100MIL)	RE PV MRK TY I(BLACK)6"(SHADOW)(100MIL)	PAVEMENT SEALER 6"	RE PM W/RET REQ TY I (W)6"(BRK)(100 MIL)	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	PREFAB PAV MRK TY C (MULTI) (SHIELD)	REFL PAV MRKR TY II-C-R	ELIM EXT PAV MRK & MRKS (4")	ELIM EXT PAV MRK & MRKS (6")	PAV SURF PREP FOR MRK (6")
	EA	EA	LF	LF	LF	LF	LF	EA	EA	LF	LF	LF
IH 20 EB	6	6	26,010	15,880	26,010	34,643	34,643	9	1,299	9,040	6,840	15,880
IH 20 WB	6	7	26,010	15,880	26,010	34,643	34,643		1,299	9,040	6,840	15,880
PROJECT TOTALS	**12**	**13**	**52,020**	**31,760**	**52,020**	**69,286**	**69,286**	**9**	**2,598**	**18,080**	**13,680**	**31,760**

IH 20

SUMMARY OF QUANTITIES

SHEET 1 OF 2

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	9
	2374	03	098	

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SUMMARY OF BRIDGE ITEMS

LOCATION	104 6009	401 6001	429 6007	429 6009	432 6008	432 6033	438 6008	451 6024	495 6001	529 6036	780 6004	785 6004	785 6010	4171 6001
	REMOVING CONC (RIPRAP)	FLOWABLE BACKFILL	CONC STR REPAIR (VERTICAL & OVERHEAD)	CONC STR REPAIR (STANDARD)	RIPRAP (CONC) (CL B) (RR8&RR9)	RIPRAP (STONE PROTECTION) (18 IN)	CLEANING AND SEALING JOINTS (CL 7)	RETROFIT RAIL (TY SSTR)	RAISING EXIST STRUCT	CONCRETE CURB (SPECIAL)	CONC CRCK REPR (DISCRETE) (ROUT AND SEAL)	BRIDGE JOINT REPAIR (ARMOR)	BRIDGE JOINT REPLACEMENT (ARMOR)	INSTALL BRIDGE IDENTIFICATION NUMBERS
	SY	CY	SF	SF	CY	CY	LF	LF	LS	LF	LF	LF	EA	EA
IH 20														
18-057-0-2374-03-166		2		5		60								
18-057-0-2374-03-167		1				24								
18-057-0-2374-03-168			60				551	944				184		1
18-057-0-2374-03-190	6	1	78		1		482	944				170		1
18-057-0-2374-03-191	497	42	16	5	98									
18-057-0-2374-03-315		3	95				70			200				
18-057-0-2374-03-316			105				198	330	1				12	
18-057-0-2374-03-322			182				70						70	
18-057-0-2374-03-323			52				140				35			
PROJECT TOTALS	**503**	**49**	**588**	**10**	**99**	**84**	**1,511**	**2,218**	**1**	**200**	**35**	**354**	**82**	**2**

IH 20

SUMMARY OF QUANTITIES

SHEET 2 OF 2

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	10
	2374	03	098	

GENERAL:

1. INSTALL BARRICADES AND ADVANCED WARNING SIGNS PER BC STANDARDS, TCP STANDARDS, WORK ZONE STANDARDS AND/OR AS DIRECTED BY THE ENGINEER. THE SIGNS, BARRICADES, OR OTHER WARNING DEVICES SHOWN SHALL BE CONSIDERED MINIMUM AND ADDITIONAL SIGNS, BARRICADES, OR WARNING DEVICES DEEMED NECESSARY BY THE ENGINEER OR DICTATED BY FIELD CONDITIONS SHALL BE PROVIDED ACCORDING TO ALL APPLICABLE STANDARDS. ADDITIONAL SIGNS OR BARRICADES WILL NOT BE PAID FOR DIRECTLY BUT SHALL BE SUBSIDIARY TO THE BID ITEM 502 "BARRICADES, SIGNS, AND TRAFFIC HANDLING".

2. INSTALL SW3P CONTROL DEVICES (BMPs) TO PROTECT RECEIVING WATERS PRIOR TO CONSTRUCTION ACTIVITIES IN THEIR VICINITY, AS NEEDED AND/OR AS APPROVED BY THE ENGINEER. CONTRACTOR IS RESPONSIBLE FOR RE-VEGETATING SOILS DISTURBED BY PROJECT. DO NOT REMOVE BMPs UNTIL THEIR CONTROL AREA HAS BEEN STABILIZED.

3. SUBMIT A DETAILED SCHEDULE OF WORK TO THE PROJECT ENGINEER FOR APPROVAL PRIOR TO THE BEGINNING OF CONSTRUCTION WHICH GENERALLY CONFORMS TO THE SEQUENCE SHOWN ON THE TCP SEQUENCE OF WORK (SEE BELOW).

4. SUBMIT ANY REQUEST TO ALTER SEQUENCE OF OPERATION OF TRAFFIC CONTROL PLANS TO THE ENGINEER FOR WRITTEN APPROVAL PRIOR TO BEGIN CONSTRUCTION. ADDITIONAL COST OR TIME IS AT THE EXPENSE OF THE CONTRACTOR.

5. MAINTAIN TEMPORARY SIGNS WITHIN THE PROJECT LIMITS AND COVER OR REMOVE ANY EXISTING SIGN OR PAVEMENT MARKING THAT CONFLICTS WITH TCP TO AVOID CONFUSION FOR THE TRAVELING PUBLIC. TEMPORARY SIGNING SHALL BE PLACED AS NEEDED DURING ALL PHASES. PAYMENT FOR THIS WORK SHALL BE SUBSIDIARY TO ITEM 502 BARRICADES.

6. APPLY LANE CLOSURES AS SHOWN ON THE PLANS AND IN ACCORDANCE WITH TCP STANDARD SHEETS AND TMUTCD AND/OR AS DIRECTED BY THE ENGINEER.

7. PLACE PORTABLE CHANGEABLE MESSAGE SIGNS TO INFORM THE TRAVELING PUBLIC OF THE INTENT TO CLOSE MAINLANES AND/OR RAMPS 7 DAYS PRIOR TO CLOSURE.

SEQUENCE OF CONSTRUCTION:

1. THE CONTRACTOR SHALL COMPLETE ALL ITEMS OF WORK ON ONE SIDE OF IH 20 FIRST (EB OR WB) BEFORE PROCEEDING TO THE OTHER DIRECTION OF TRAVEL UNLESS OTHERWISE APPROVED BY THE ENGINEER.

2. PERFORM FULL DEPTH CONCRETE PAVEMENT REPAIR AND FLEXIBLE PAVEMENT REPAIR (SHOULDER) IN AREAS IDENTIFIED BY THE ENGINEER.

3. PERFORM BRIDGE REHABILITATION ITEMS.

4. MILL 2.25" HMA, APPLY MEMBRANE UNDERSEAL, THEN INLAY 2.25" SMA C ON IH 20 EB & WB LANES/SHOULDERS AND RAMPS. ALL MILLED AREAS SHALL BE INLAYED BEFORE OPENING LANES TO TRAFFIC.

5. INSTALL MBGF THRIE BEAM TRANSITION, REMOVE & REPLACE EXISITNG MBGF, REMOVE & REPLACE EXISTING SGT, REMOVE EXISTING TAS, INSTALL DAT AS SHOWN ON THE PLANS AND/OR AS DIRECTED BY THE ENGINEER.

6. PLACE PERMANENT PAVEMENT MARKINGS AND MARKERS THROUGHOUT THE PROJECT LIMITS.

7. REMOVE TEMPORARY SW3P CONTROL MEASURES AS DIRECTED OR AUTHORIZED BY ENGINEER.

8. FINAL PROJECT CLEAN UP.

TCP NOTES:

- THE PROJECT IS A "MILL & INLAY" OPERATION. PAVEMENT AND BRIDGE REPAIR WORK ARE TO BE DONE PRIOR TO MILL & INLAY OPERATION. ANY TEMPORARY MIX PLACED WILL BE SUBSIDIARY TO ITEM 361.
- IF ADDITIONAL MILLING AND INLAY IS REQUIRED DUE TO DEGRADING OF THE EXISTING HMA, MILLING WILL BE PAID FOR UNDER ITEM 354 AND LEVEL-UP UNDER ITEM 3080.
- PAVEMENT EDGE DROP- OFFS GREATER THAN 2" WILL NOT BE ALLOWED TO REMAIN. PROVIDE PAVEMENT EDGE DROP- OFFS WITH AN ACCEPTABLE MATERIAL TO FORM A 3:1 SLOPE OR FLATTER.
- THE CONTRACTOR SHOULD NOT REMOVE AND MOVE TO ANOTHER LOCATION WITHOUT REPLACING THE MBGF.
- TEMPORARY SW3P EROSION CONTROL MEASURES SHALL ONLY BE PLACED IN AREAS WHERE CONSTRUCTION ACTIVITIES ARE EXPECTED TO OCCUR WITHIN TWO WEEKS.
- MAINTAIN EXISTING DRAINAGE DURING ALL CONSTRUCTION ACTIVITIES AT EXISTING INLETS AND SLOTTED DRAINS.
- PLACE WORK ZONE TABS ON OVERLAY SURFACE PRIOR TO OPENING TO TRAFFIC. MAINTAIN WORK ZONE TABS UNTIL PERMANENT PAVEMENT MARKINGS ARE PLACED.

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

Signature of Registrant & P.E. 3/17/2023 Date

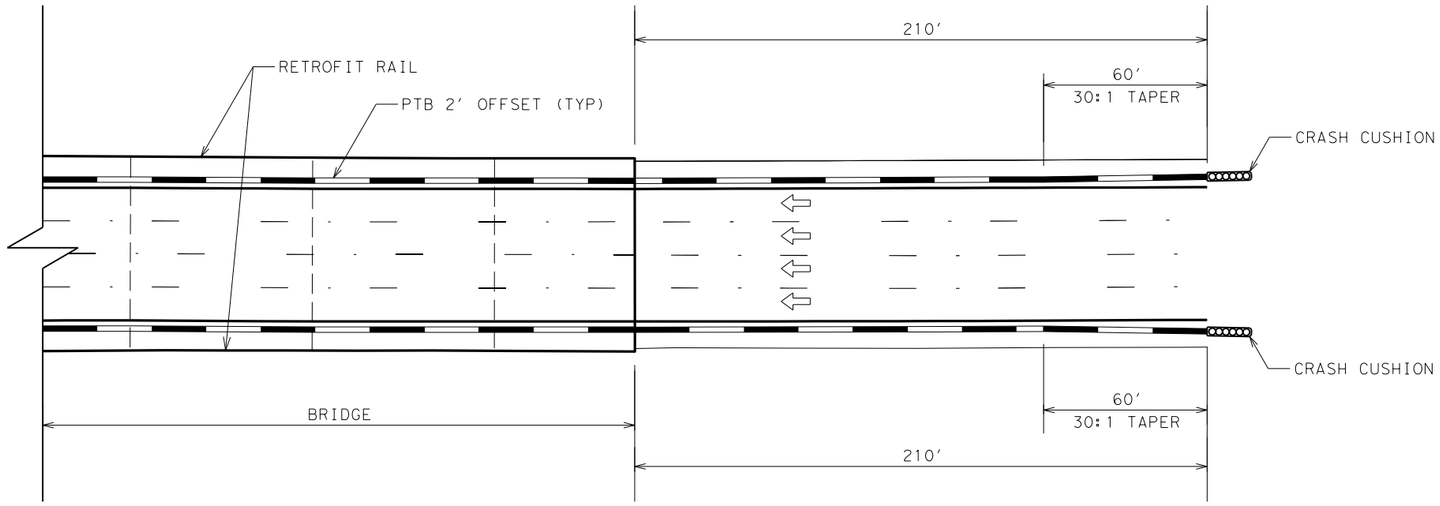
Texas Department of Transportation

IH 20

TCP NARRATIVE

SHEET 1 OF 1

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	
	2374	03	098	



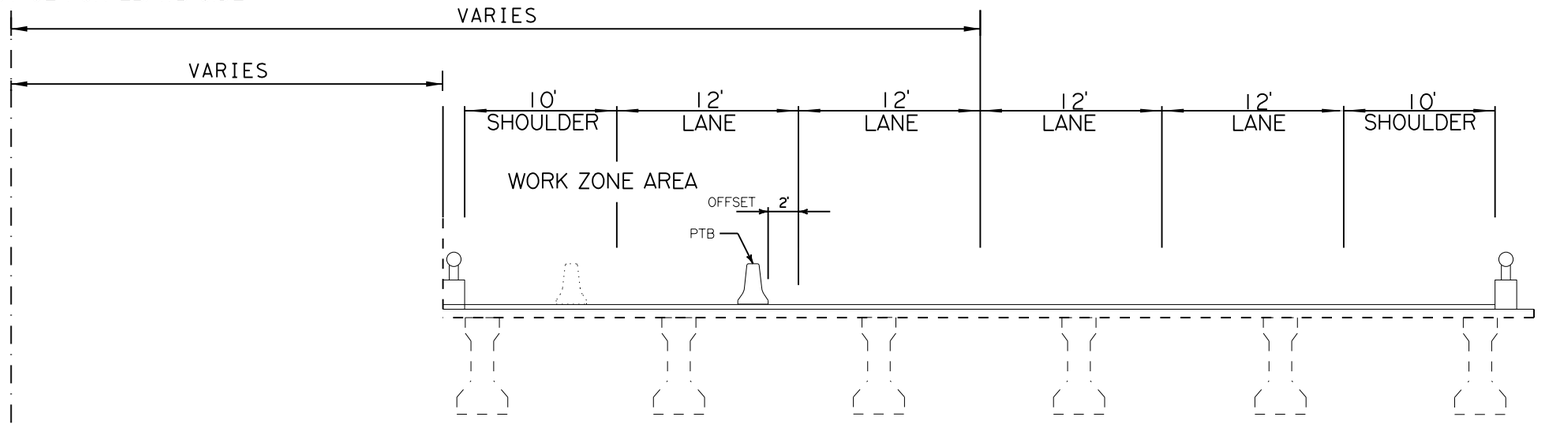
BARRIER PLACEMENT PLAN VIEW

NOTES:
LATERAL ADJUSTMENTS TO PTB MAY BE MADE DURING MAINLANE IH20/IH35E LANE CLOSURES. THESE LATERAL ADJUSTMENTS WILL BE CONSIDERED SUBSIDIARY TO THE INITIAL PLACEMENT AT EACH LOCATION.

DO NOT PLACE PTB ON INSIDE AND OUTSIDE SHOULDERS AT THE SAME TIME. SEE CRASH CUSHION SUMMARY SHEET FOR INSTALL, MOVE/RESET SEQUENCE.

℄ IH 20

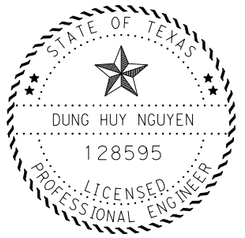
SYMMETRICAL ABOUT CL FOR EB/WB SIDE



TYPICAL BRIDGE PROFILE VIEW

TCP NOTES:

-PLACE SIGNS ACCORDING TO APPLICABLE TCP STANDARDS
-SEE TCP STANDARDS FOR DETAILS NOT SHOWN



Dung Nguyen, P.E. 3/17/2023
Signature of Registrant & Date

Texas Department of Transportation

IH 20

BARRIER PLACEMENT DETAILS

SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	12
	2374	03	098	

LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
															MOVE / RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC.#	N	W	N	W	N	W
1		37	IH 20 WB EXIT 473 C	443+00	TL-3	UNI	EXIST	N/A	PERM CTB	24"	32"			1				X				
2		37	IH 20 WB EXIT 473 C	443+00	TL-3	UNI	EXIST	N/A	PERM CTB	24"	32"		1					X				
3		44	PRAIRIE CREEK WB	609+52	TL-3	UNI	EXIST	N/A	PCTB	24"	32"		1								X	
4		44	PRAIRIE CREEK WB	609+52	TL-3	UNI	EXIST	N/A	PCTB	24"	32"				1	3					X	
5		44	PRAIRIE CREEK EB	614+00	TL-3	UNI	EXIST	N/A	PCTB	24"	32"				1	4					X	
6		49	US 175 FRONTAGE WB	732+40	TL-3	UNI	EXIST	N/A	PCTB	24"	32"			1	1	5					X	
												TOTALS	2	2	3							

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

FOR DEFINITIONS SEE THE "CRASH CUSHION CATEGORIZATION CHART.PDF" AT THE DESIGN DIVISION (ROADWAY STANDARDS) WEBSITE. USE QUICK LINKS TO ACCESS ATTENUATORS / CRASH CUSHIONS SECTION.
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/rdwyise.htm

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

Signature of Registrant & P.E. 3/27/2023 Date

CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:		CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		
	DAL	DALLAS		
	FEDERAL AID PROJECT			SHEET NO.
	SEE TITLE SHEET			13

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		14

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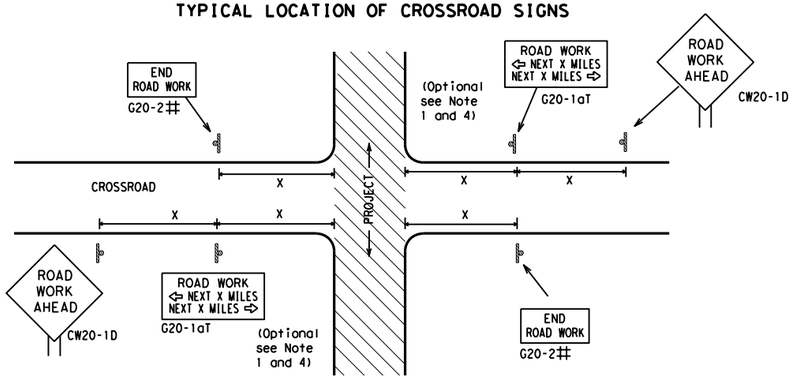
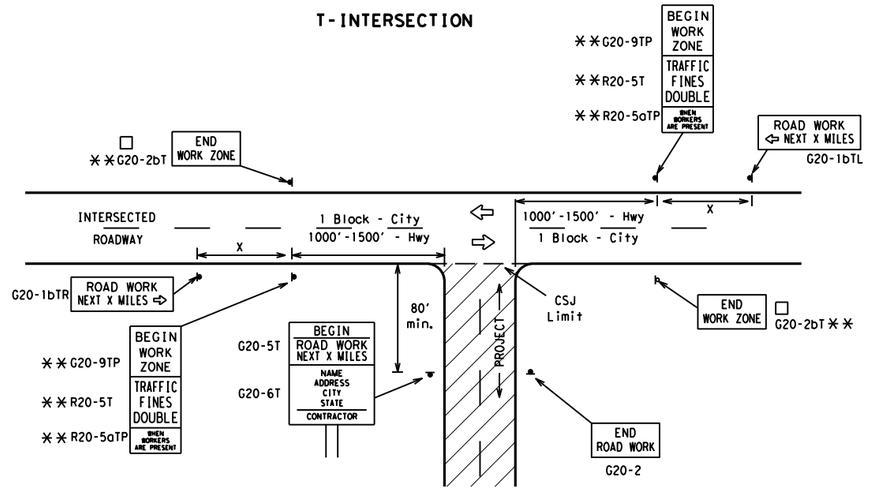
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

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

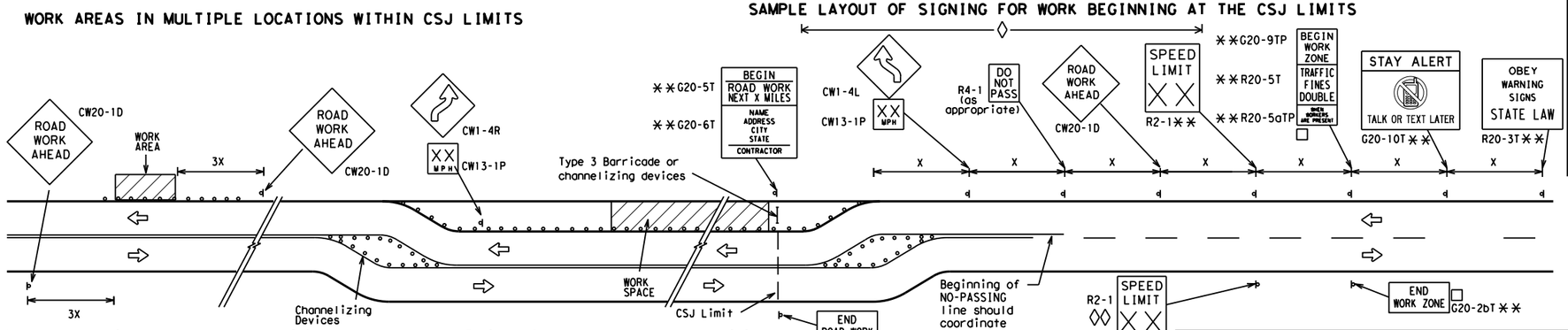
△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

GENERAL NOTES

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

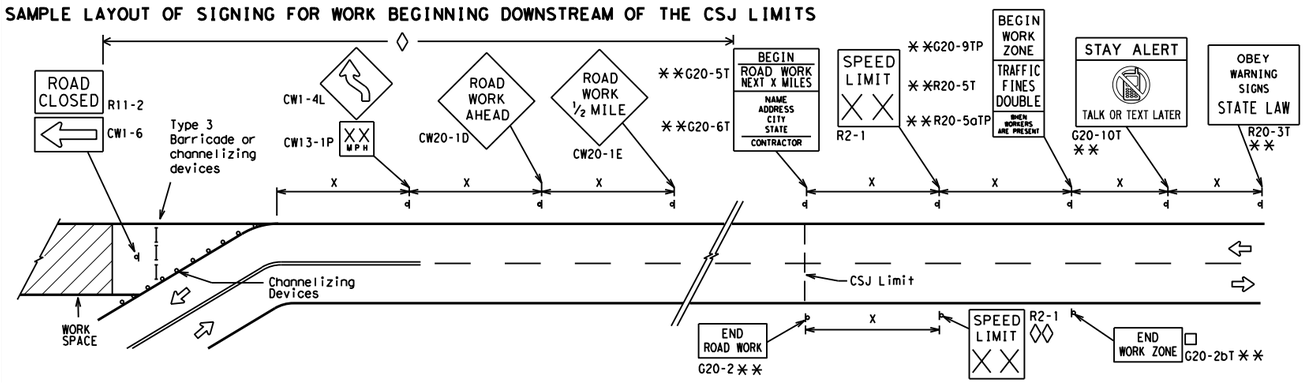
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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

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



NOTES

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

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

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

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

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

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	DALLAS		15

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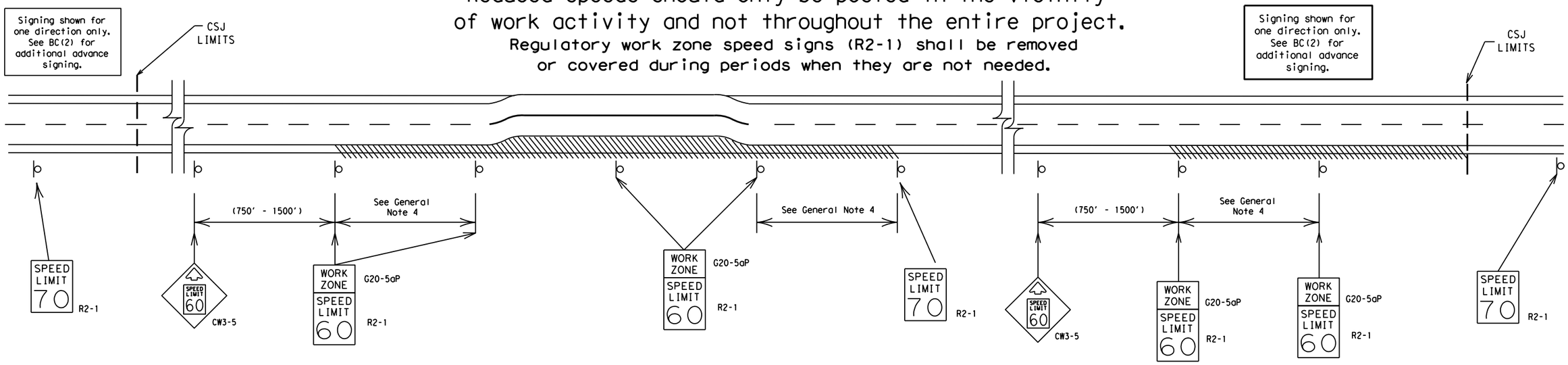
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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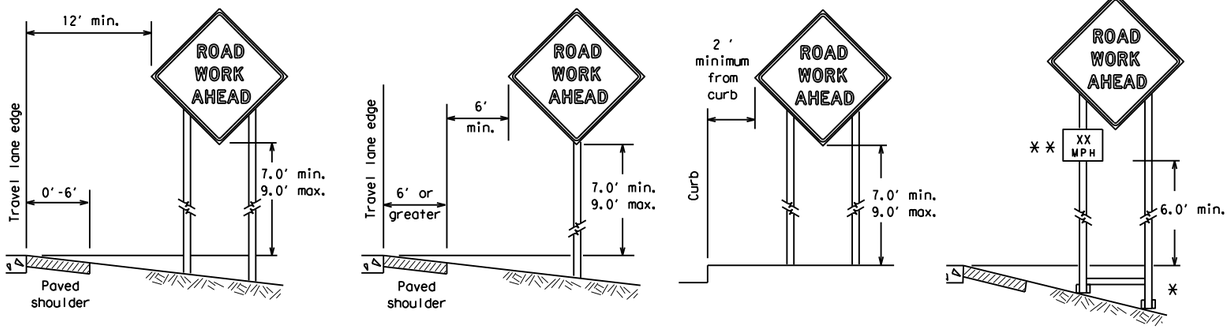
REVISIONS	2374	03	098	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	DALLAS		16

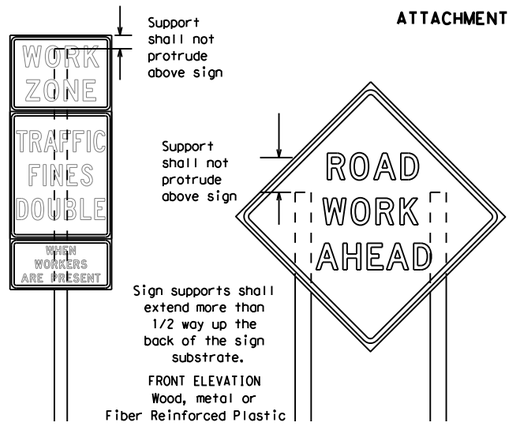
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

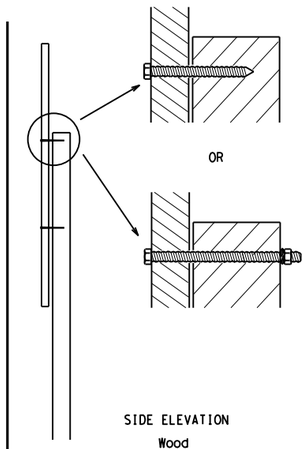


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





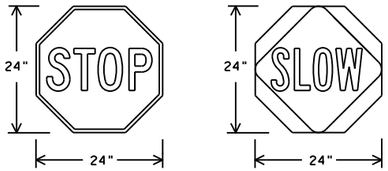
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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	2374	03	098	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	DALLAS		17

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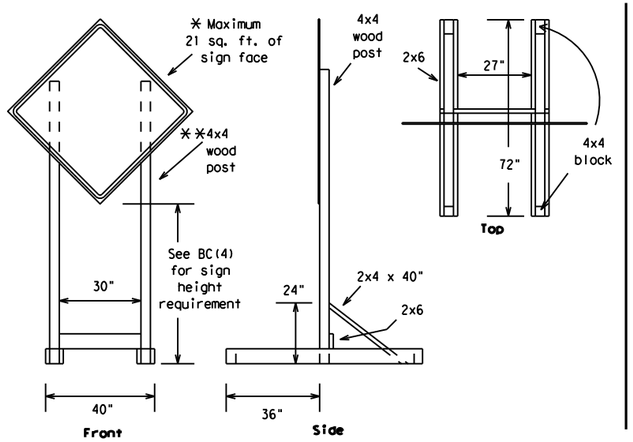
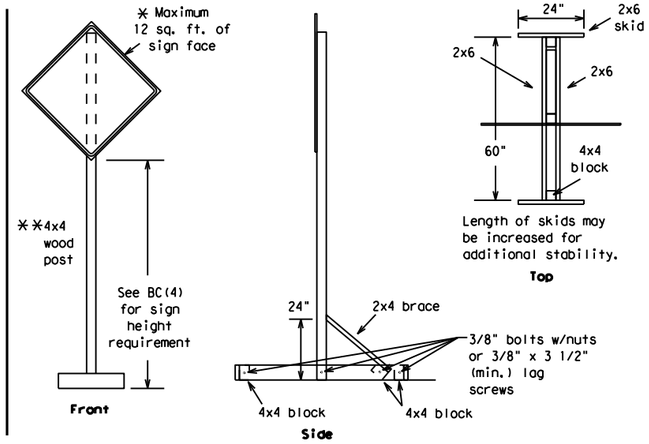
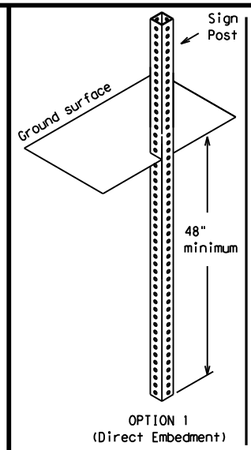
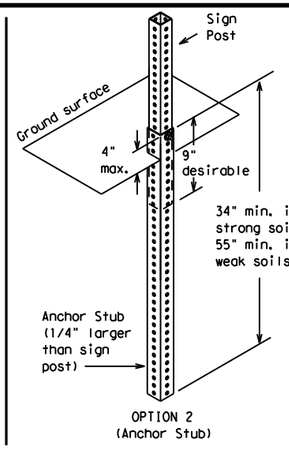


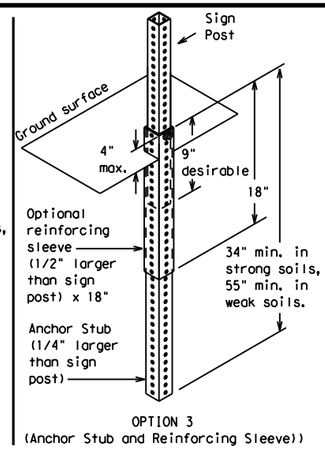


SKID MOUNTED WOOD SIGN SUPPORTS

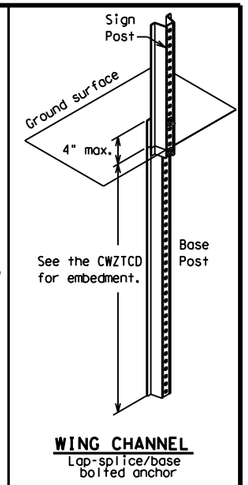
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS





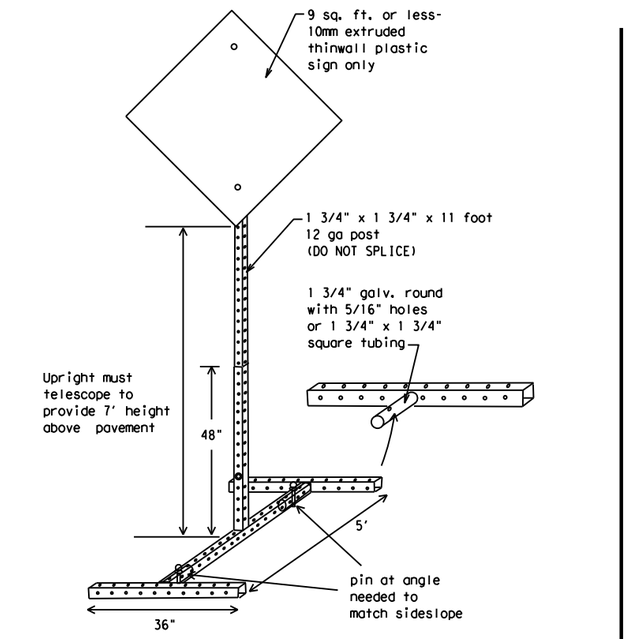


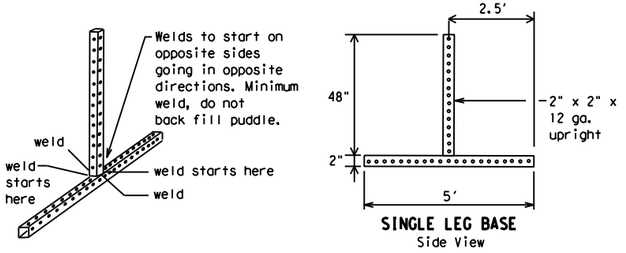
PERFORATED SQUARE METAL TUBING

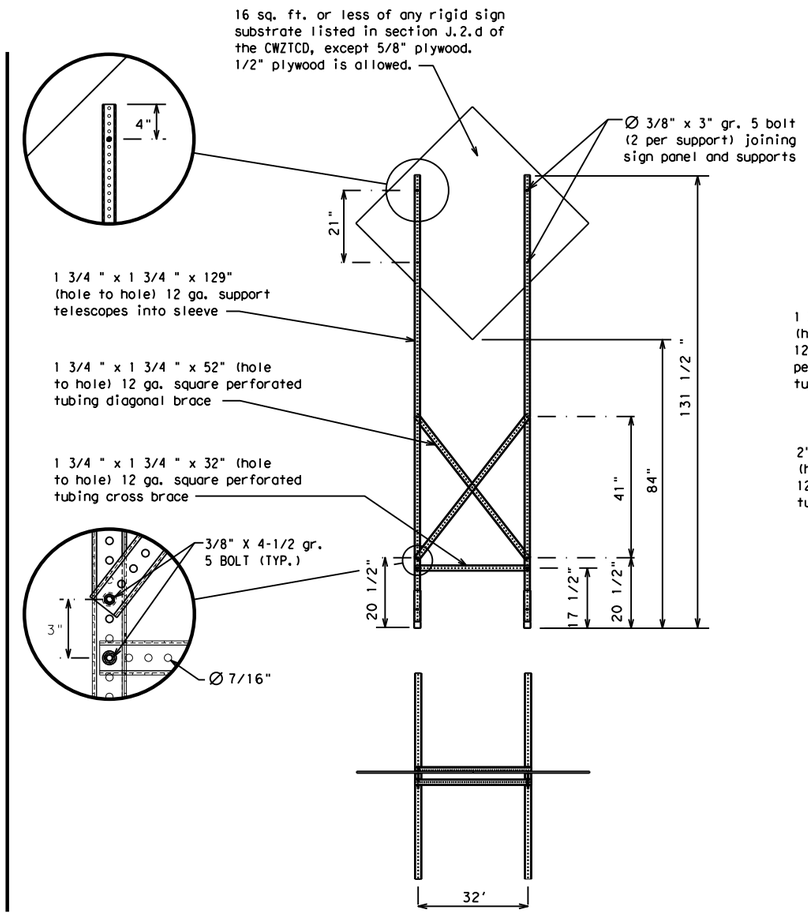


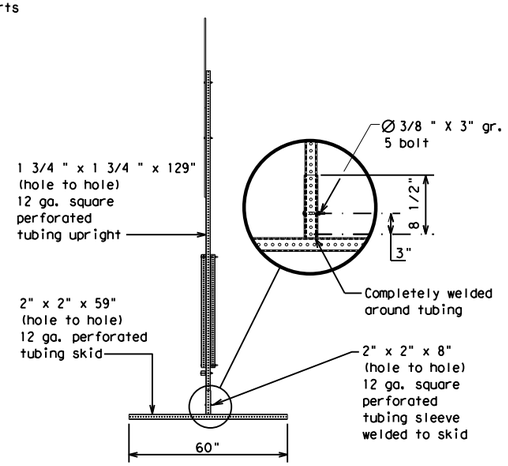
GROUND MOUNTED SIGN SUPPORTS

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.

SHEET 5 OF 12

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	2374	03	098	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	DALLAS		18

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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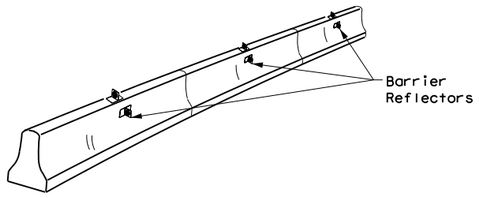
REVISIONS	2374	03	098	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	DALLAS		19

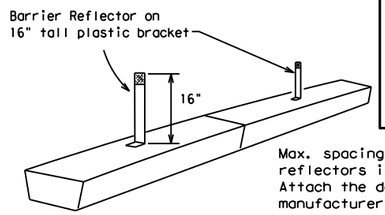
100

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.

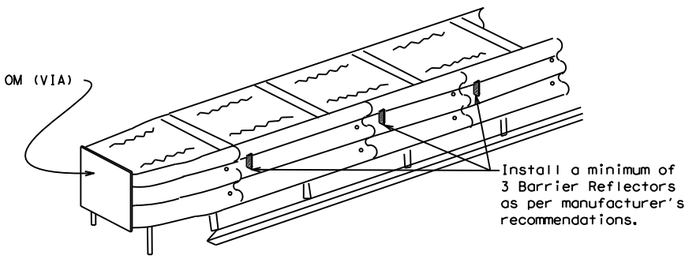


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

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)

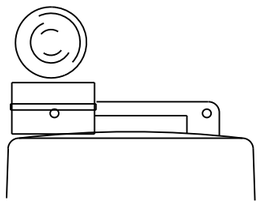


DELINEATION OF END TREATMENTS

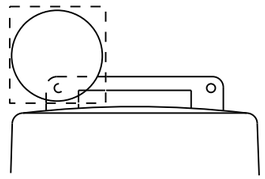
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

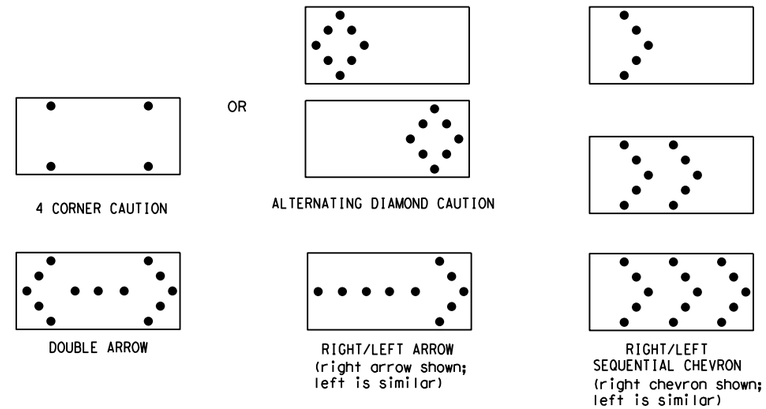
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

SHEET 7 OF 12

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	2374	03	098	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

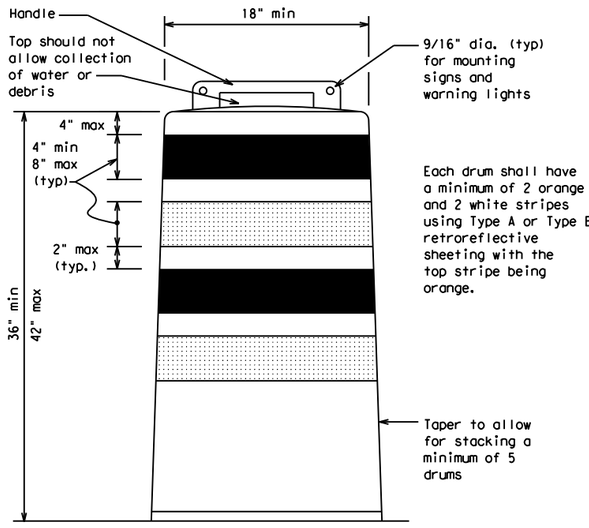
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

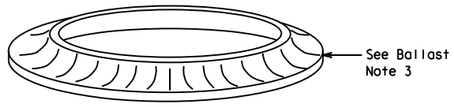
RETROREFLECTIVE SHEETING

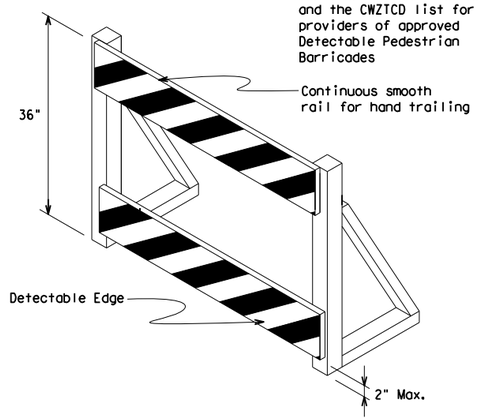
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

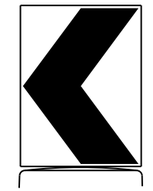




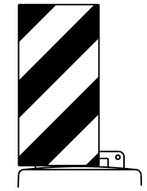


DETECTABLE PEDESTRIAN BARRICADES

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

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REVISIONS	2374	03	098	IH 20
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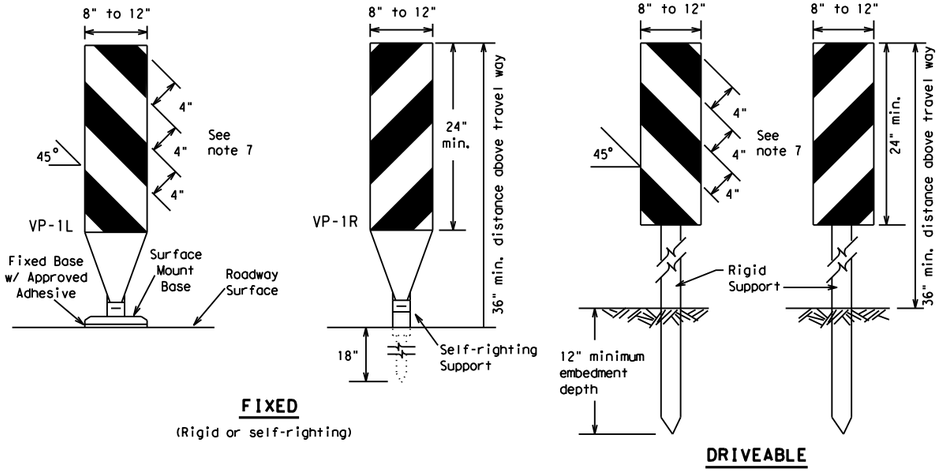
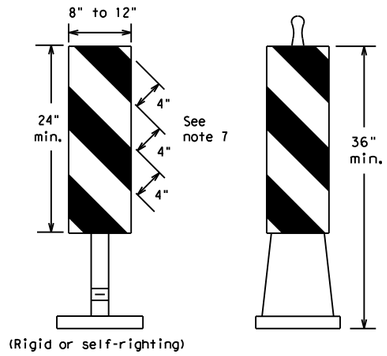


FIXED
(Rigid or self-righting)

DRIVEABLE

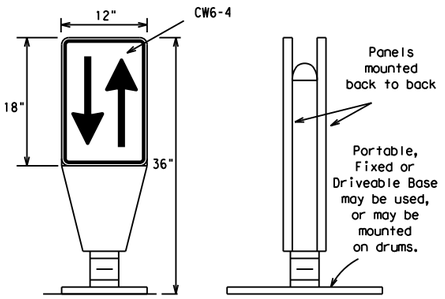


(Rigid or self-righting)

PORTABLE

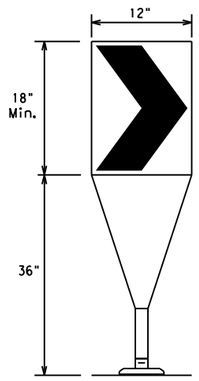
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



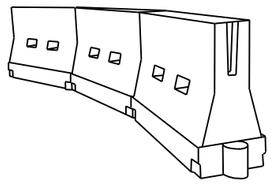
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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103

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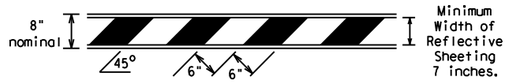
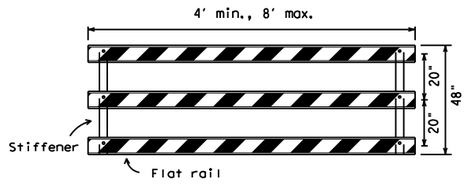
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



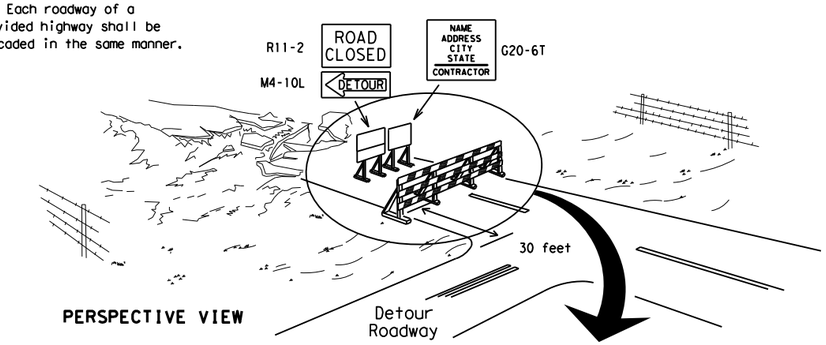
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

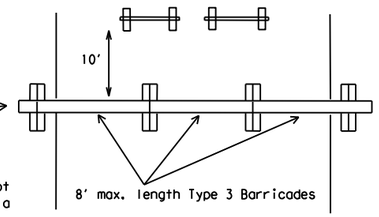
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

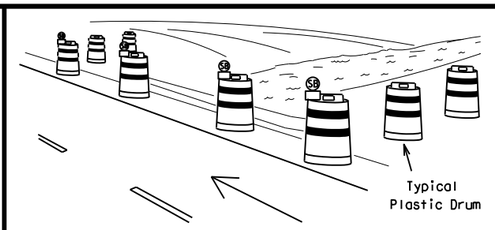
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

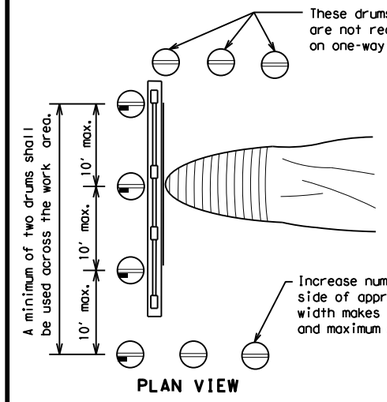
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

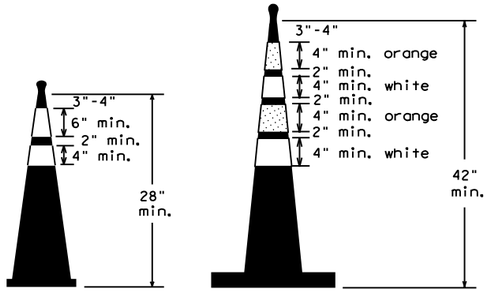
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

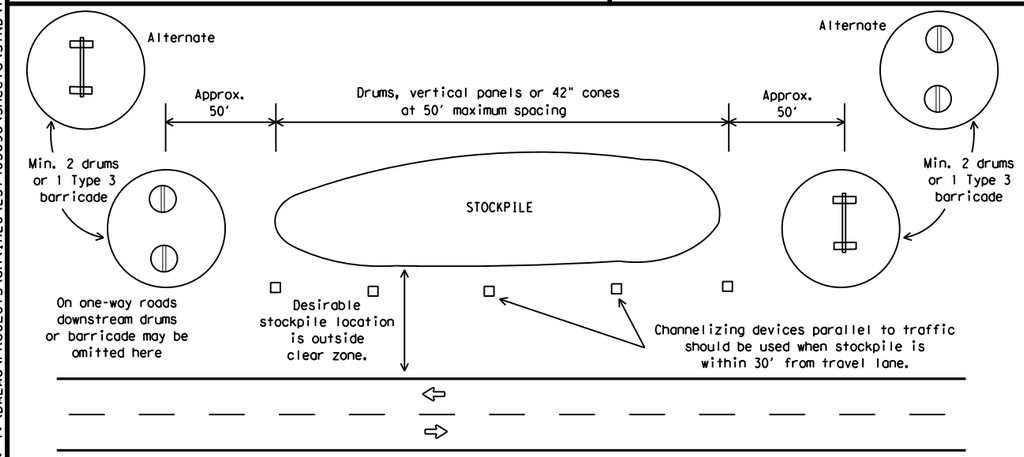


Two-Piece cones | One-Piece cones | Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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	2374	03	098	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DAL	DALLAS		23

104

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

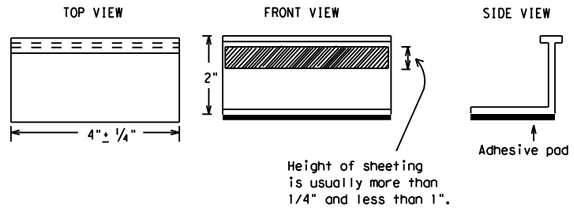
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	DAL	DALLAS		24
11-02 8-14				

105

DATE: 3/17/2023 2:59:17 PM
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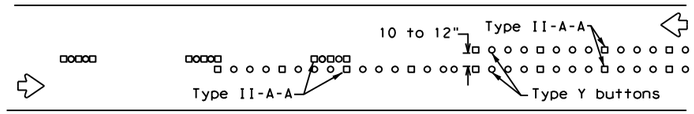
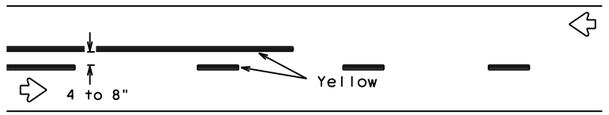
PAVEMENT MARKING PATTERNS

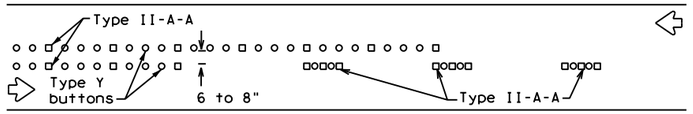
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



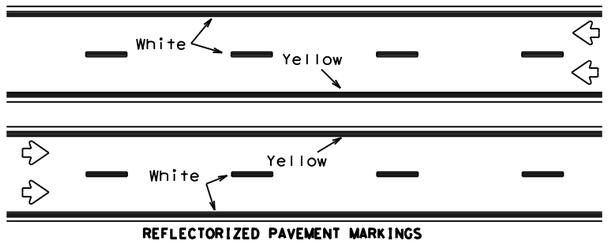
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



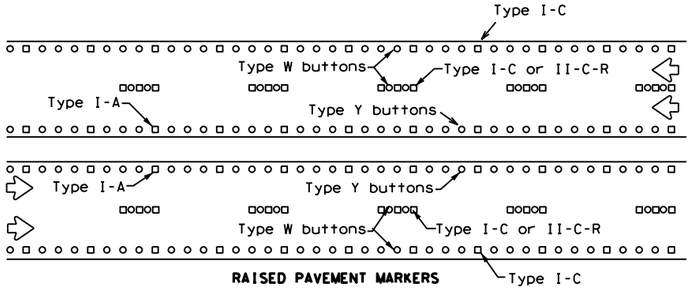
RAISED PAVEMENT MARKERS - PATTERN B

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

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



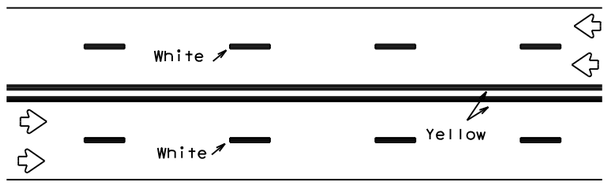
REFLECTORIZED PAVEMENT MARKINGS



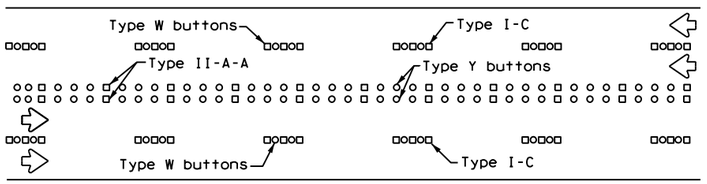
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



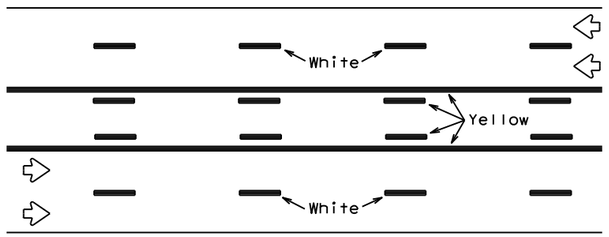
REFLECTORIZED PAVEMENT MARKINGS



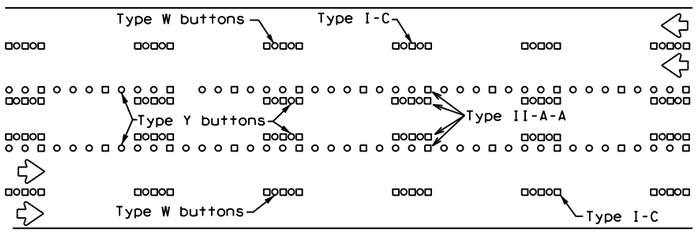
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

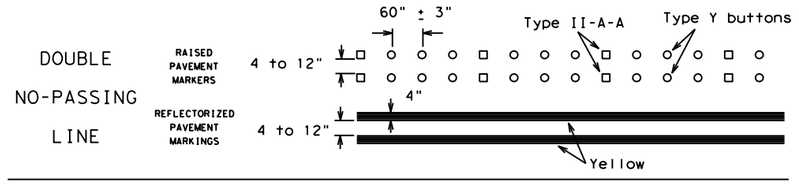
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

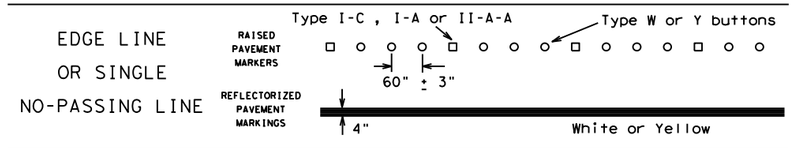
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

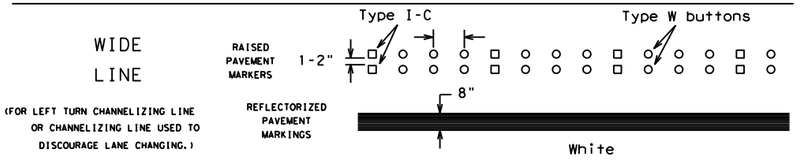


EDGE LINE OR SINGLE NO-PASSING LINE



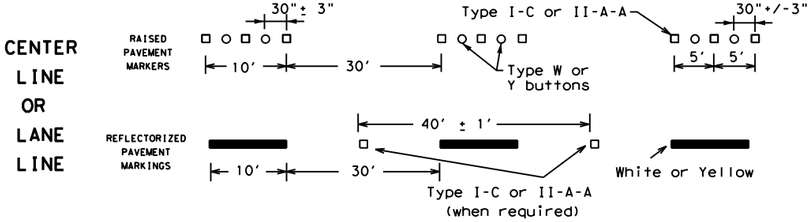
WIDE LINE

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

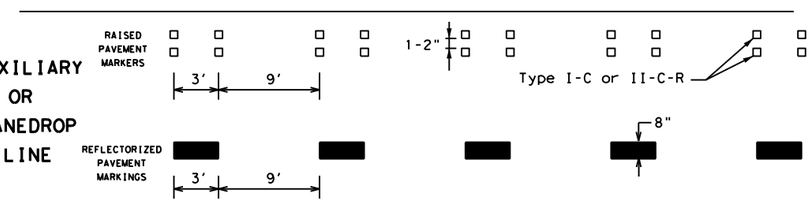


BROKEN LINES

CENTER LINE OR LANE LINE

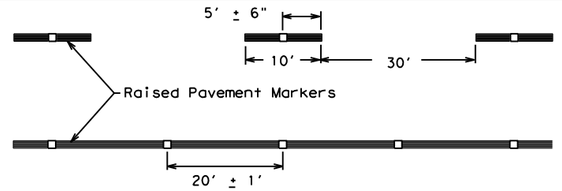


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic 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	2374	03	098	IH 20
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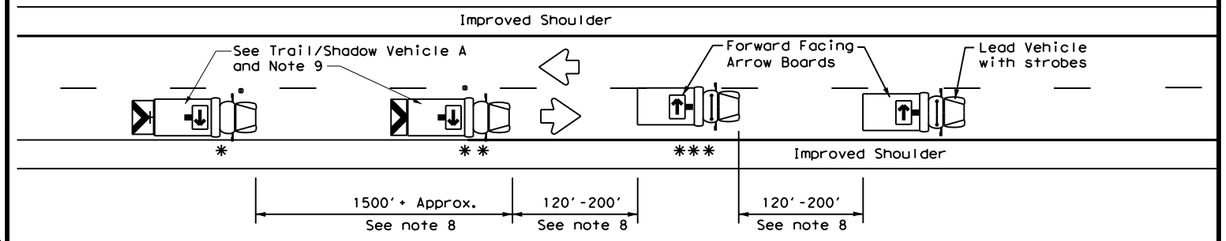
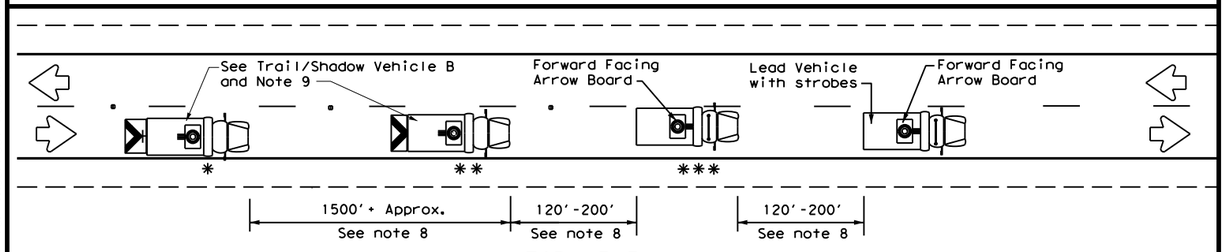
	DAL	DALLAS		25

106



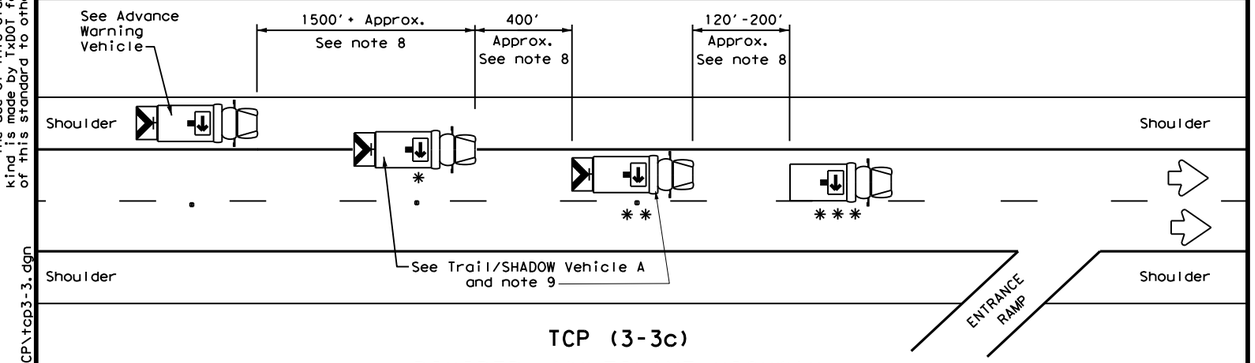
TCP (3-3a)

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



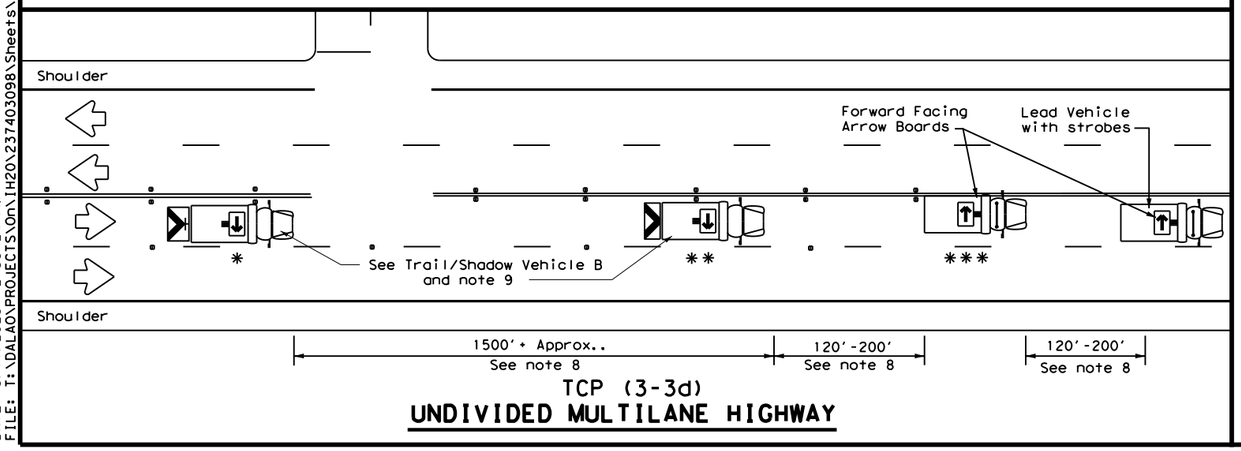
TCP (3-3b)

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



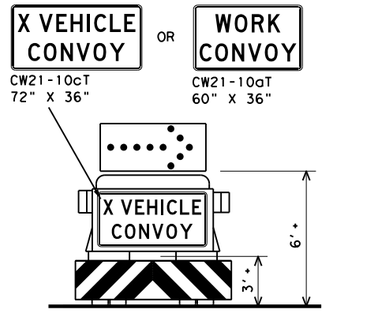
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



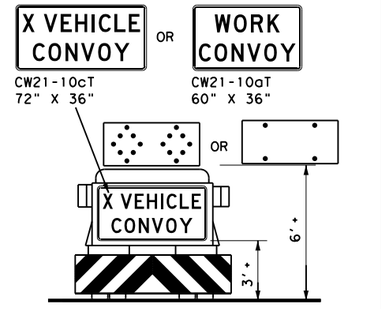
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



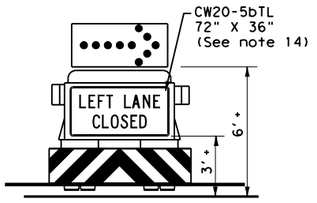
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

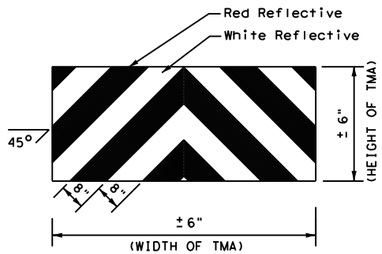


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
MOBILE OPERATIONS
RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL
TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	DAL	DALLAS		26
1-97 7-14				

177

DATE: 3/17/2023 2:59:24 PM
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DATE: 3/17/2023 2:59:32 PM
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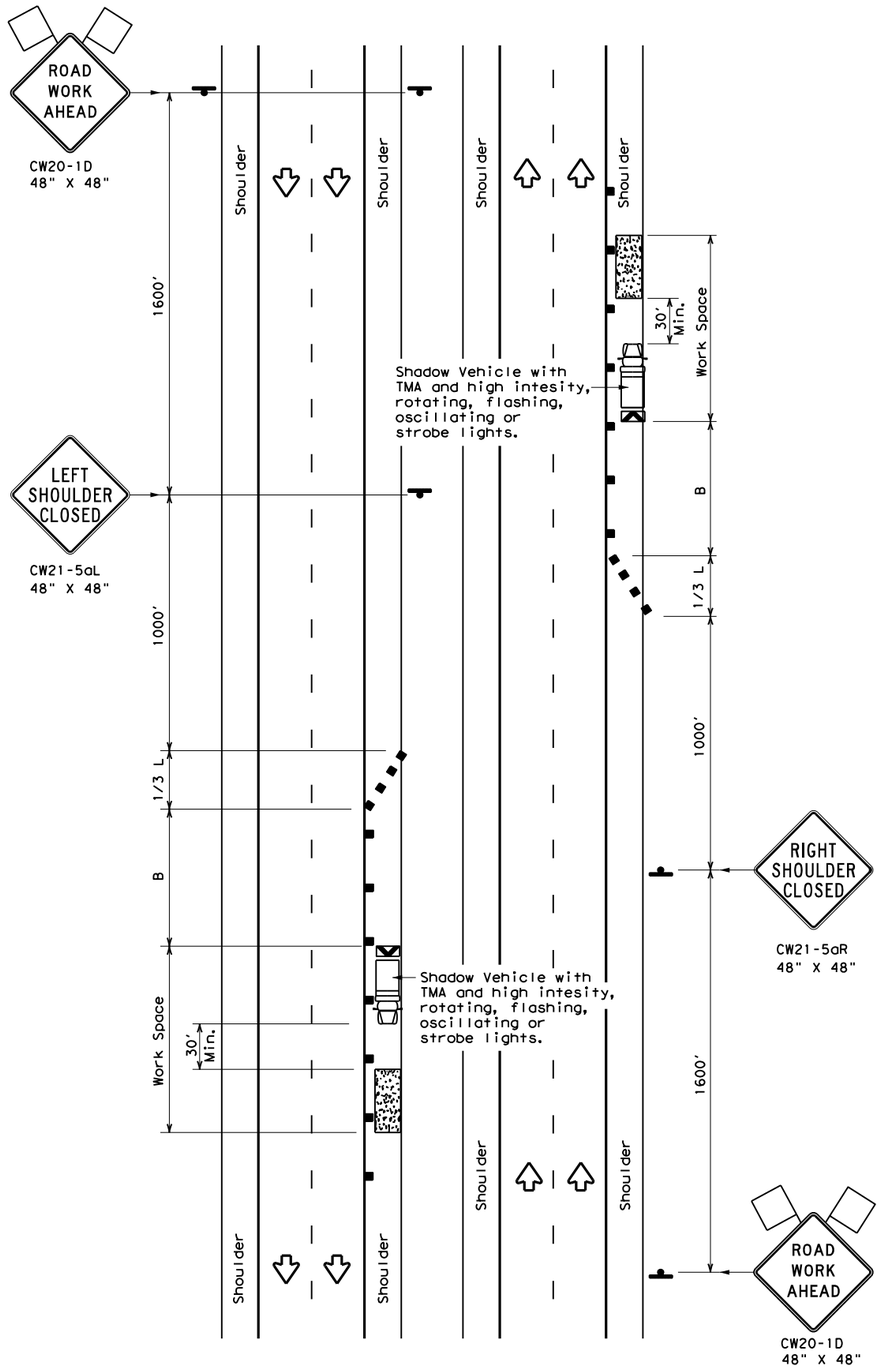
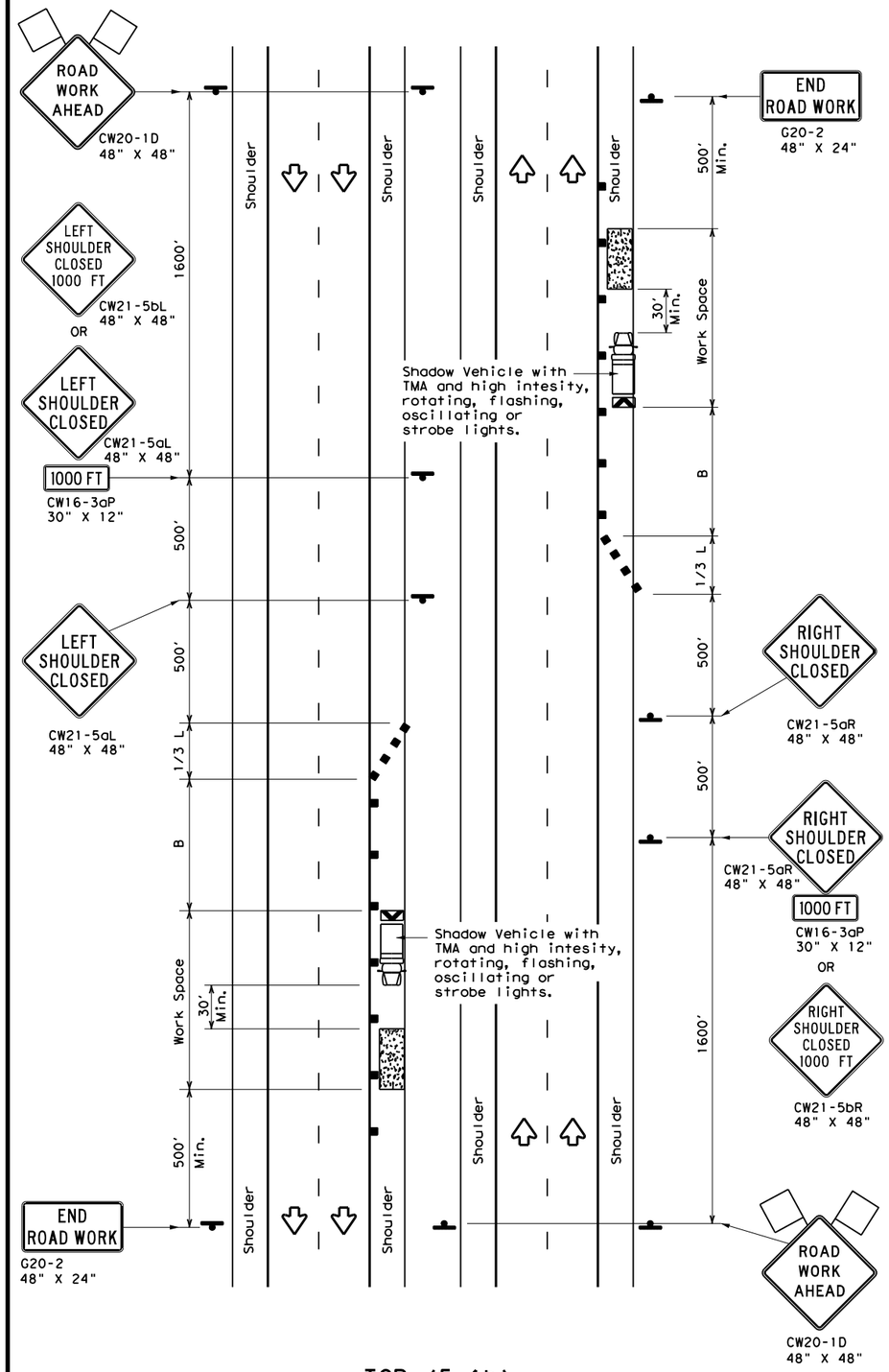


TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		27

DATE: 3/17/2023 2:59:37 PM
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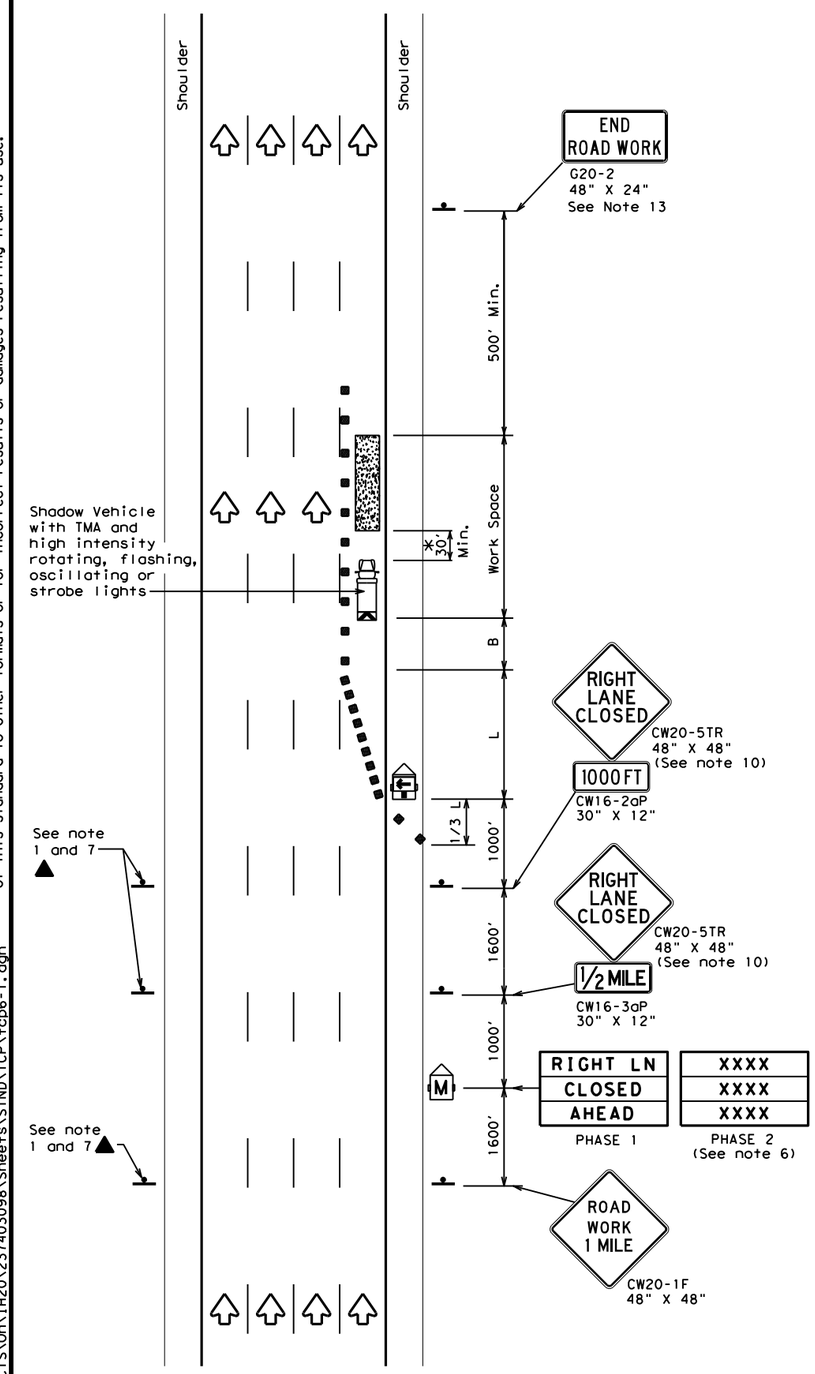
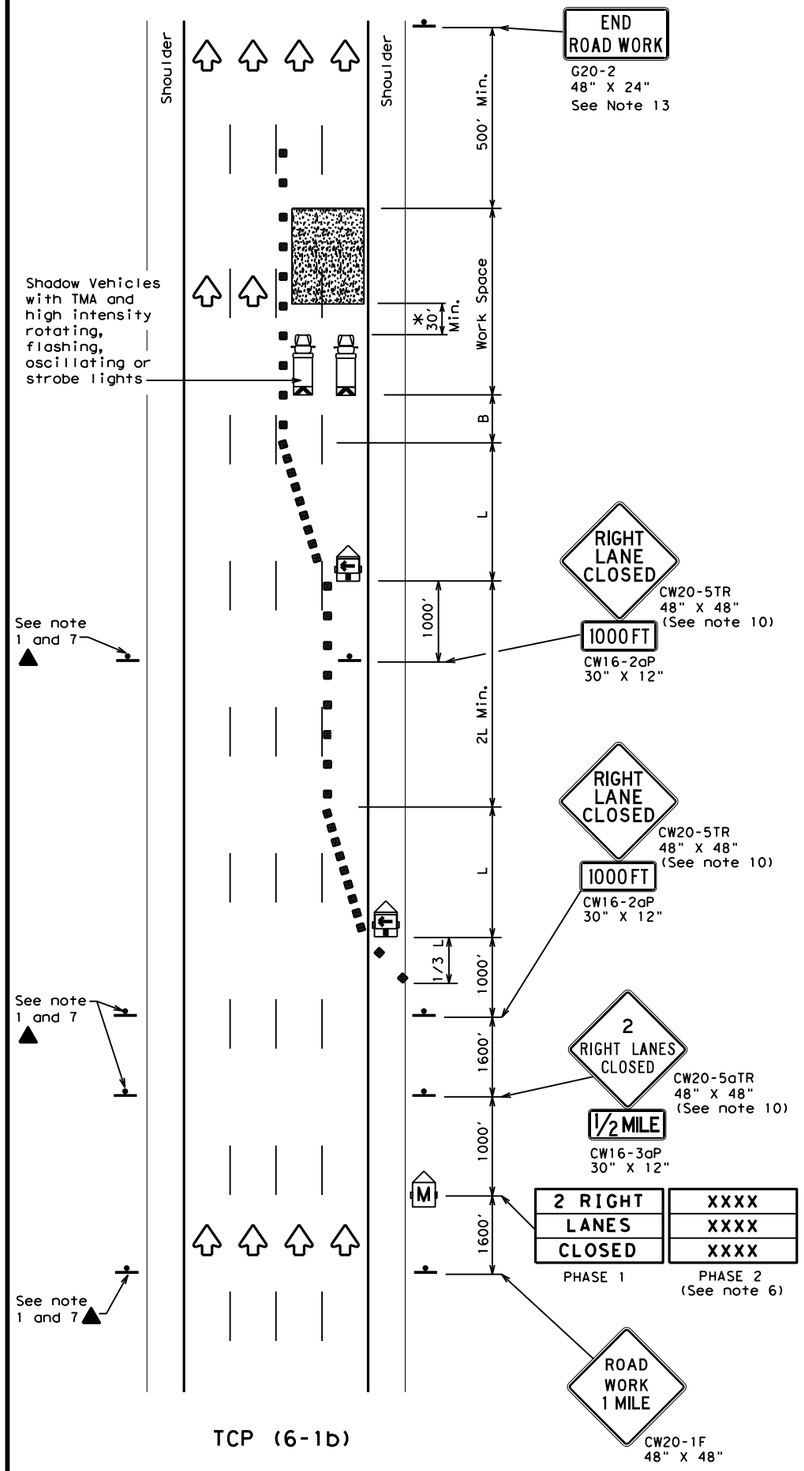


TCP (6-1a)

TYPICAL FREEWAY ONE LANE CLOSURE



TCP (6-1b)

TYPICAL FREEWAY TWO LANE CLOSURE

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

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

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

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

GENERAL NOTES

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

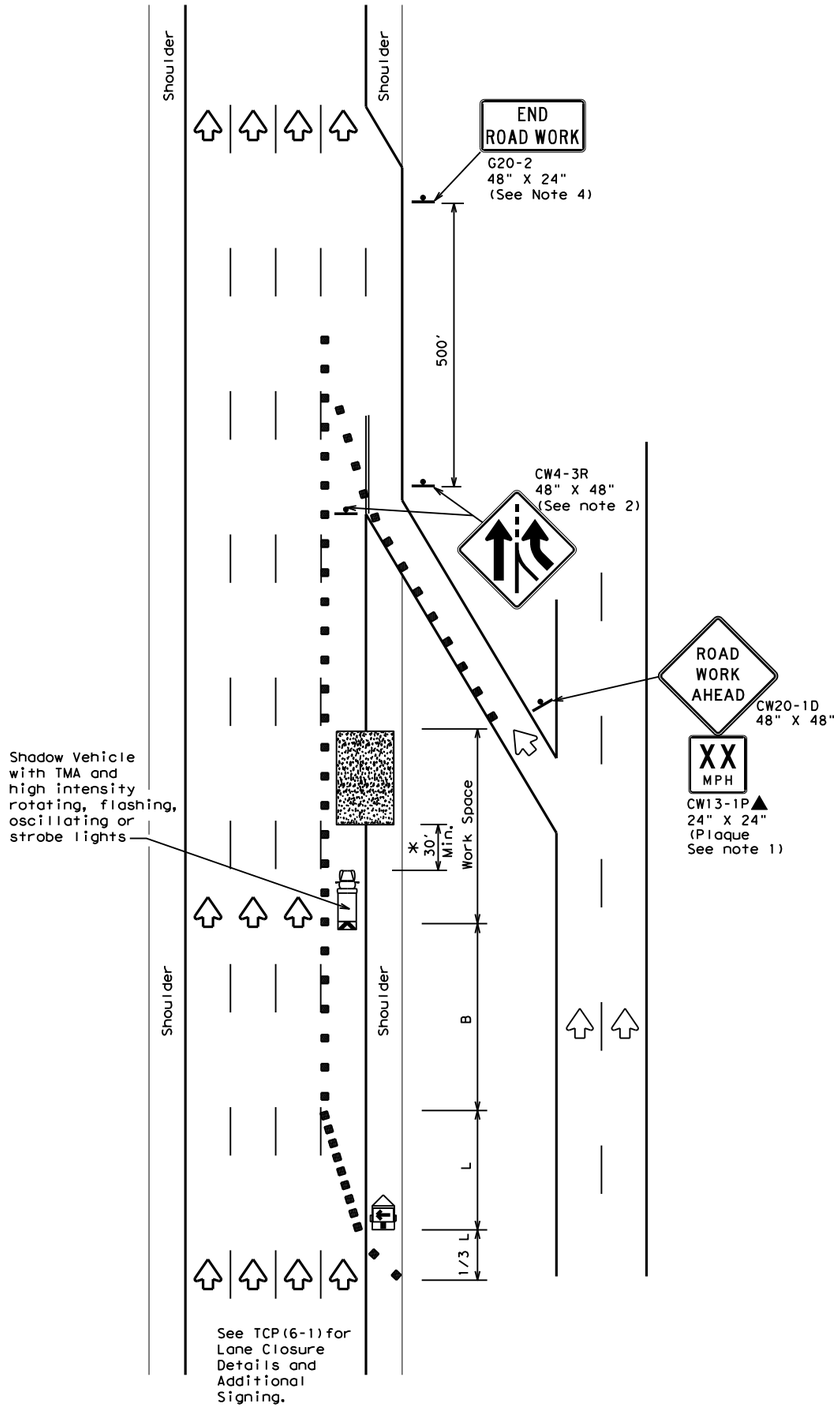
* A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

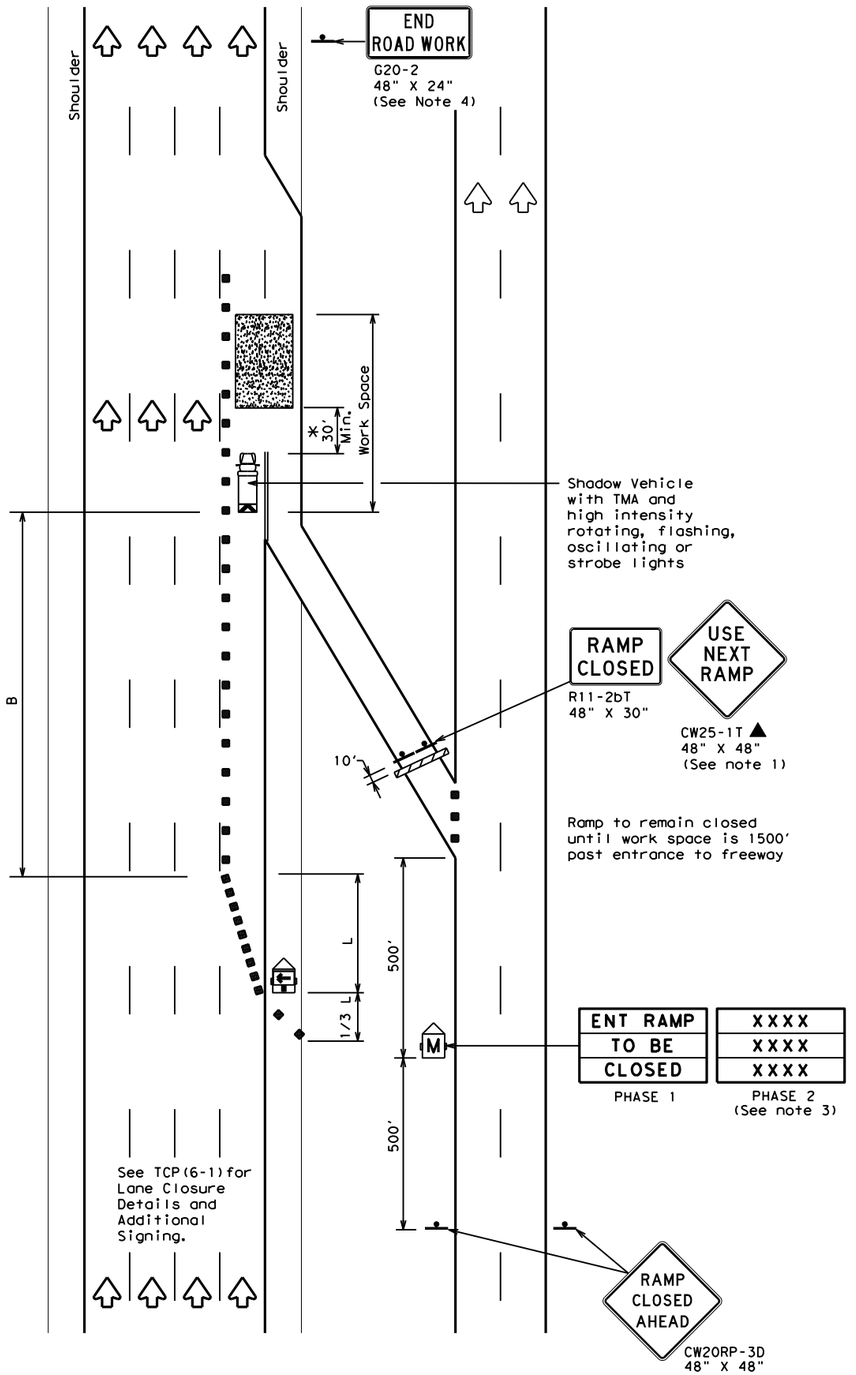
TCP(6-1)-12

FILE: tcp6-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-12	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		28



TCP (6-2a)

ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)

ENTRANCE RAMP CLOSED

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

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

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

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

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. ADDED LANE Symbol (CW4-3) sign may be omitted when sign between ramp and mainlane can be seen from both roadways.
3. See "Advance Notice List" on BC(6) for recommended date and time formatting options for PCMS Phase 2 message.
4. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP(6-2)-12

FILE: tcp6-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	DAL	DALLAS		29

202

DATE: 3/17/2023 2:59:43 PM
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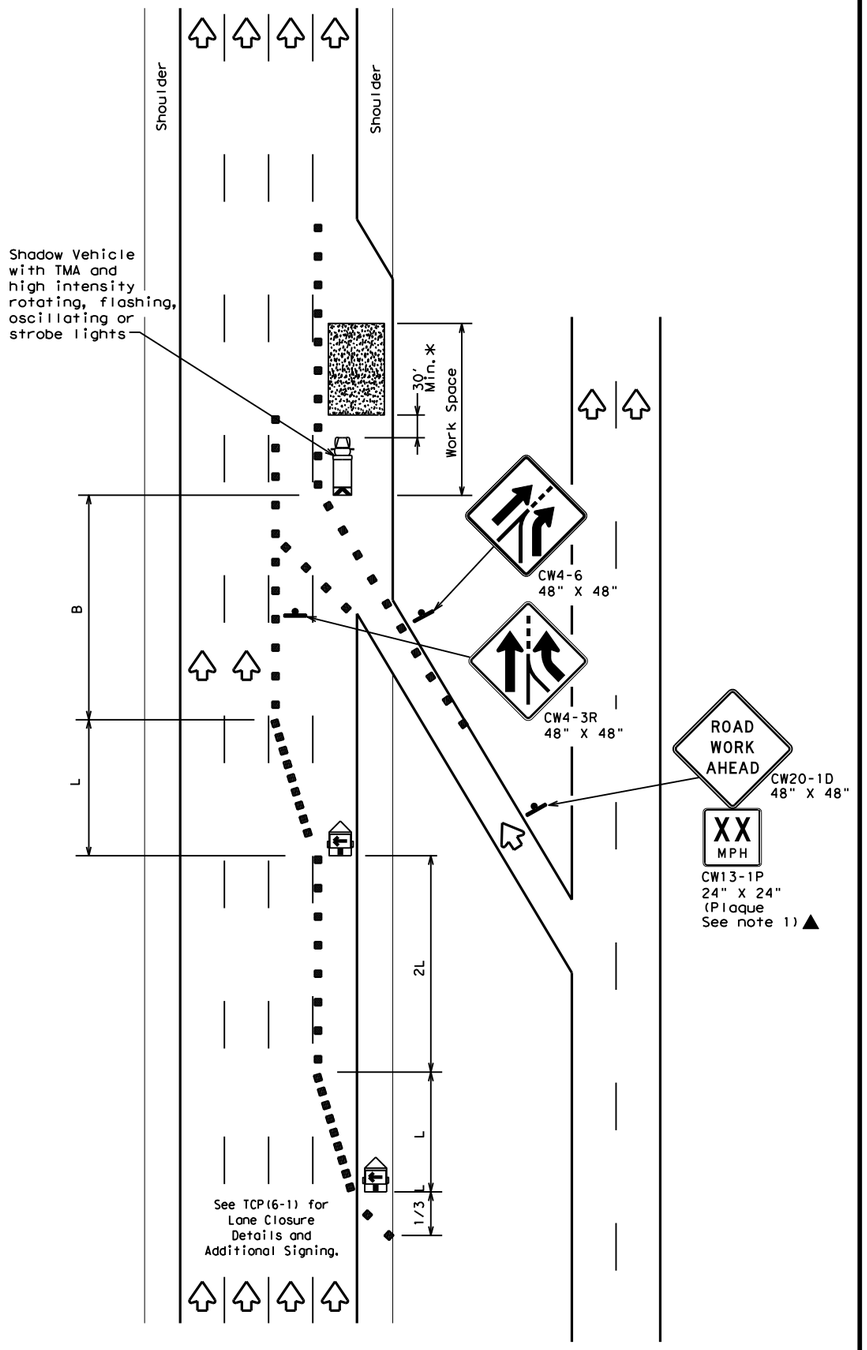
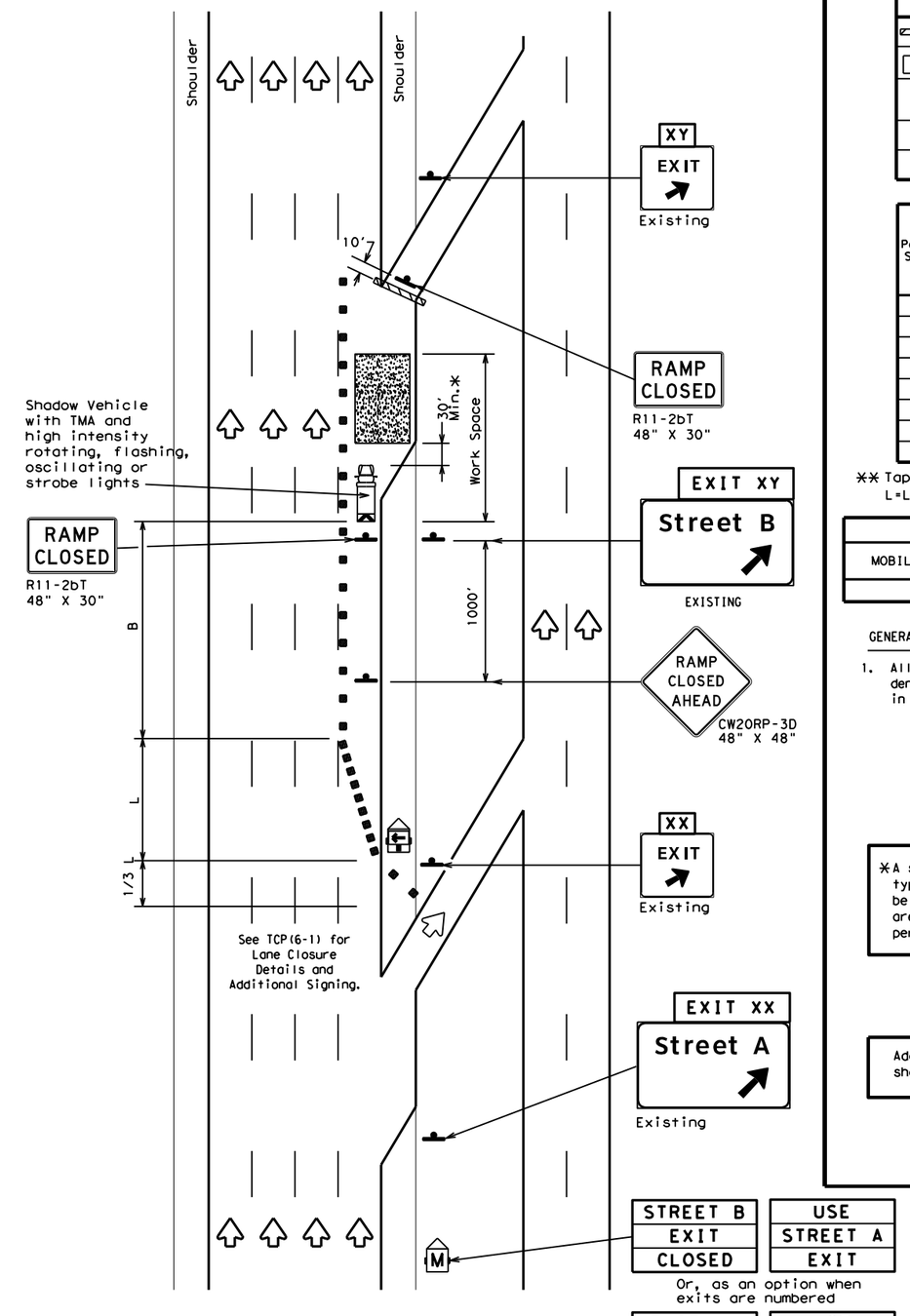


TCP (6-3a)

ENTRANCE RAMP OPEN



TCP (6-3b)

EXIT RAMP CLOSED

TRAFFIC EXITS PRIOR TO CLOSED RAMP

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

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

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

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

GENERAL NOTES:

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

TCP(6-3)-12

FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	DAL	DALLAS		30

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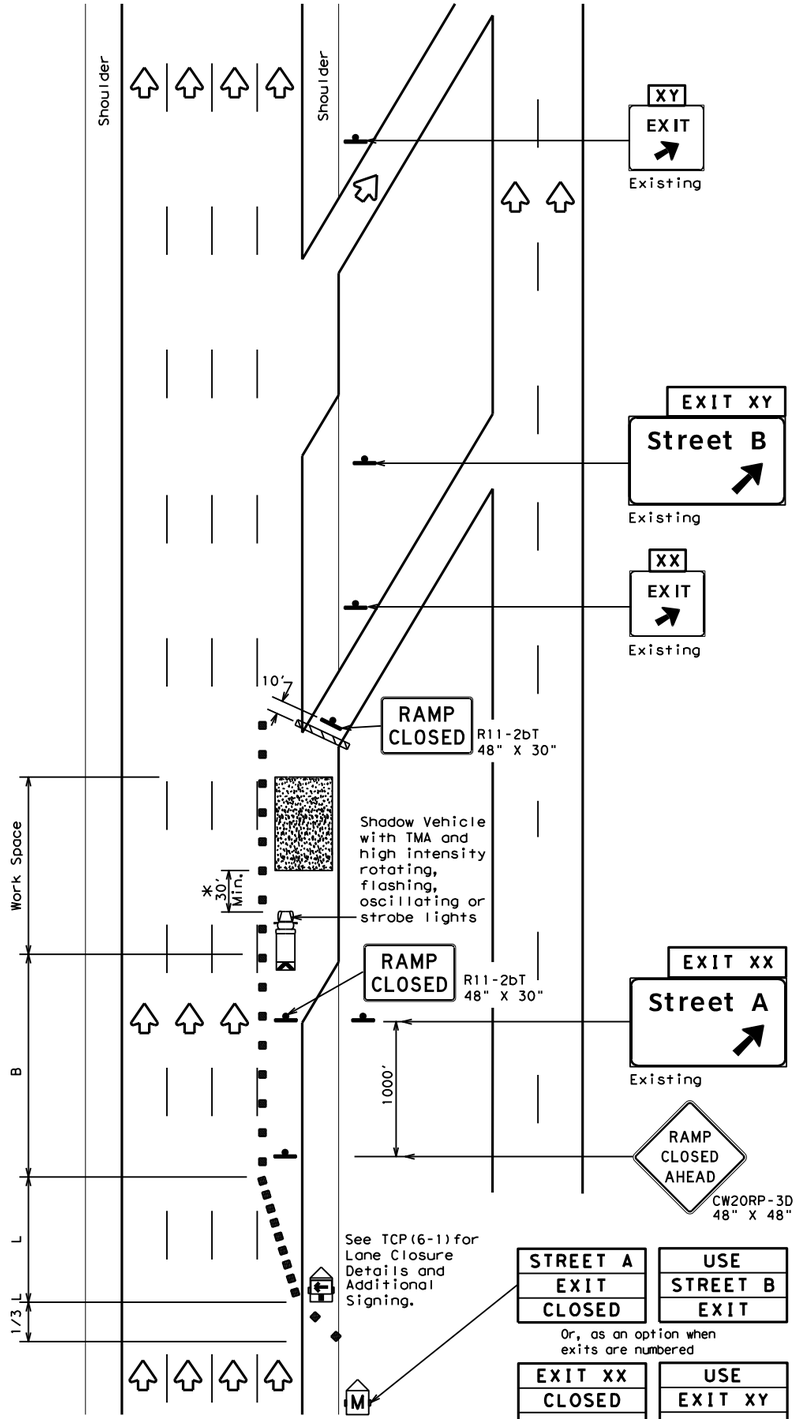
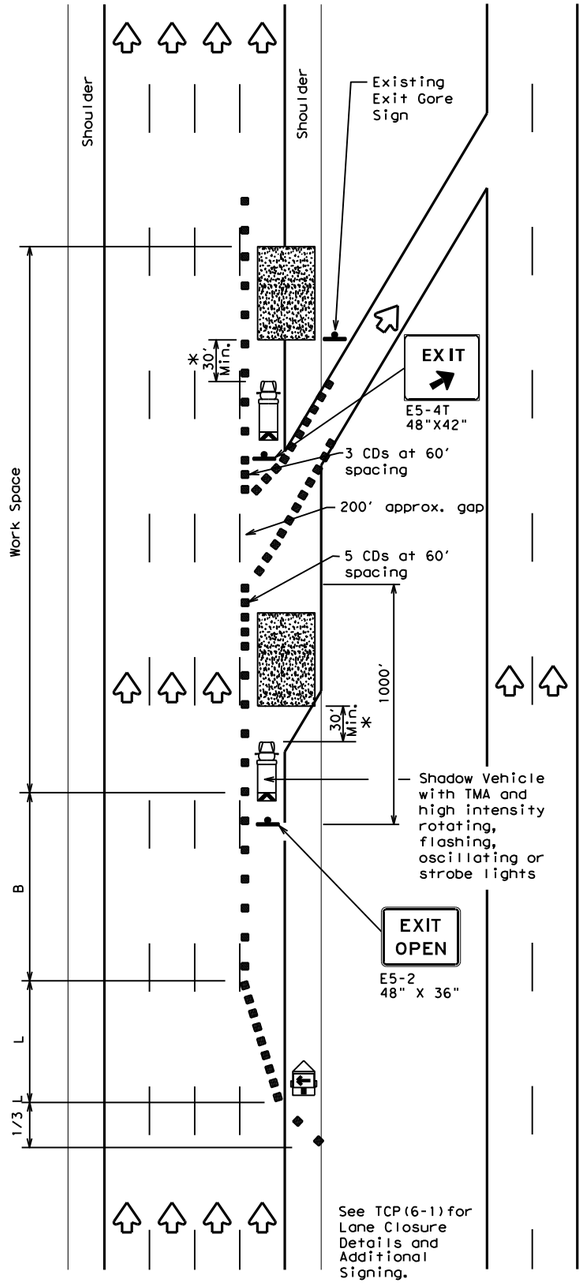


TCP (6-4a)

EXIT RAMP CLOSED
TRAFFIC EXITS PAST CLOSED RAMP



TCP (6-4b)

EXIT RAMP OPEN

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. See BC Standards for sign details.

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

TCP(6-4)-12

FILE: tcp6-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT Feburary 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	DAL	DALLAS		31

DATE: 3/17/2023 2:59:55 PM
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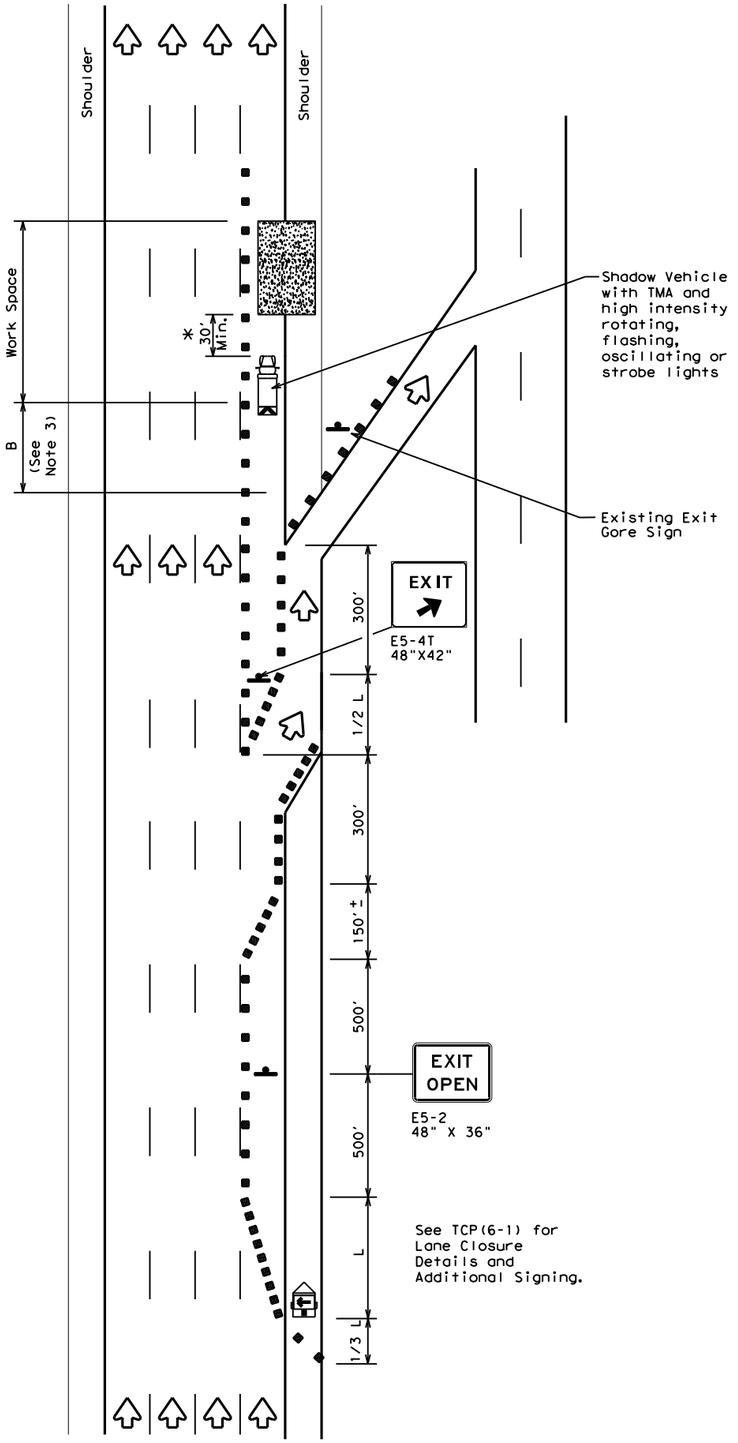
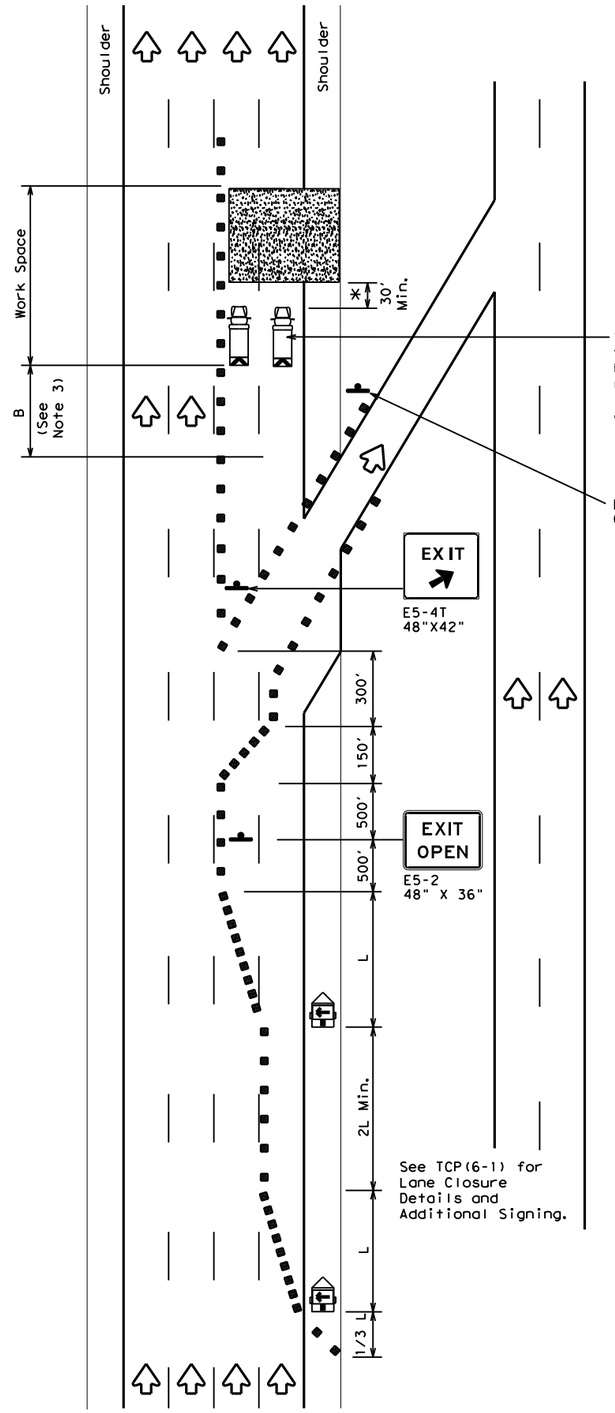


TCP (6-5a)

EXIT RAMP OPEN



TCP (6-5b)

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

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

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

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

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

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. See BC standards for sign details.
3. If adequate longitudinal buffer length "B" does not exist between the work space and the exit ramp, consideration should be given to closing the ramp.

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

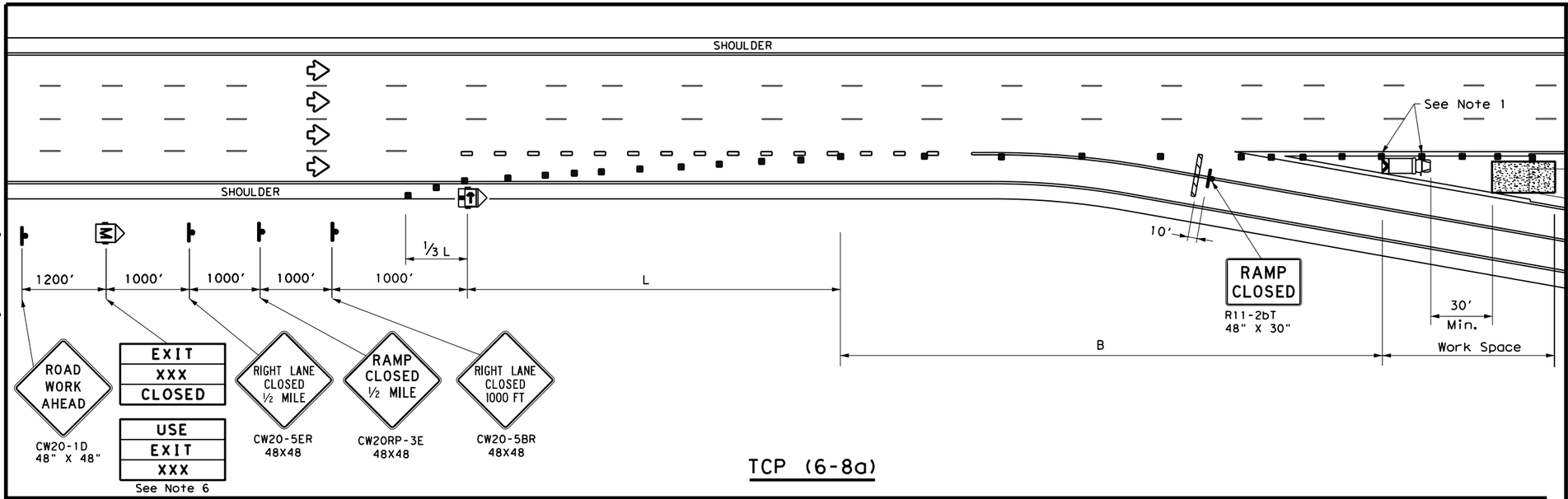
Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

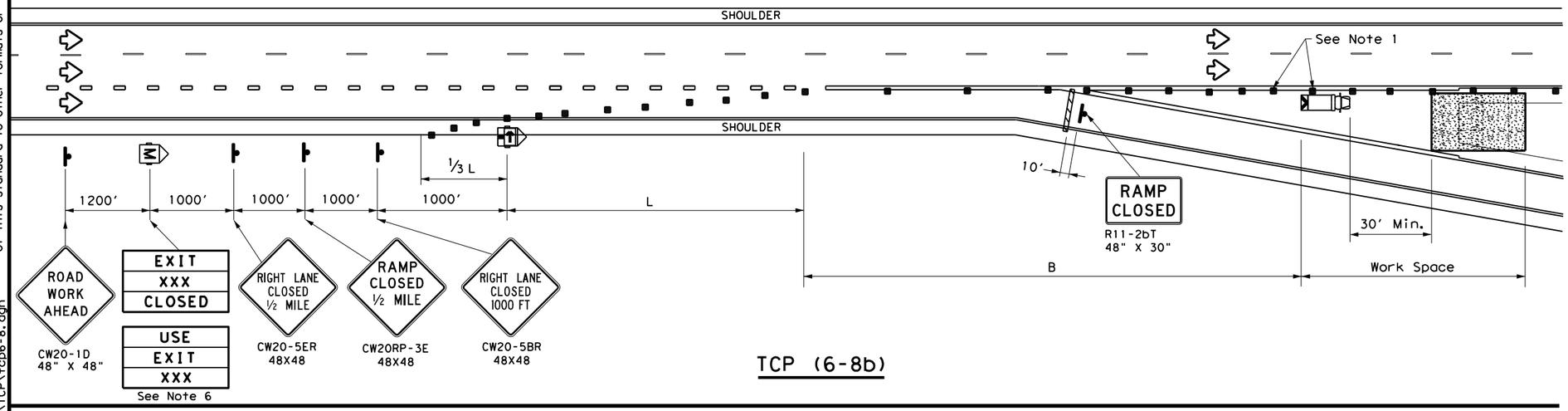
TRAFFIC CONTROL PLAN
WORK AREA BEYOND EXIT RAMP

TCP(6-5)-12

FILE: tcp6-5.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT Feburary 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	DAL	DALLAS		32



TCP (6-8a)



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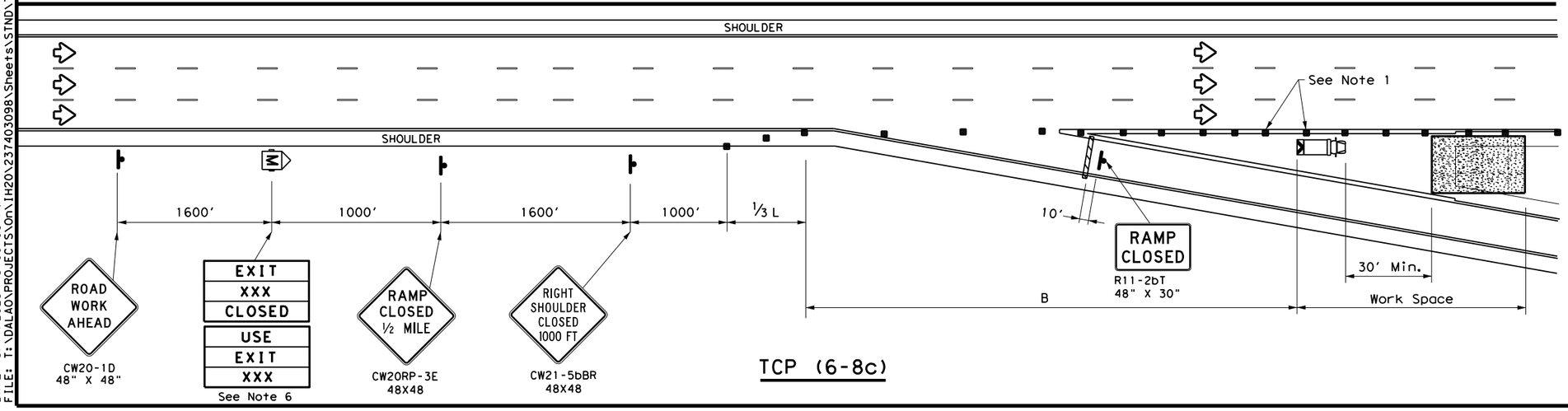

TCP (6-8c)

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK IN EXIT GORE FOR ADT GREATER THAN 10,000

TCP(6-8)-14

FILE: tcp6-8.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		33

DATE: 3/17/2023 3:00:06 PM
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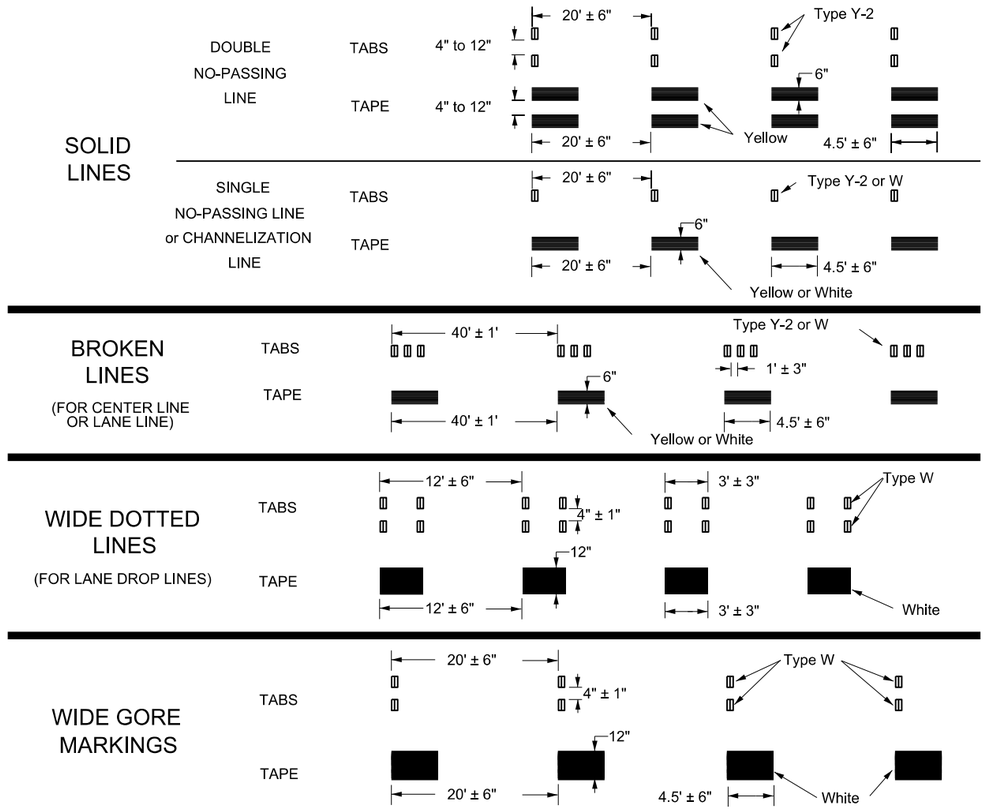
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



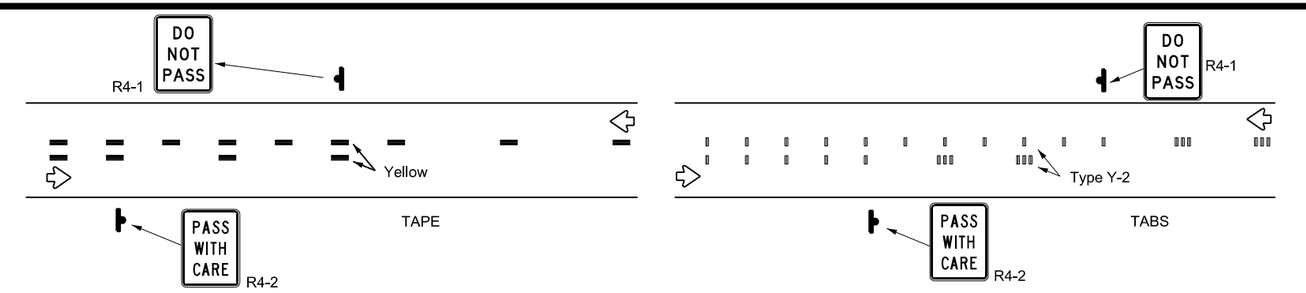
NOTES:

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

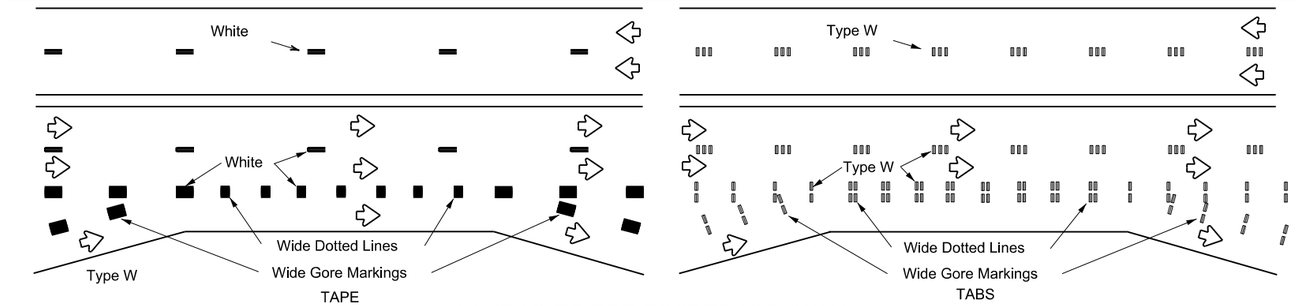
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

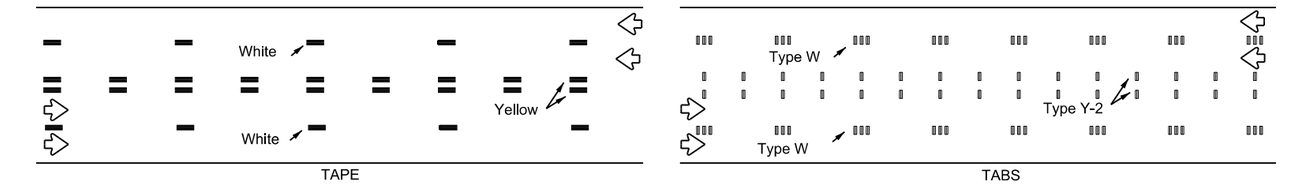
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



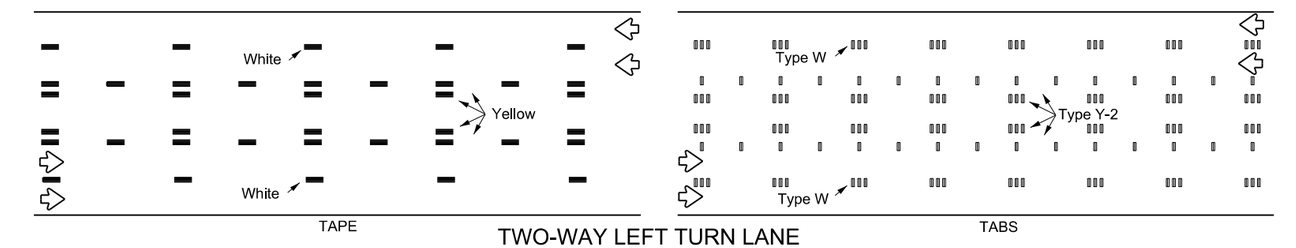
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



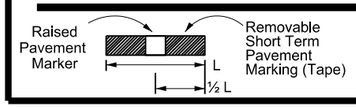
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:

http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

Traffic Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

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© TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
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4-92 7-13 1-97 2-23 3-03	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		34

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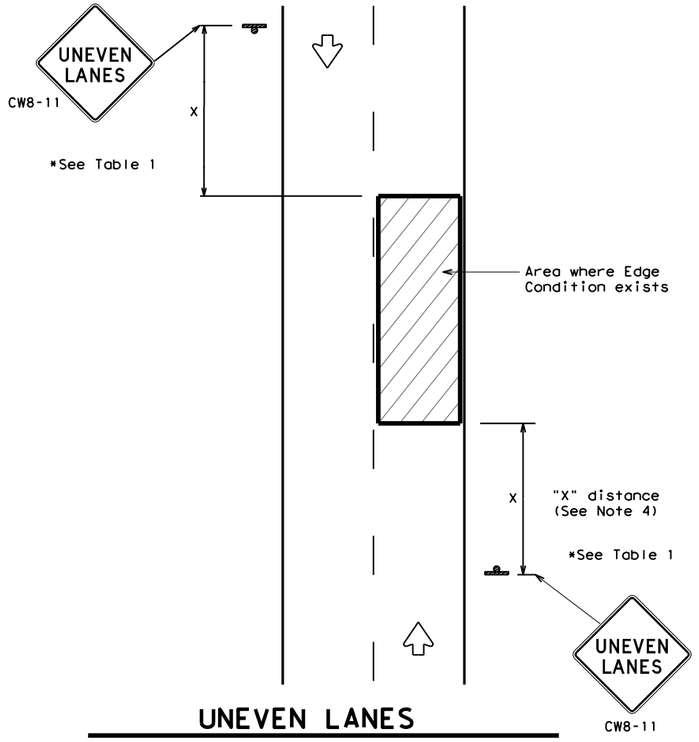
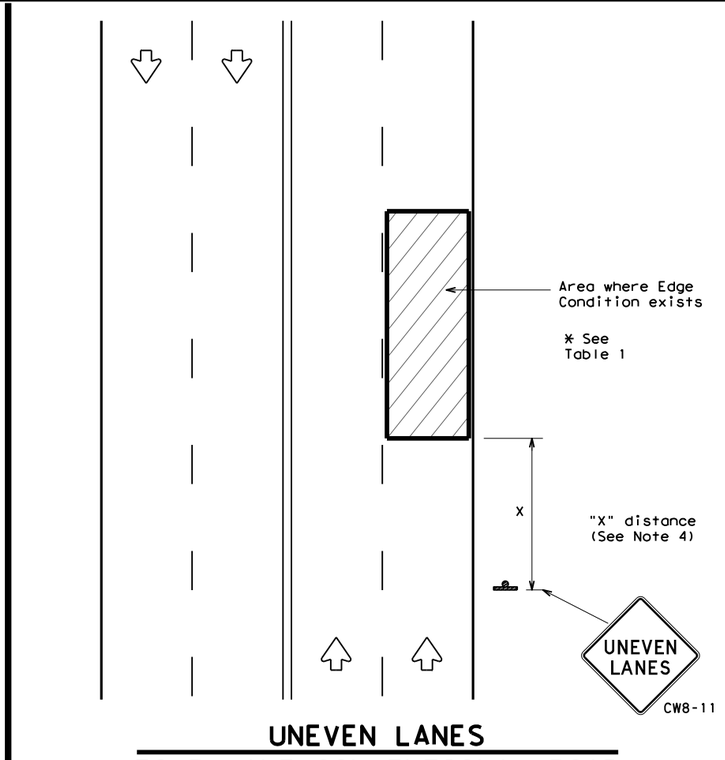
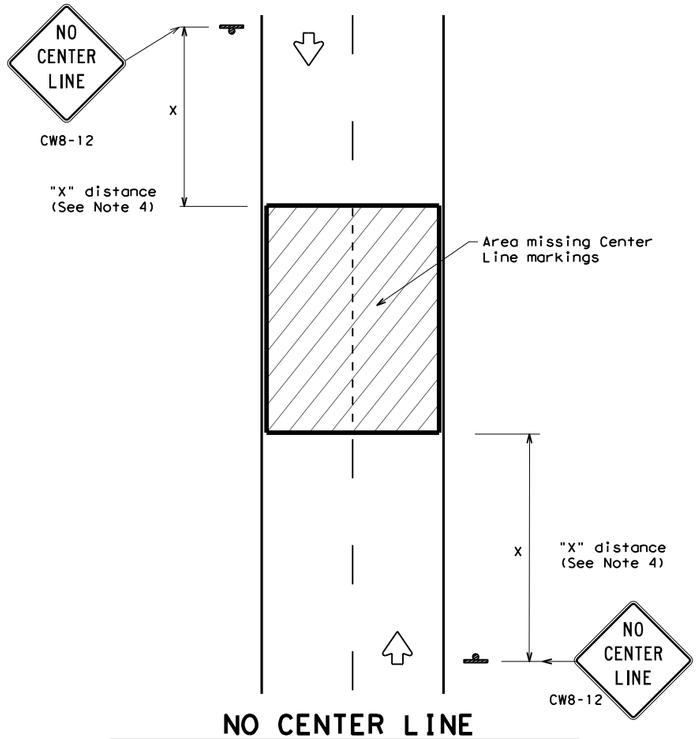


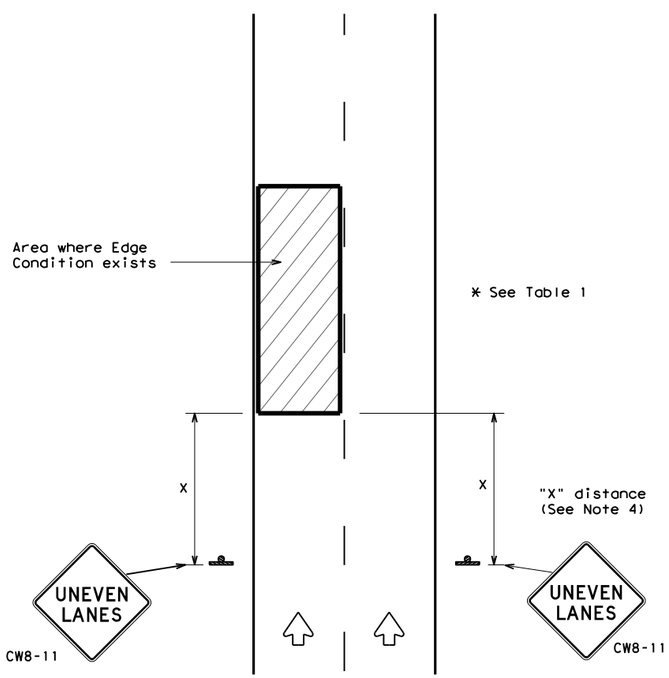
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

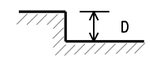
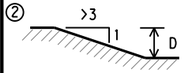
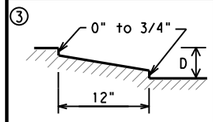
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

1. If spalling or holes occur, ROUGH ROAD (CW8-8) signs should be placed in advance of the condition and be repeated every two miles where the condition persists.
2. UNEVEN LANES (CW8-11) signs shall be installed in advance of the condition and repeated every mile. Signs installed along the uneven lane condition may be supplemented with the NEXT XX MILES (CW7-3aP) plaque or Advisory Speed (CW13-1P) plaque.
3. NO CENTER LINE (CW8-12) signs and temporary pavement markings as per the WZ(STPM) standard shall be installed if yellow centerlines separating two way traffic are obscured or obliterated. Repeat NO CENTER LINE signs every two miles where the center line markings are not in place. The signs and markings shall remain in place until permanent pavement markings are installed.
4. Signs shall be spaced at the distances recommended as per BC standards.
5. Additional signs may be required as directed by the Engineer. Signs shall remain in place until final surface is applied. Signs shall be considered subsidiary to Item 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING."
6. Signs shall be fabricated and mounted on supports as shown on the BC standards and/or listed on the "Compliant Work Zone Traffic Control Devices" list.
7. Short term markings shall not be used to simulate edge lines.
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition.

TABLE 1

Edge Condition	Edge Height (D)	* Warning Devices
① 	Less than or equal to: 1¼" (maximum-planing) 1½" (typical-overlay)	Sign: CW8-11
	Distance "D" may be a maximum of 1 1/4 " for planing operations and 2" for overlay operations if uneven lanes with edge condition 1 are open to traffic after work operations cease.	
② 	Less than or equal to 3"	Sign: CW8-11
③  Notched Wedge Joint	Distance "D" may be a maximum of 3" if uneven lanes with edge condition 2 or 3 are open to traffic after work operations cease. Uneven lanes should not be open to traffic when "D" is greater than 3".	

TRAFFIC CONTROL DURING PLANING, OVERLAY AND LEVELING OPERATIONS ARE SHOWN ELSEWHERE IN THE PLANS.

MINIMUM WARNING SIGN SIZE	
Conventional roads	36" x 36"
Freeways/expressways, divided roadways	48" x 48"

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	DAL	DALLAS		35

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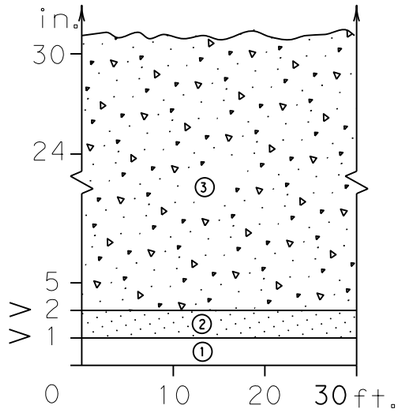
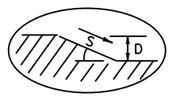
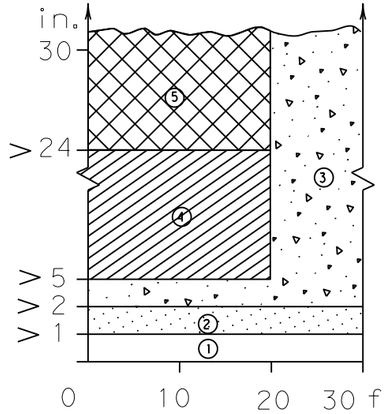
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

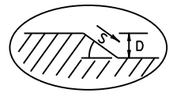


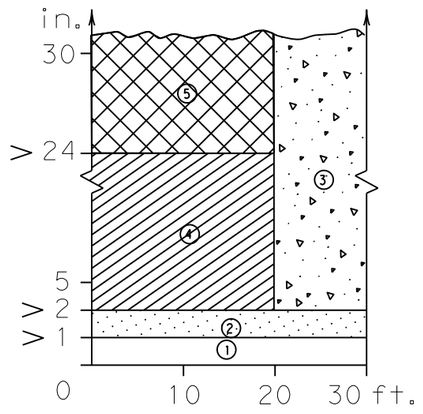
Edge Condition I
S = (3:1) (or flatter)



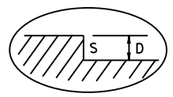


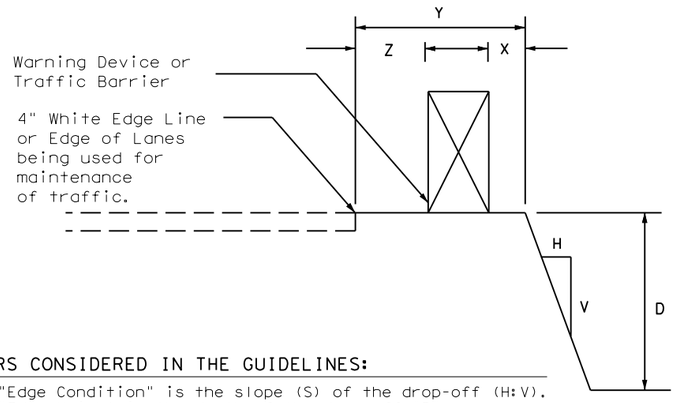
Edge Condition II
S = ((2.99):1) to (1:1)





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





FACTORS CONSIDERED IN THE GUIDELINES:

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

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

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

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

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

Zone	Treatment Types Guidelines:
①	No treatment
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge slope to that of the profered Edge Condition I.
⑤	Check indications (Figure-1) for possitive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.

Edge Condition Notes:

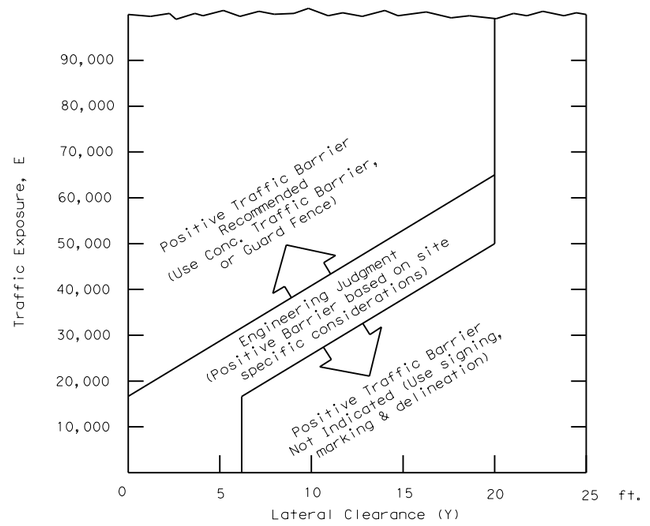
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

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

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

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



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

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

3. An approved end treatment should be provided for any positive barrier end located within the clear zone.

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

Engineer's Seal

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED PROFESSIONAL ENGINEER

Signature of Registrant & P.E. 3/29/2023 Date

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

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©TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
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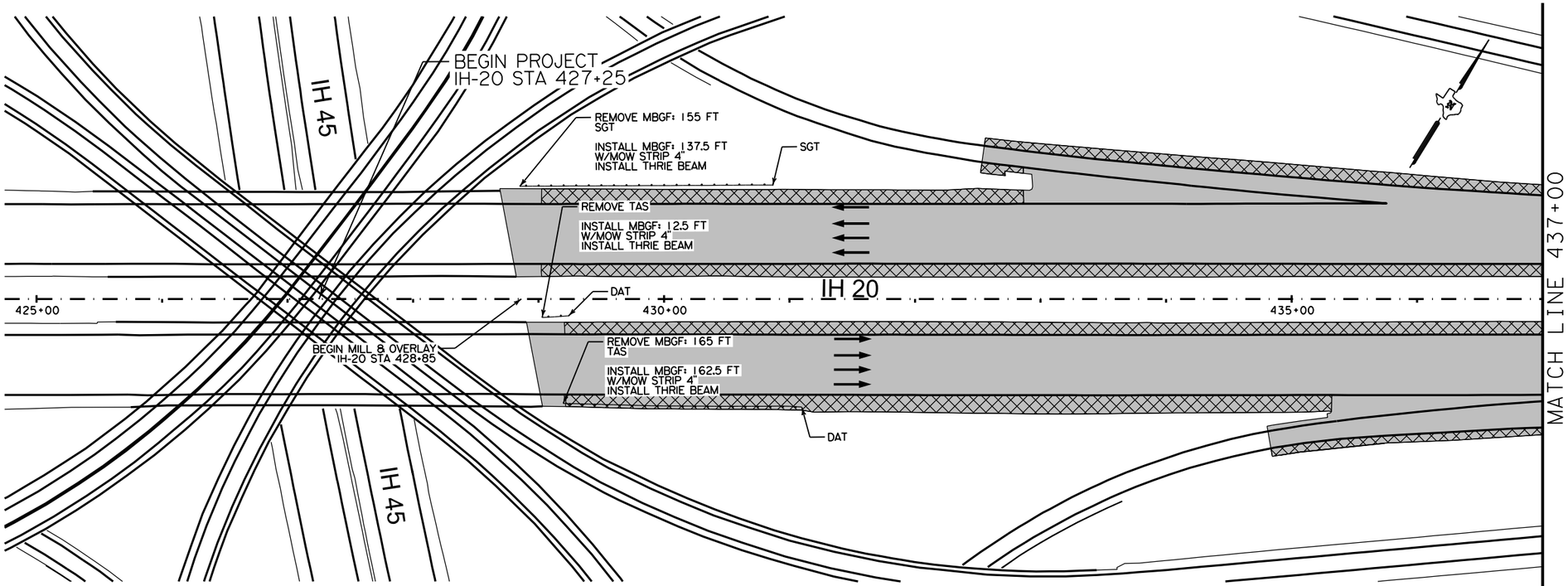


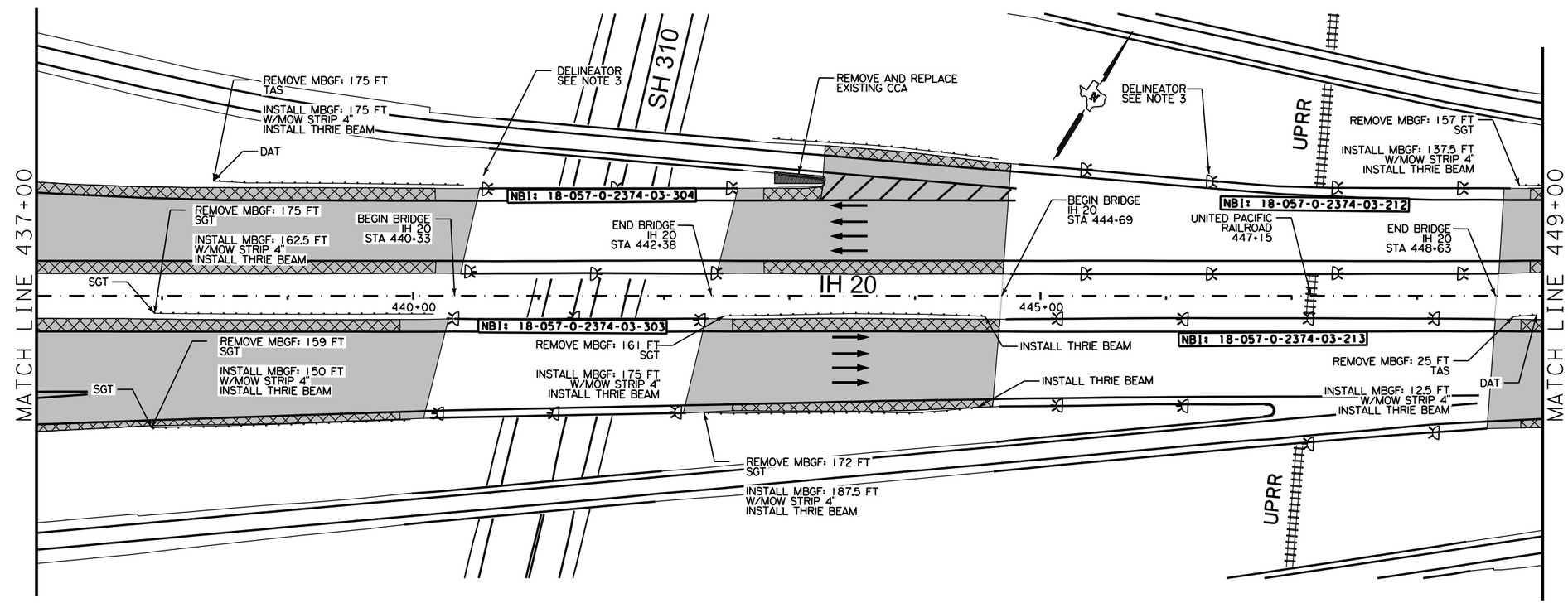
0 50 100

LEGEND

- MILL & OVERLAY AREA
- FLEX PAVEMENT REPAIR AREA
- DIRECTION OF TRAFFIC
- EXISTING MBGF
- DELINEATOR
- CONSTRUCTION EXIT
- SCF — SEDIMENT CONTROL FENCE
- RFD3 — ROCK FILTER DAM TYPE 3
- BLOCK SODDING

NOTES:

1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. MINIMIZE DISTURBANCE OF STREAMS AND VEGETATIVE BUFFERS/HABITAT TO THE EXTEND FEASIBLE. ADHERE TO EPIC AND SW3P SHEETS AND TO USACE NWP 14.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO DBOM STANDARD SHEETS FOR MORE DETAIL.
4. CONSTRUCTION EXITS AND OTHER BMPs MAY BE ADJUSTED AS NEEDED, WITH ENGINEER'S APPROVAL OR DIRECTION.



STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED PROFESSIONAL ENGINEER

Signature of Registrant & P.E. 3/17/2023 Date

Texas Department of Transportation

IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 1 OF 15

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	37
	2374	03	098	

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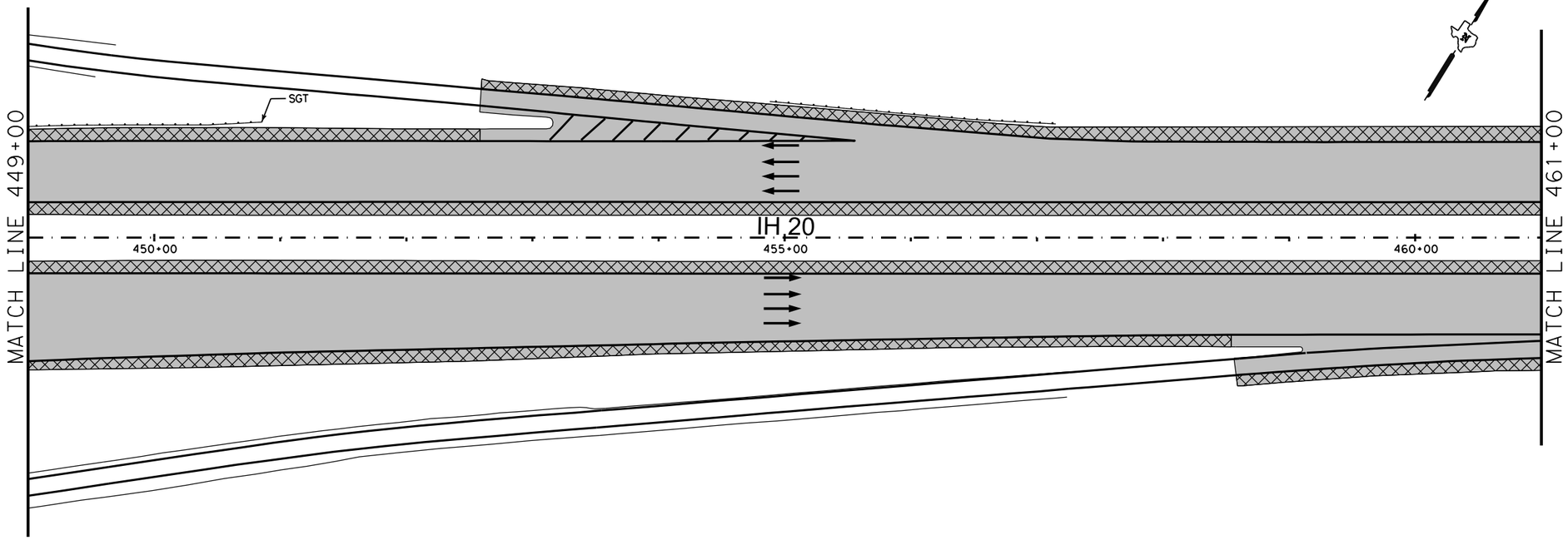
DATE STABILIZED : _____



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LEGEND

- MILL & OVERLAY AREA
- FLEX PAVEMENT REPAIR AREA
- DIRECTION OF TRAFFIC
- EXISTING MBGF
- DELINEATOR
- CONSTRUCTION EXIT
- SCF — SEDIMENT CONTROL FENCE
- RFD3 — ROCK FILTER DAM TYPE 3
- BLOCK SODDING

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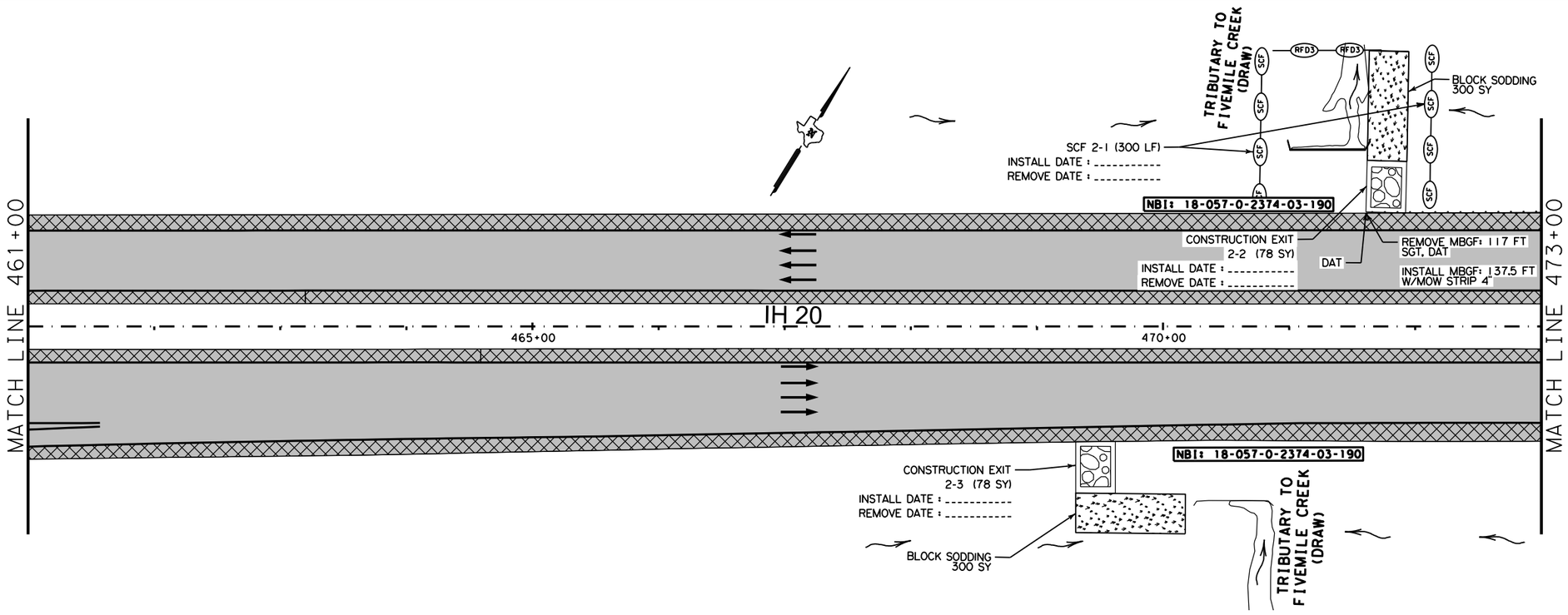

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IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 2 OF 15

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	38
	2374	03	098	

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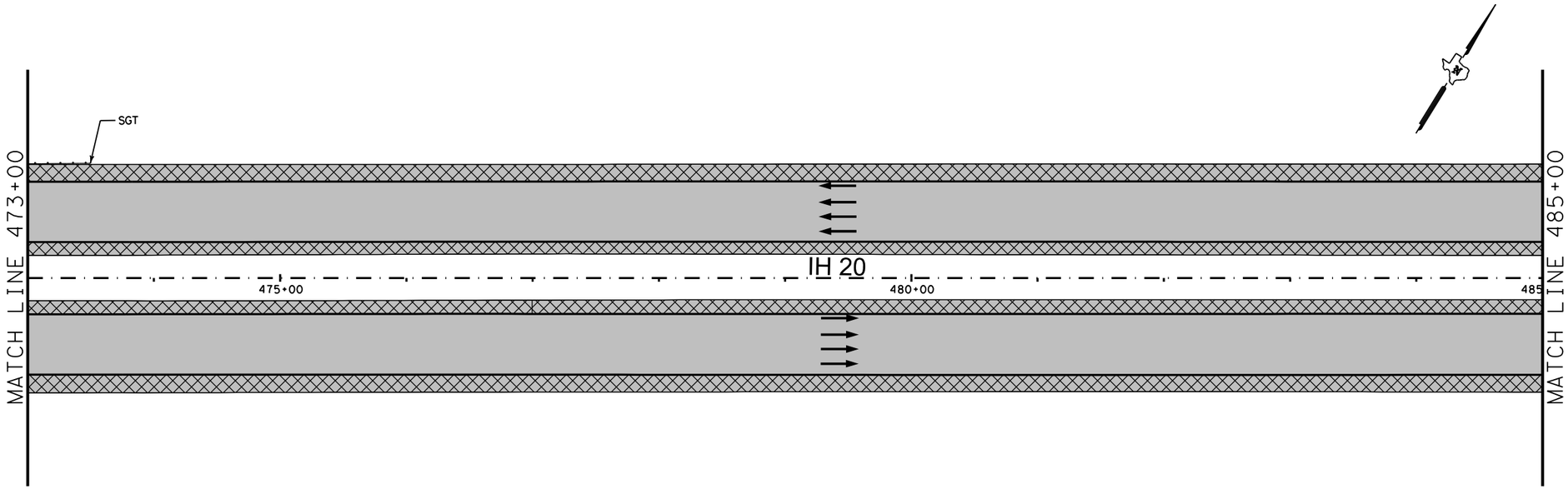

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LEGEND

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- FLEX PAVEMENT REPAIR AREA
- DIRECTION OF TRAFFIC
- EXISTING MBGF
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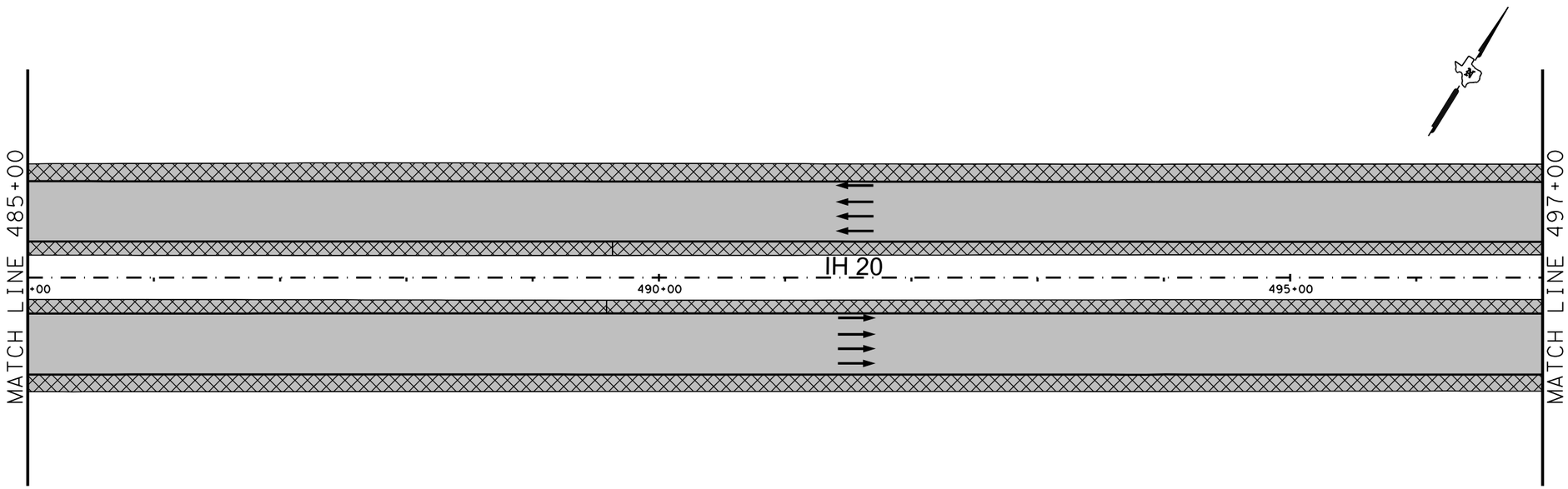

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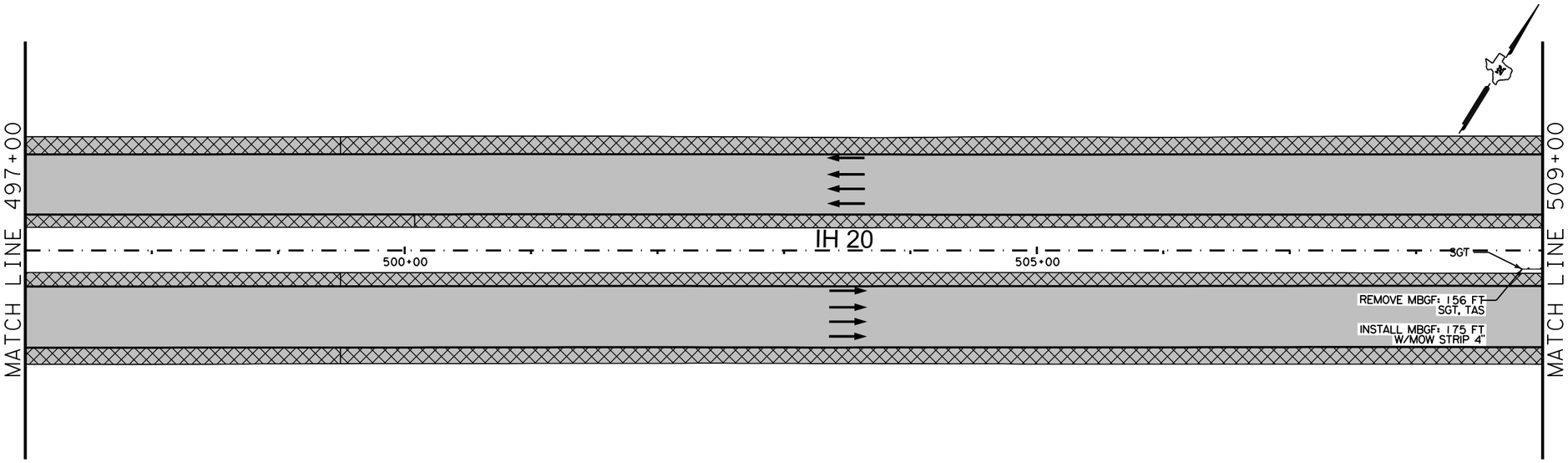
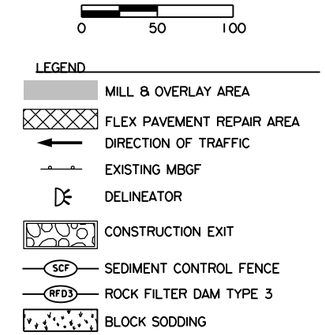
IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 3 OF 15

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	39
	2374	03	098	





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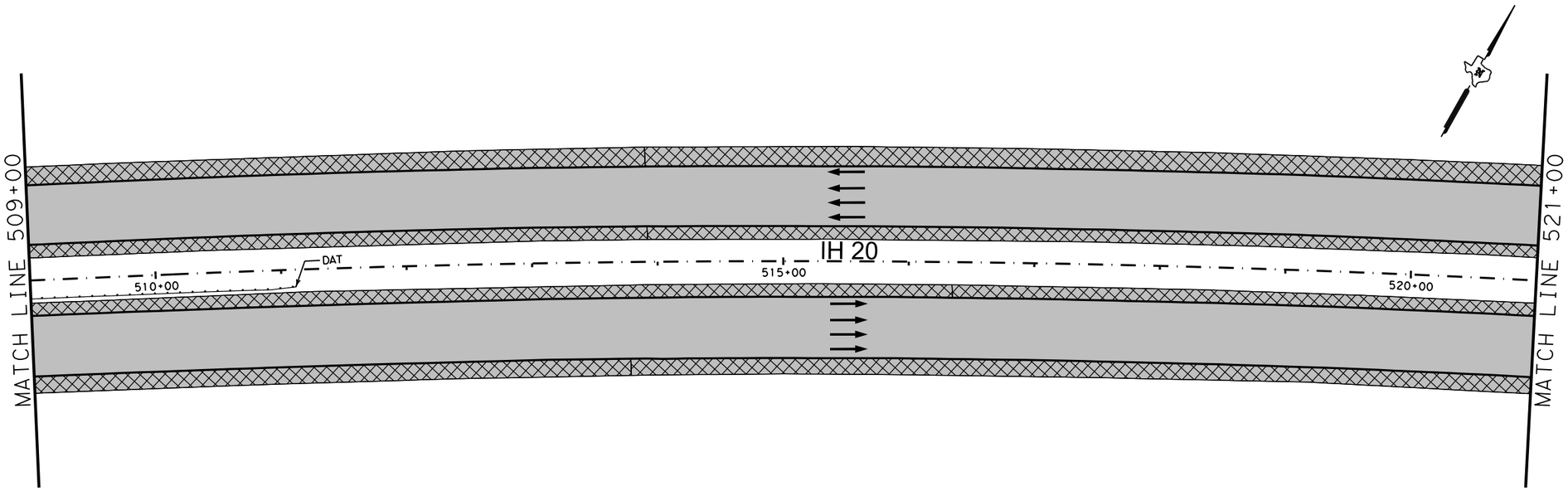

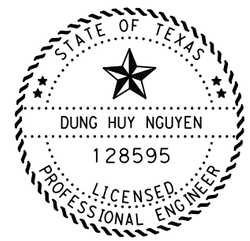

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IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 4 OF 15

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	40
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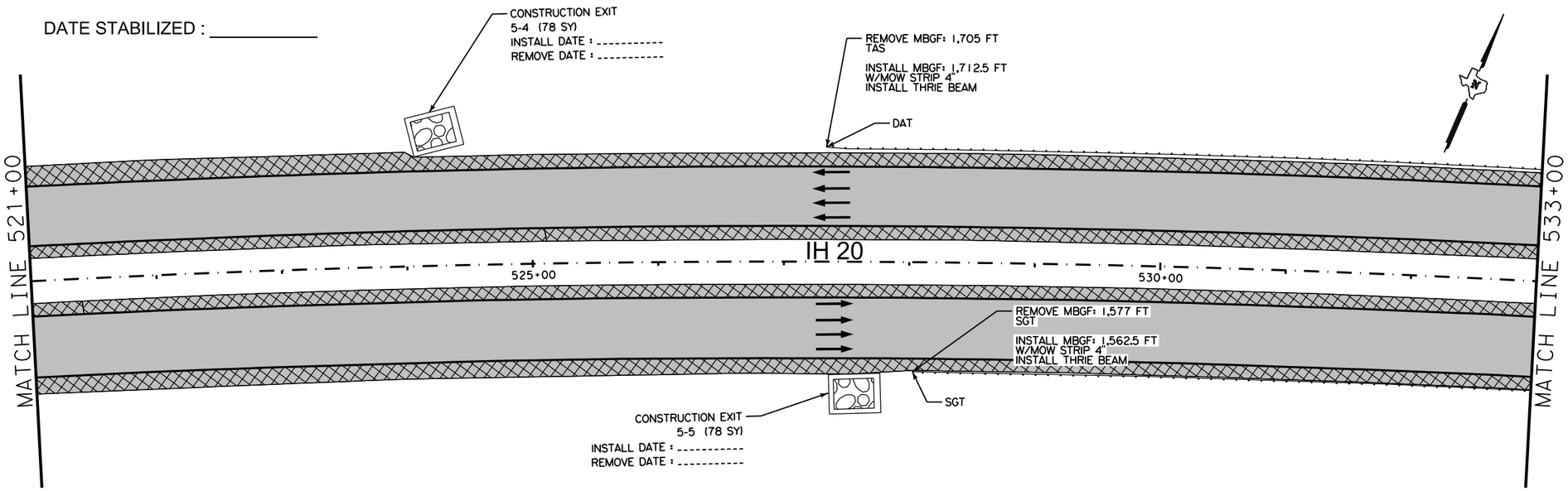

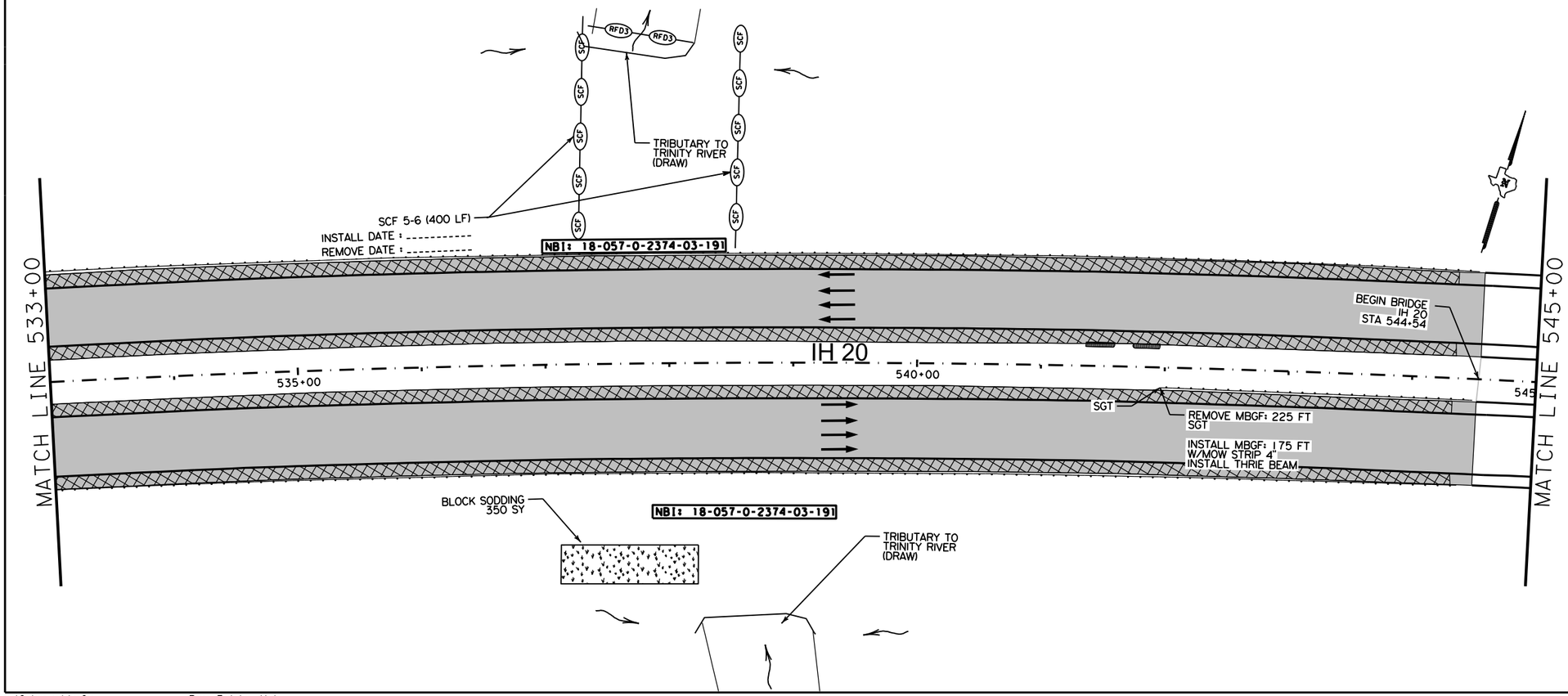

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LEGEND

- MILL & OVERLAY AREA
- FLEX PAVEMENT REPAIR AREA
- DIRECTION OF TRAFFIC
- EXISTING MBGF
- DELINEATOR
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IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 5 OF 15

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	41
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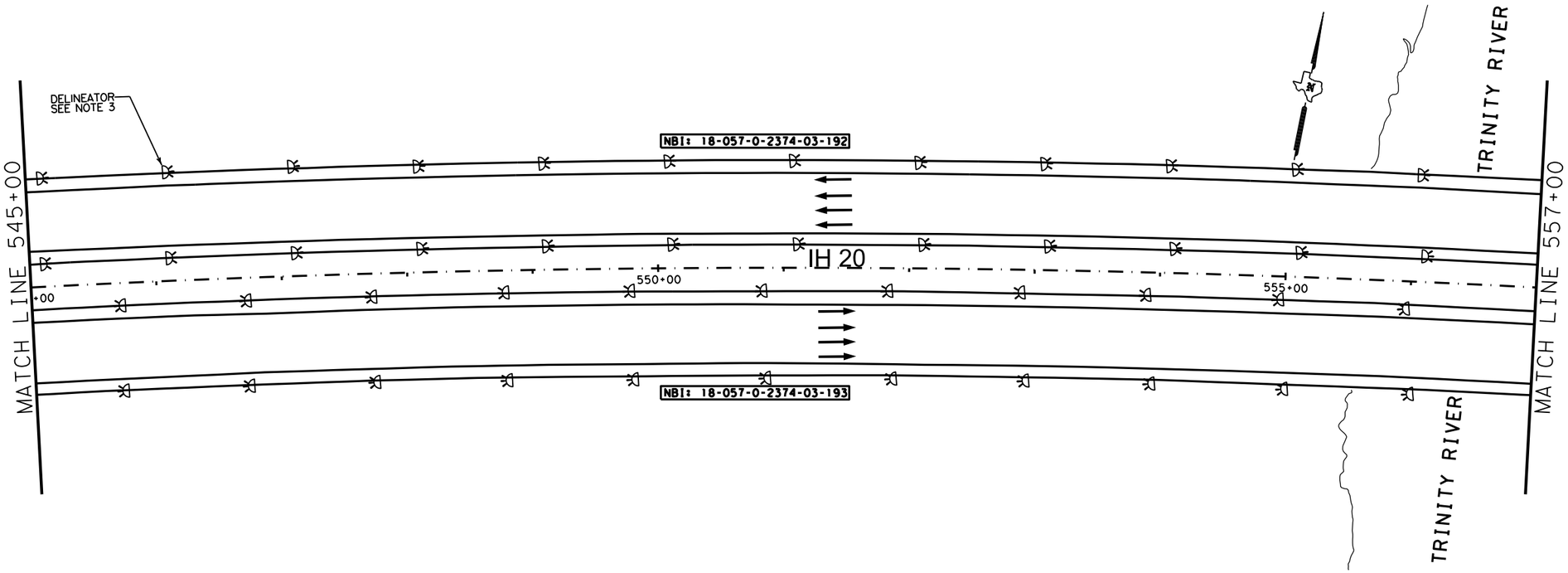

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- FLEX PAVEMENT REPAIR AREA
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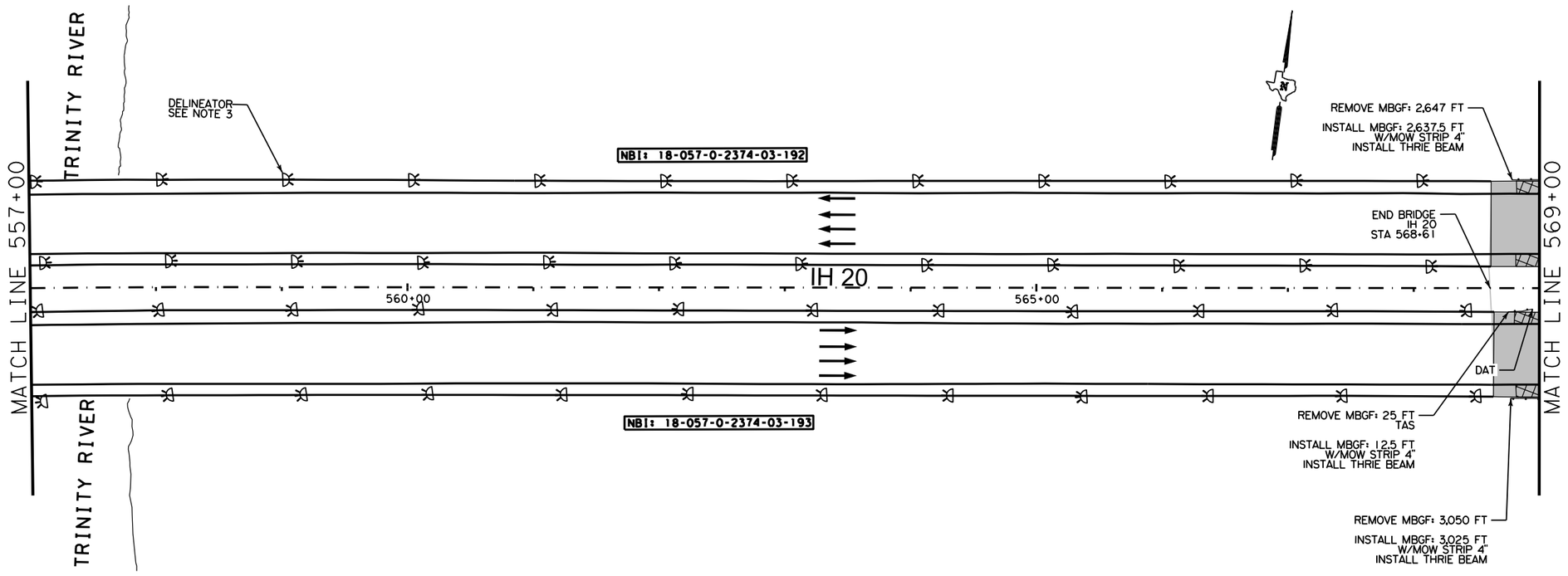

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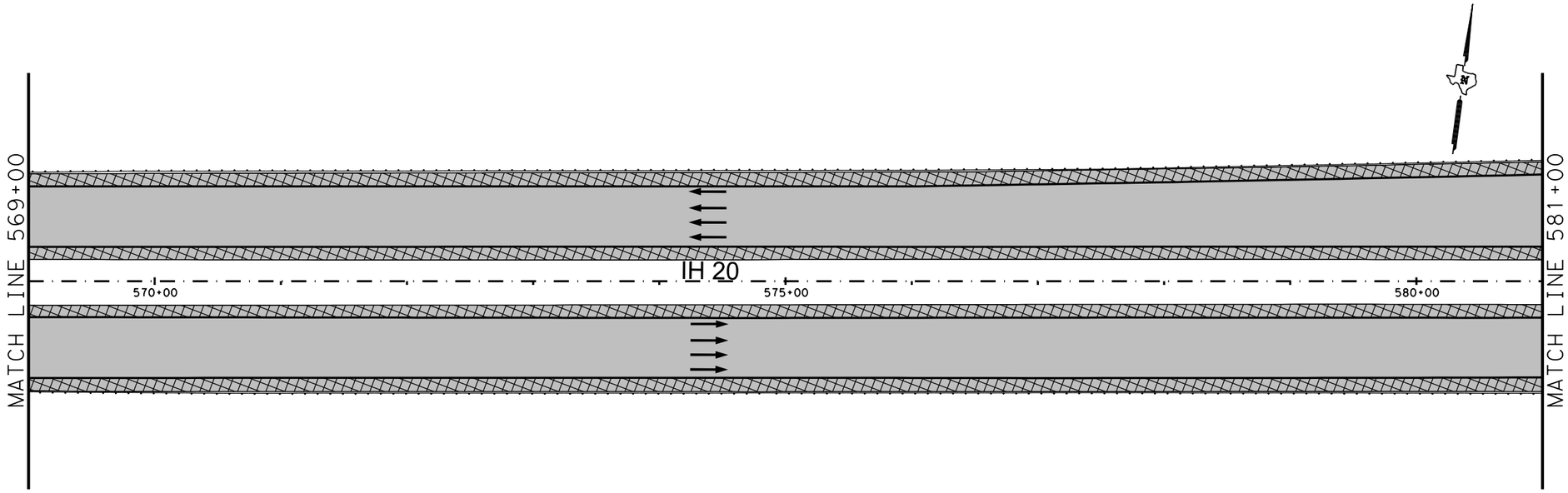
IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 6 OF 15

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	42
	2374	03	098	



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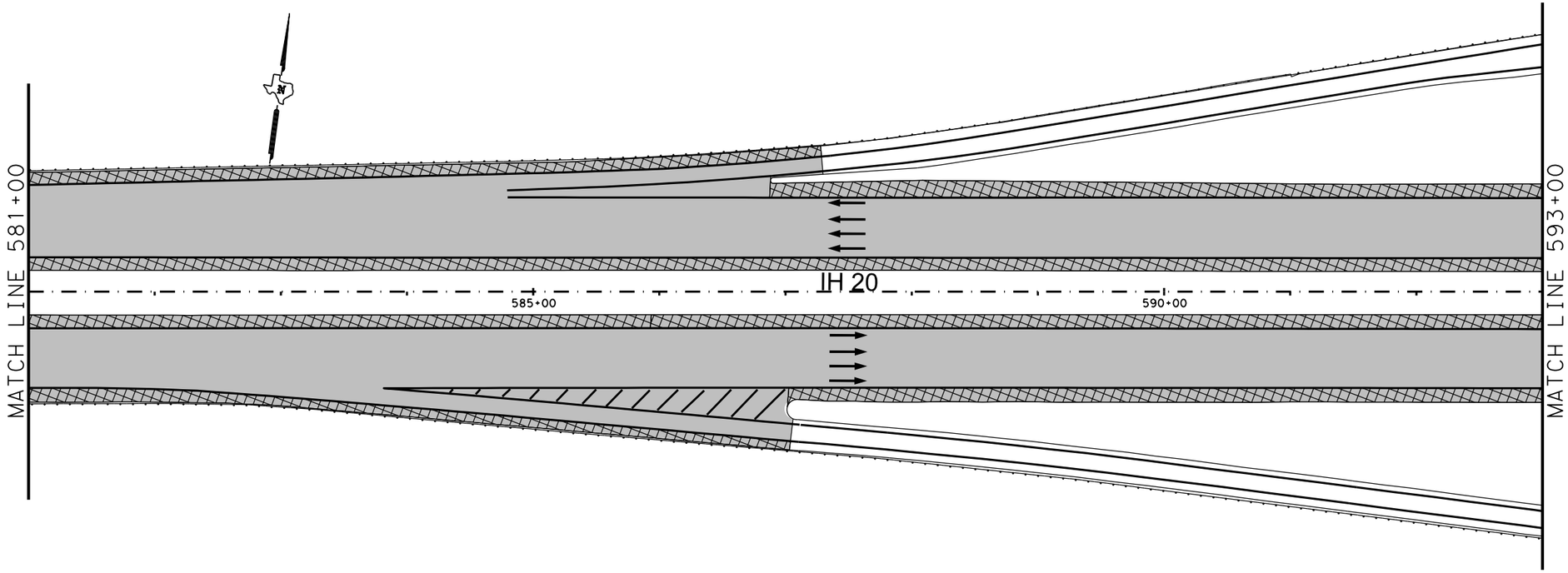

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Texas Department of Transportation

IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 7 OF 15

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	43
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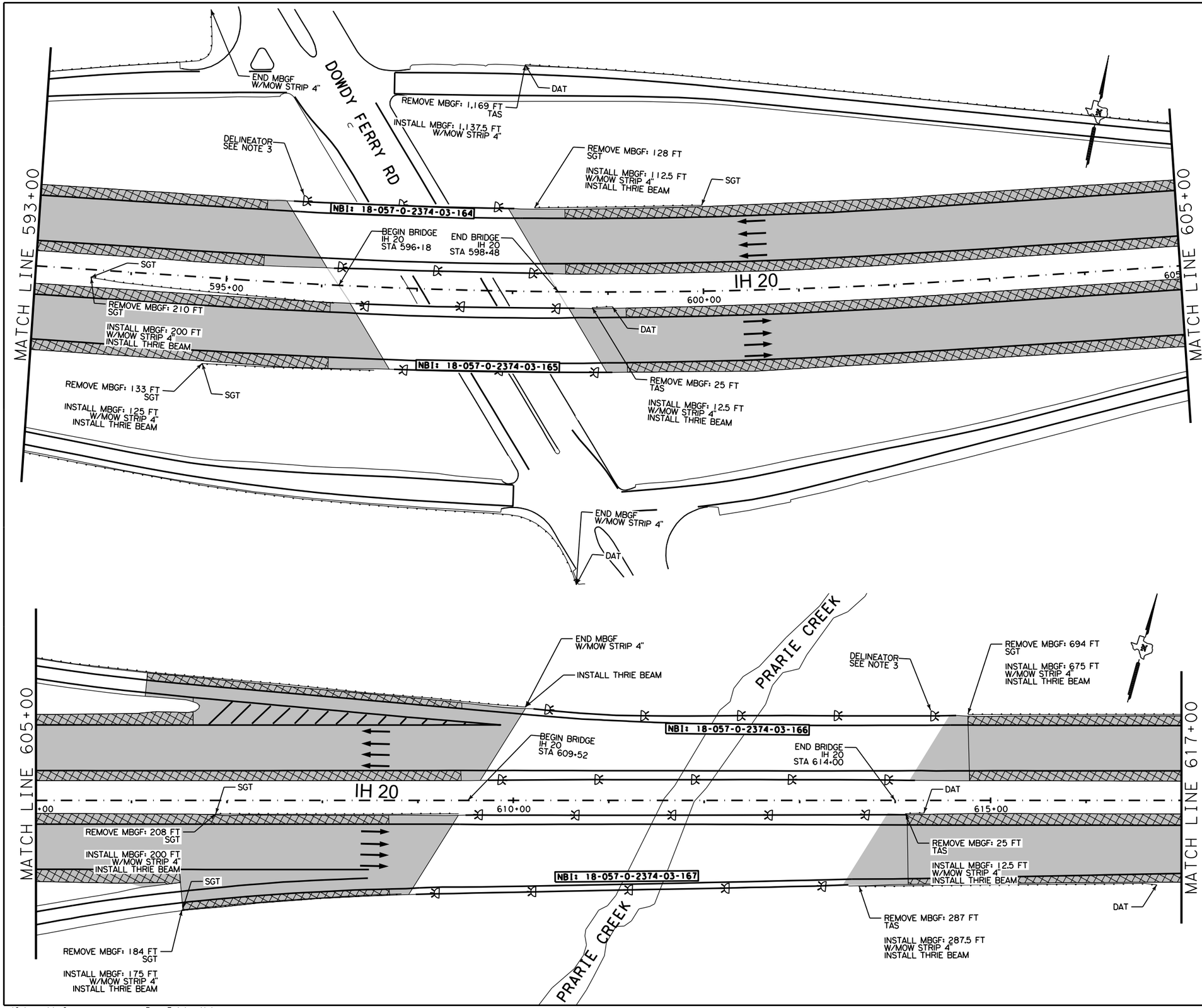

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LEGEND

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IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 8 OF 15

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
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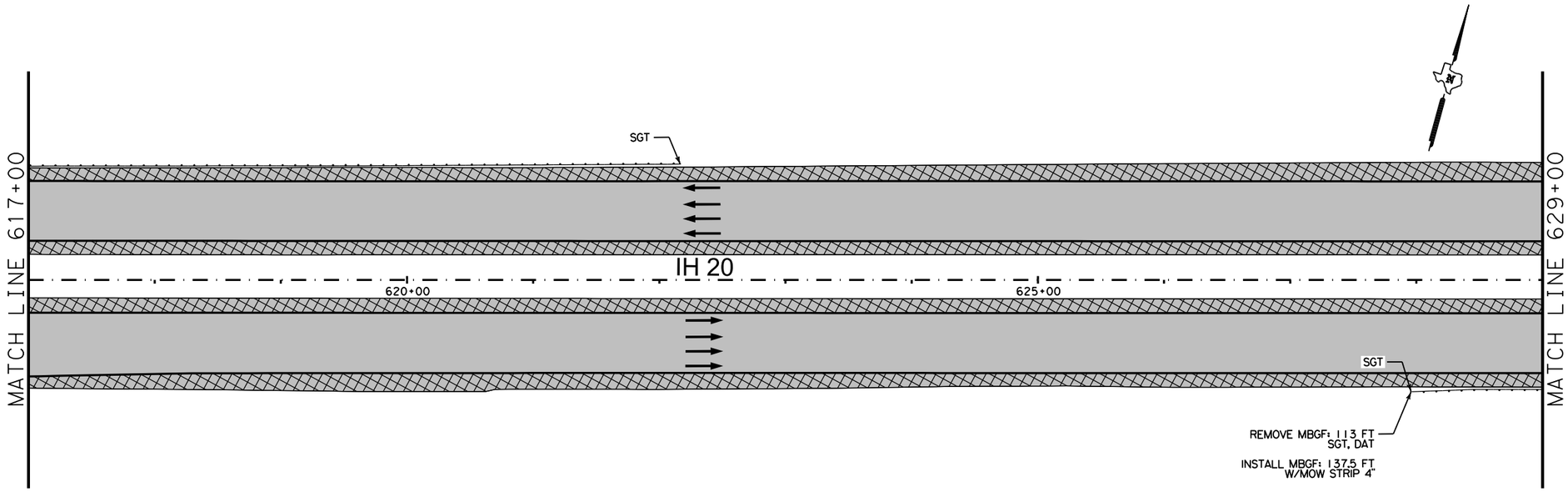

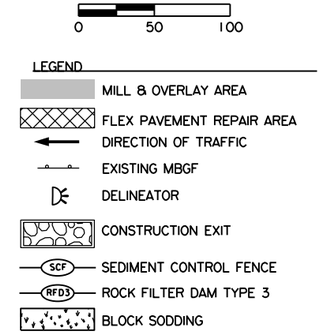

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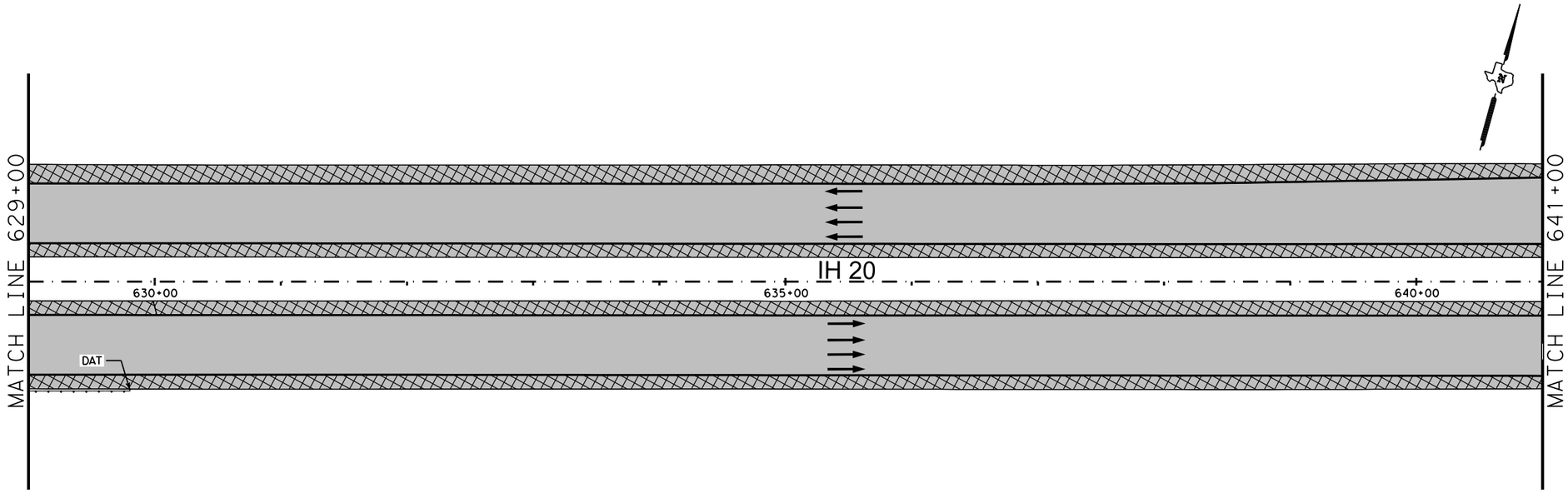

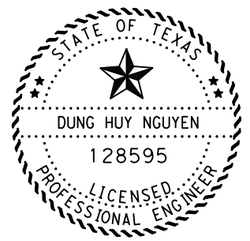

Dung Nguyen, P.E. 3/17/2023
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IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 9 OF 15

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	45
	2374	03	098	

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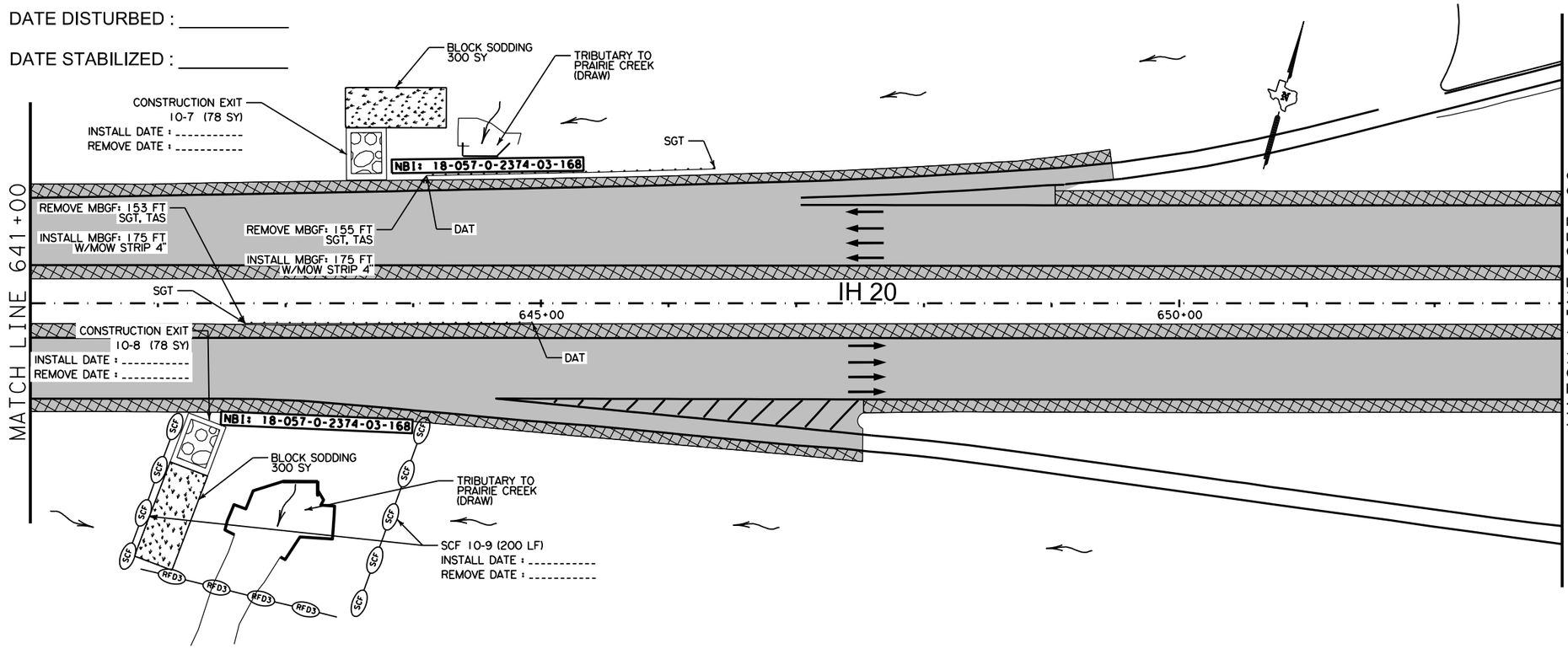

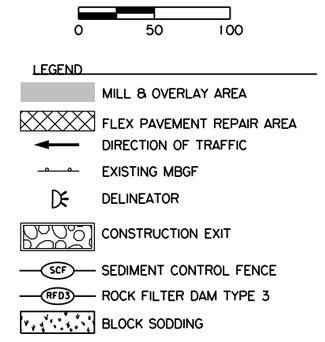

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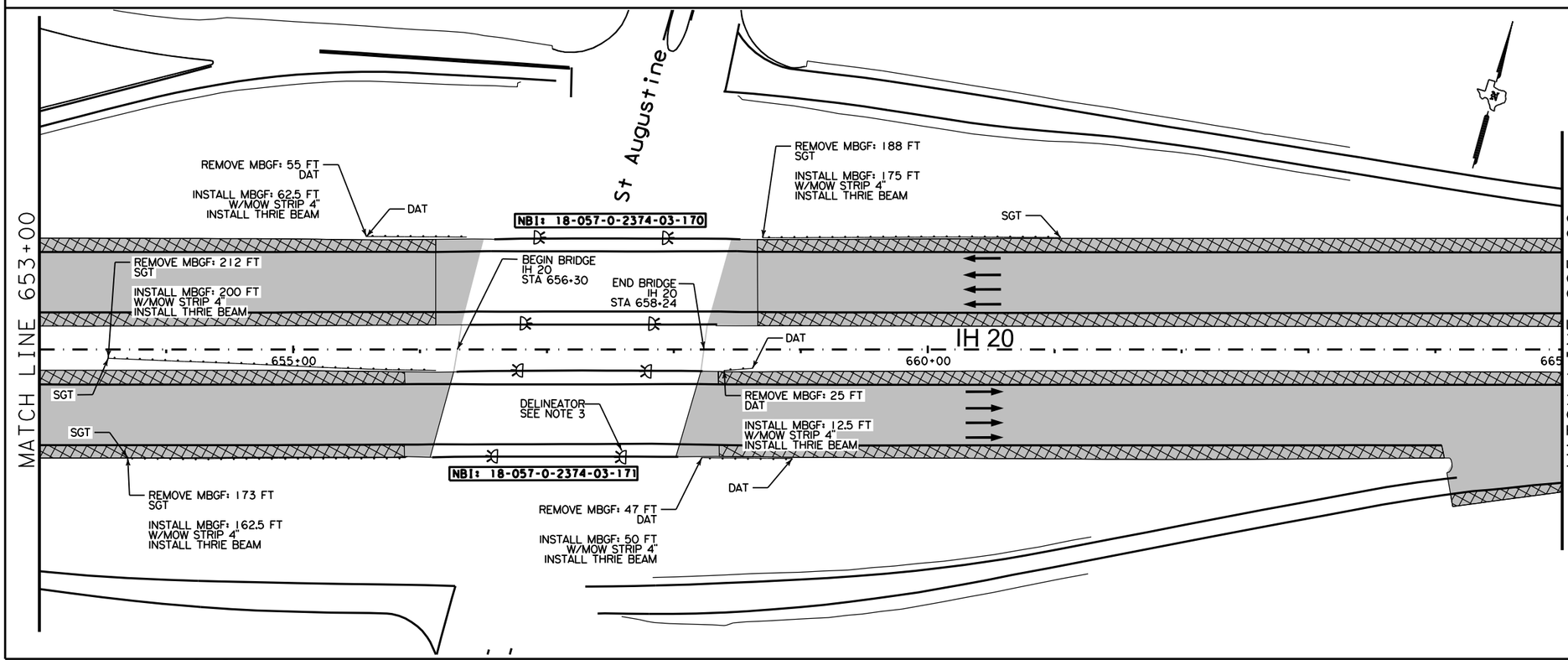

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IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 10 OF 15

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	46
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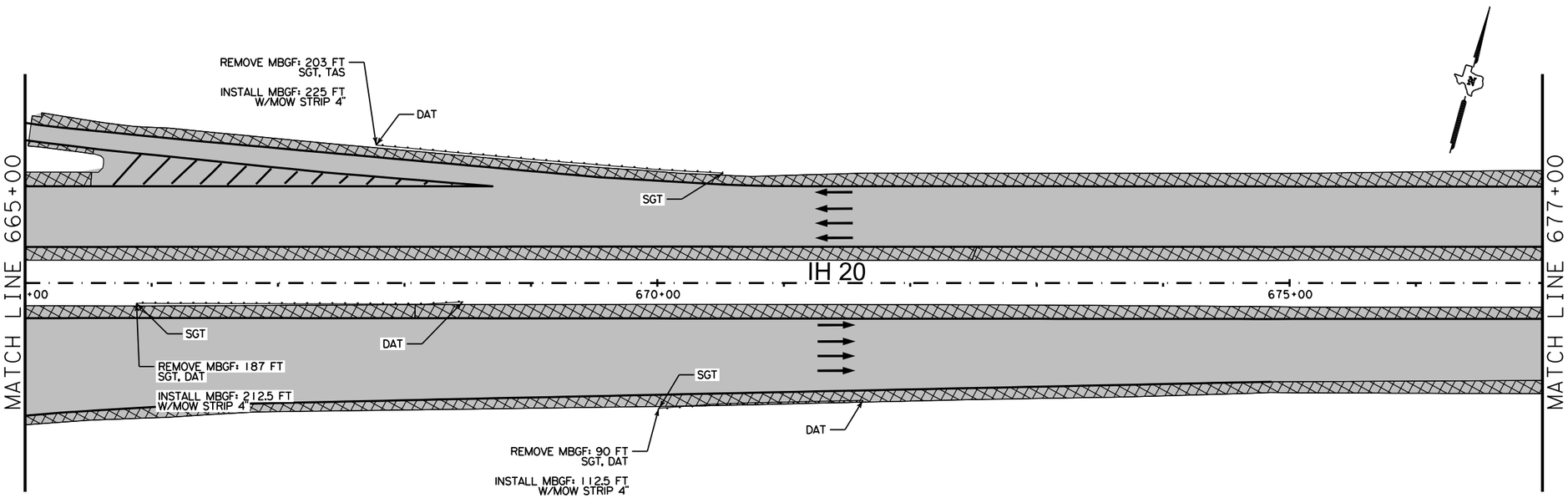

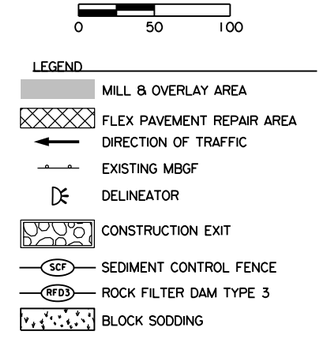

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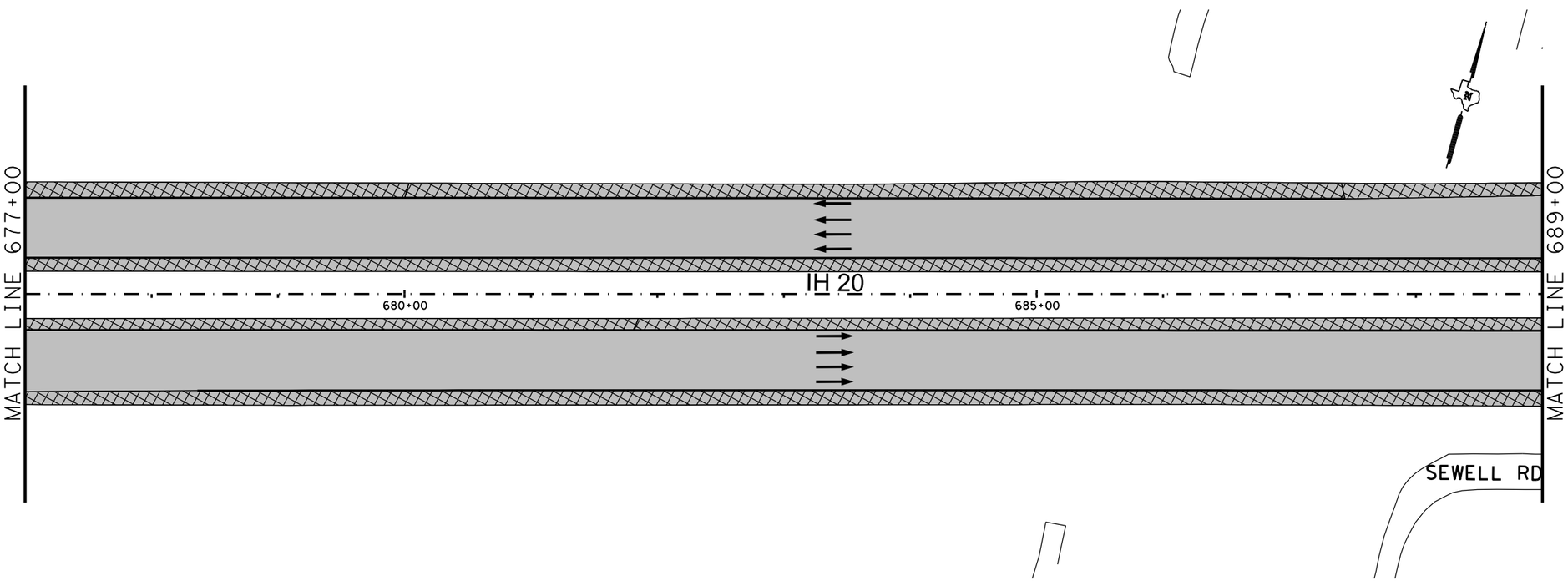

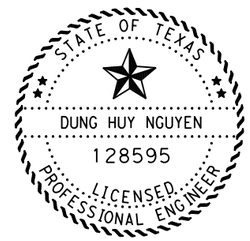

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IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 11 OF 15

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
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CHECK NP	CONTROL	SECTION	JOB	47
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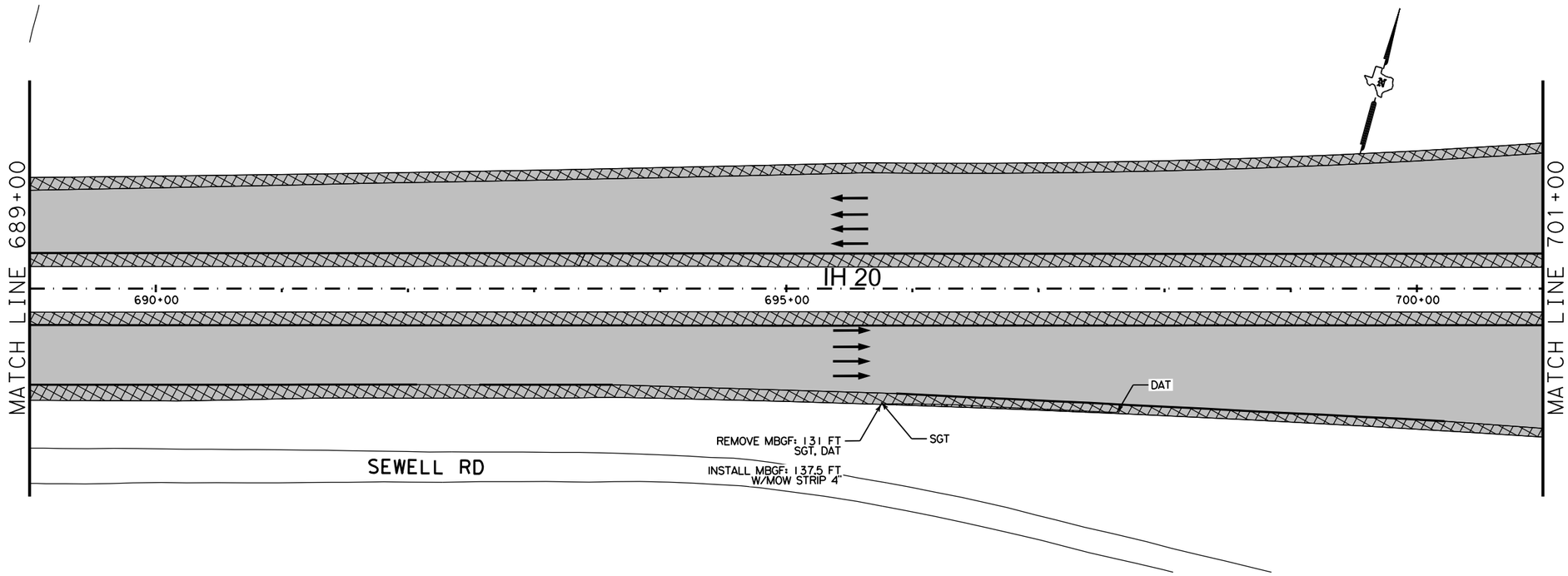
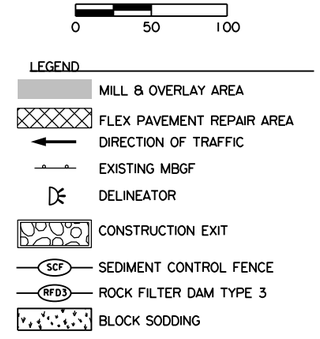
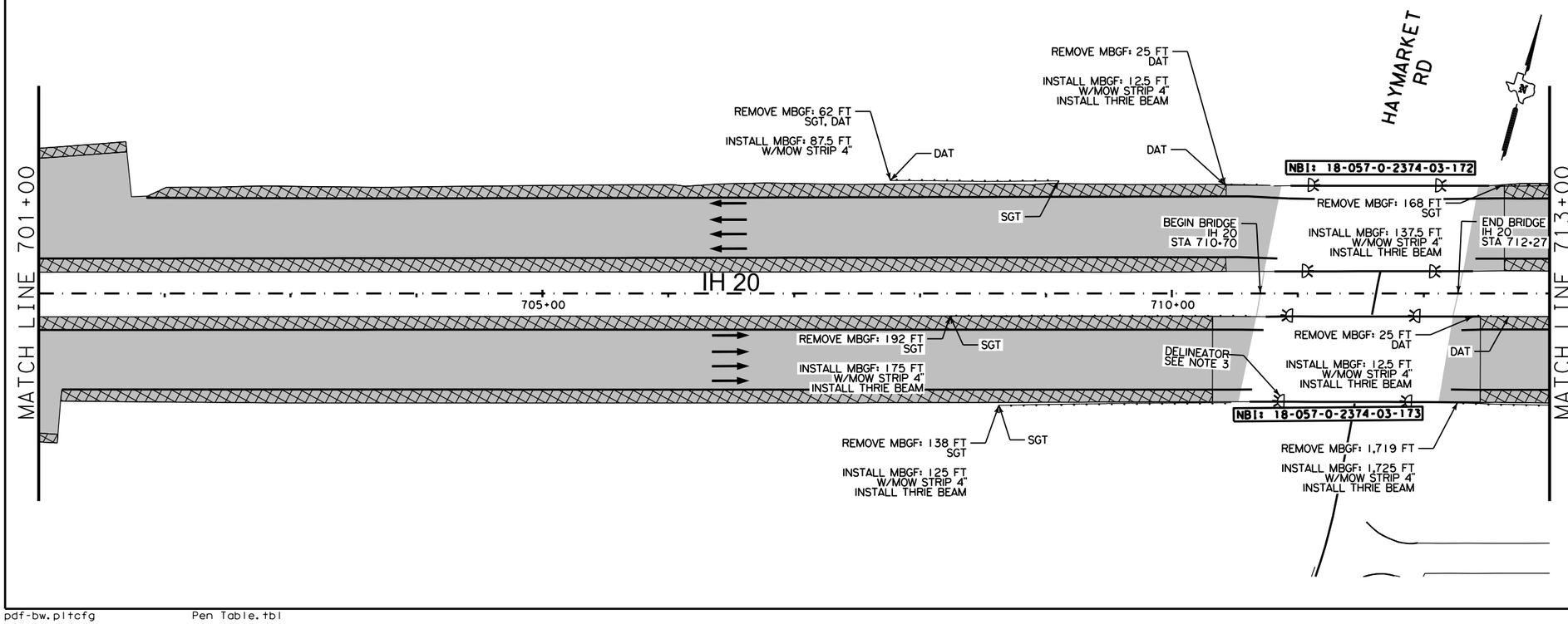




NOTES:

1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. MINIMIZE DISTURBANCE OF STREAMS AND VEGETATIVE BUFFERS/HABITAT TO THE EXTEND FEASIBLE. ADHERE TO EPIC AND SW3P SHEETS AND TO USACE NWP 14.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO DBOM STANDARD SHEETS FOR MORE DETAIL.
4. CONSTRUCTION EXITS AND OTHER BMPs MAY BE ADJUSTED AS NEEDED, WITH ENGINEER'S APPROVAL OR DIRECTION.



STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED PROFESSIONAL ENGINEER

Signature of Registrant & Date: P.E. 3/17/2023

Texas Department of Transportation

IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 12 OF 15

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	48
	2374	03	098	

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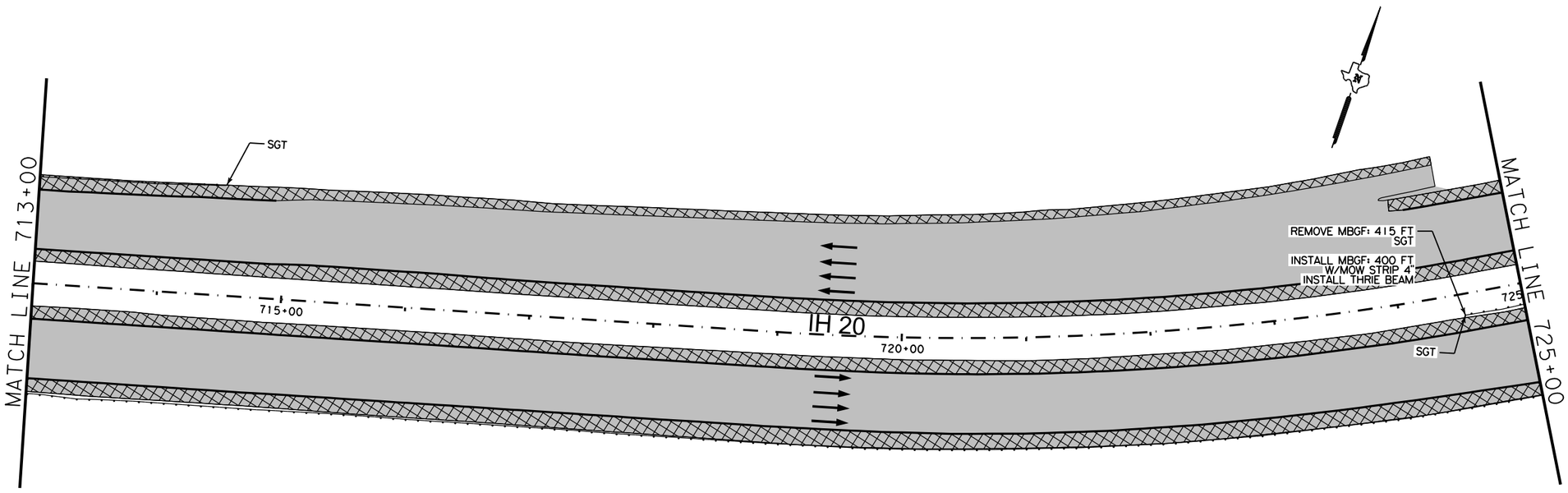

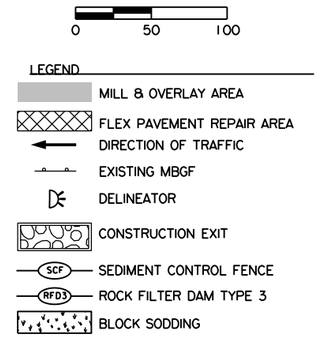

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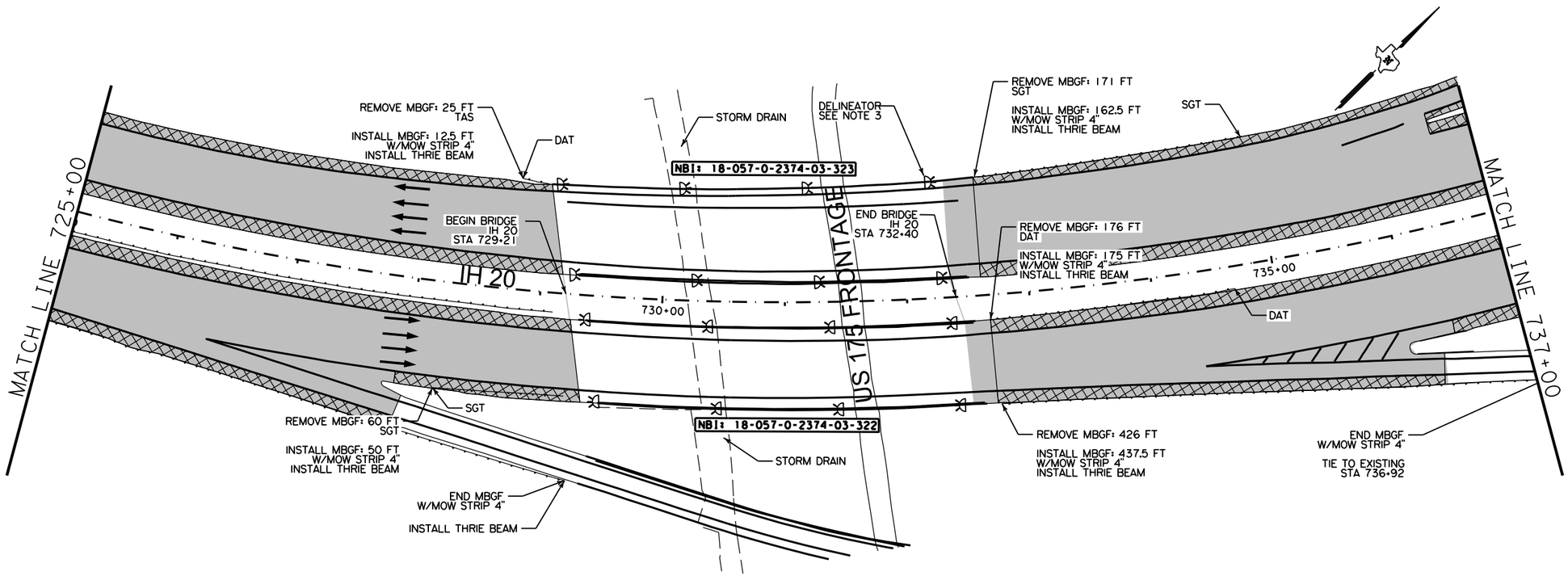

STATE OF TEXAS
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PROFESSIONAL ENGINEER

Signature of Registrant & P.E. Date 3/17/2023

Texas Department of Transportation

IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 13 OF 15

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	49
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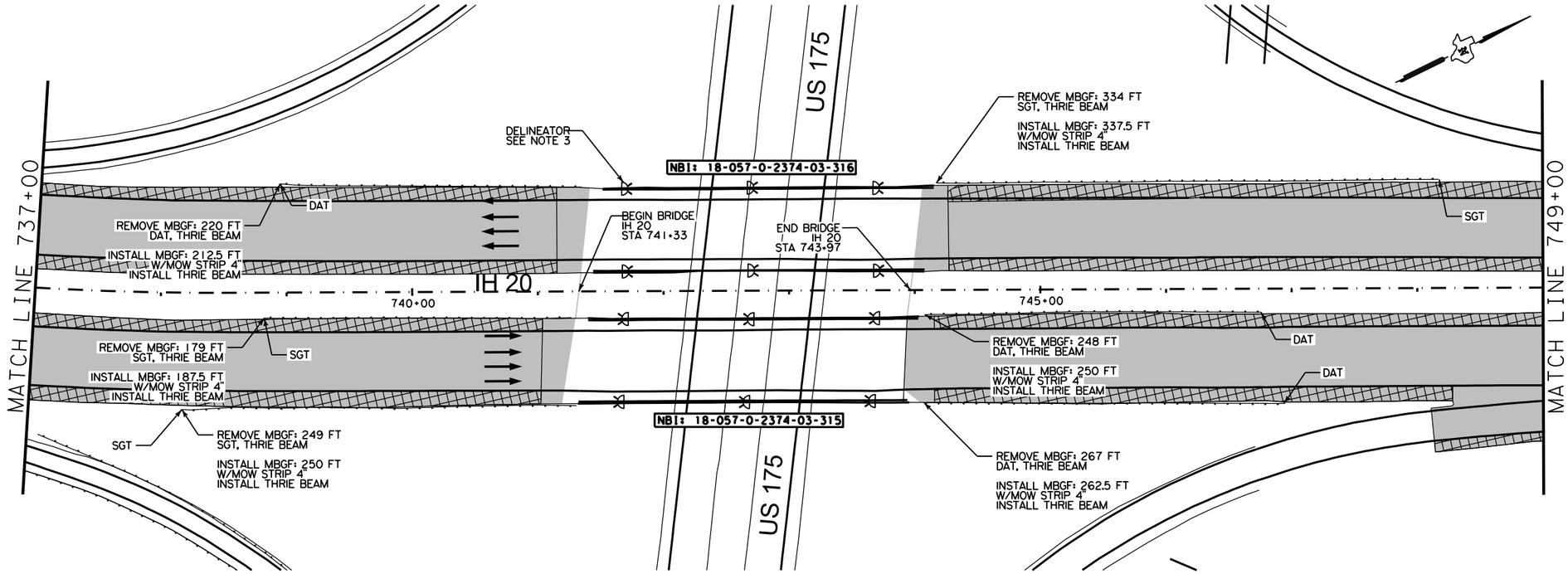

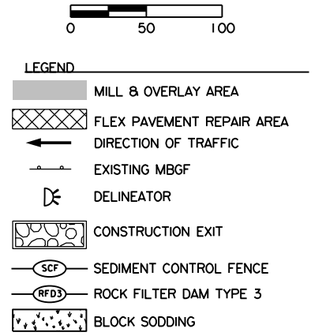

NOTES:

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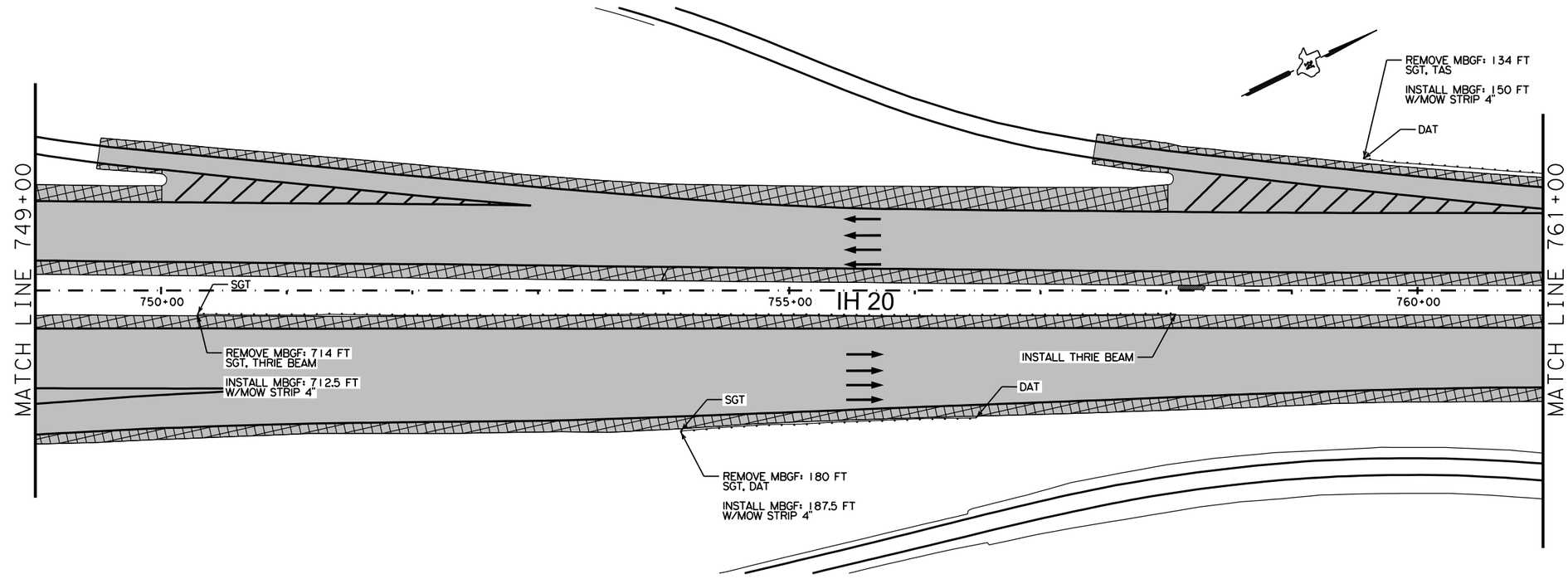

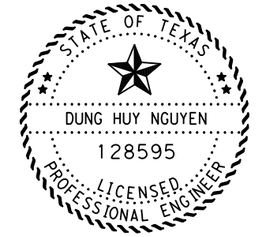

Signature of Registrant , P.E. & Date 3/17/2023

IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 14 OF 15

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
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CHECK NP	CONTROL	SECTION	JOB	50
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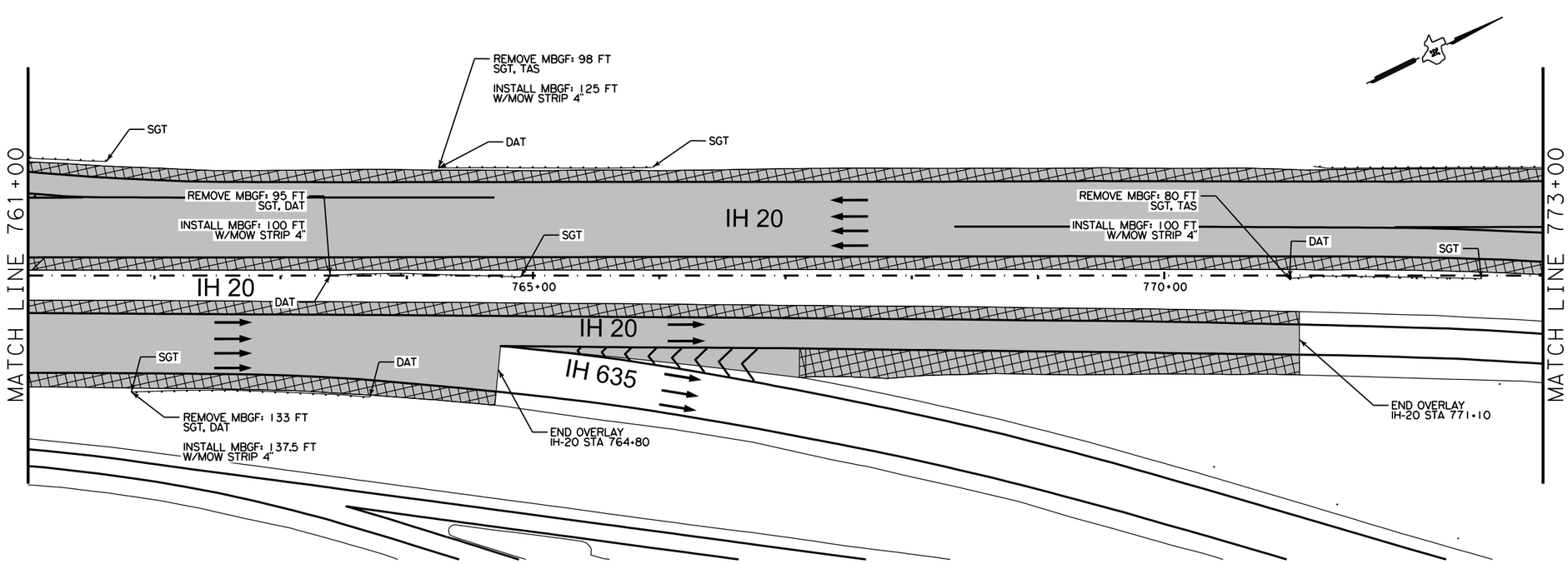

LEGEND

- MILL & OVERLAY AREA
- FLEX PAVEMENT REPAIR AREA
- DIRECTION OF TRAFFIC
- EXISTING MBGF
- DELINEATOR
- CONSTRUCTION EXIT
- SCF — SEDIMENT CONTROL FENCE
- RFD3 — ROCK FILTER DAM TYPE 3
- BLOCK SODDING

NOTES:

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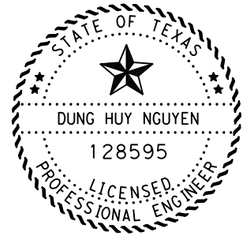

Dung Nguyen, P.E. 3/17/2023
Signature of Registrant & Date

IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 15 OF 15

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
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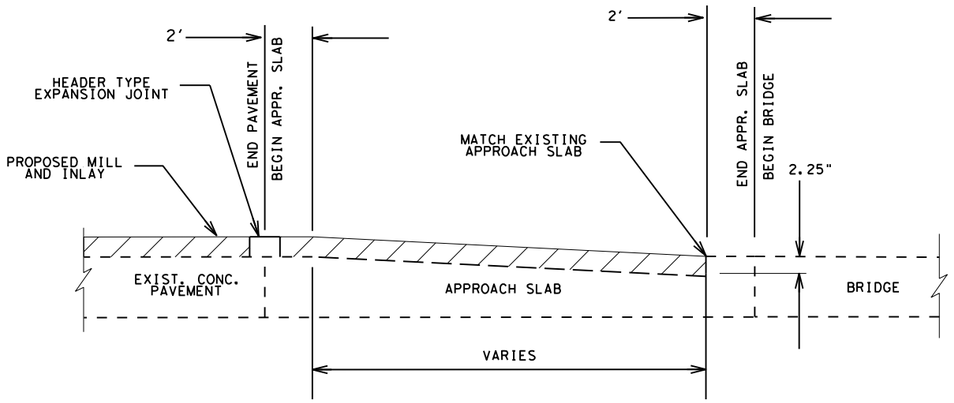
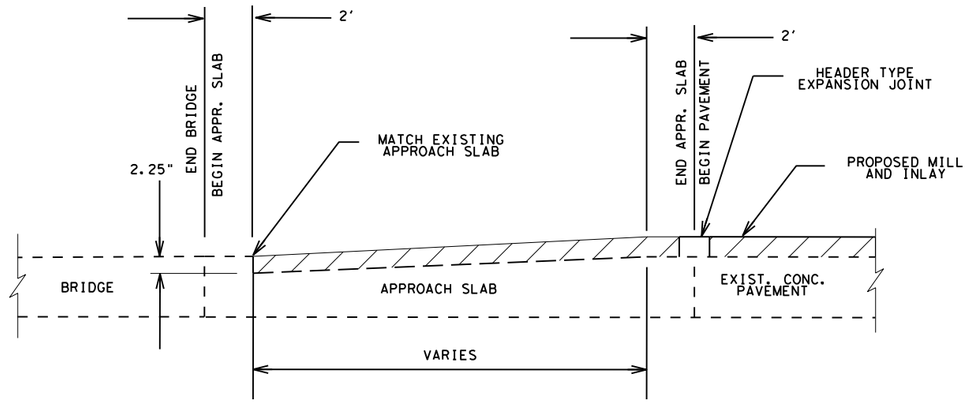
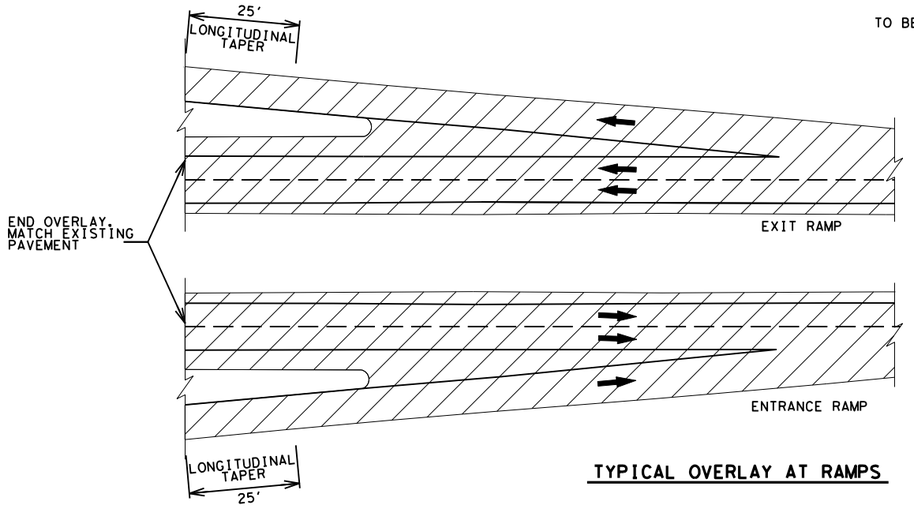


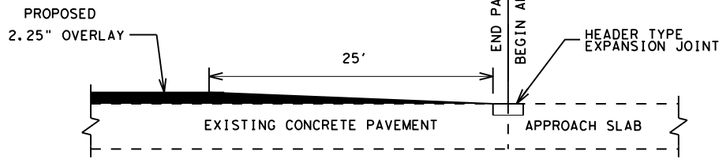


TRANSITION TAPER AT BRIDGE

TO BE USED ON ALL BRIDGES EXCEPT HOUSTON SCHOOL ROAD BRIDGE

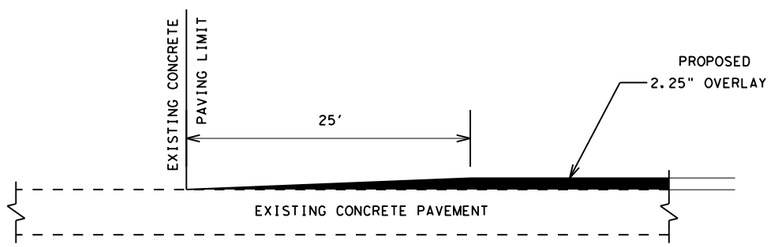


TYPICAL OVERLAY AT RAMPS



LONGITUDINAL TAPER AT BRIDGE

TO BE USED ON HOUSTON SCHOOL ROAD BRIDGE



LONGITUDINAL TAPER

TO BE USED ON ON-RAMPS AND OFF-RAMPS

LEGEND

MILL AND INLAY AREA

OVERLAY AREA

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED PROFESSIONAL ENGINEER

Signature of Registrant, P.E. & Date 3/17/2023

Texas Department of Transportation

IH 20

MISCELLANEOUS ROADWAY DETAILS

SHEET 1 OF 2

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
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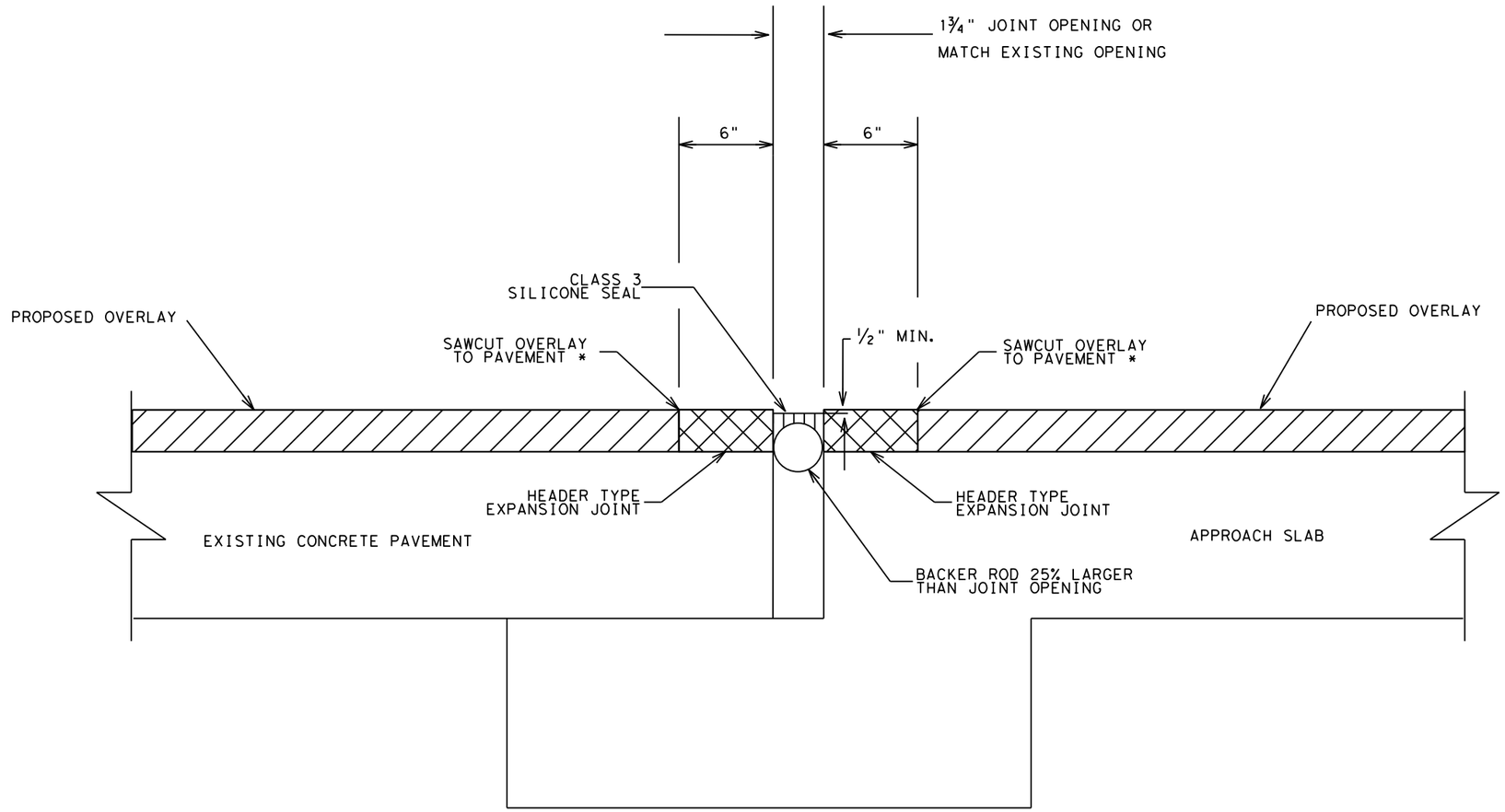
	2374	03	098	



HEADER TYPE EXPANSION JOINT DETAILS

NOTES:
* SAWCUT OVERLAY TO PAVEMENT IS SUBSIDIARY TO ITEM 454-6008

LEGEND

MILL AND INLAY AREA

EXPANSION JOINT

STATE OF TEXAS
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IH 20

MISCELLANEOUS ROADWAY DETAILS

SHEET 2 OF 2

DESIGN	FED. RD. DIV. NO.	PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DAL	DALLAS	
CHECK NP	CONTROL	SECTION	JOB	53
	2374	03	098	

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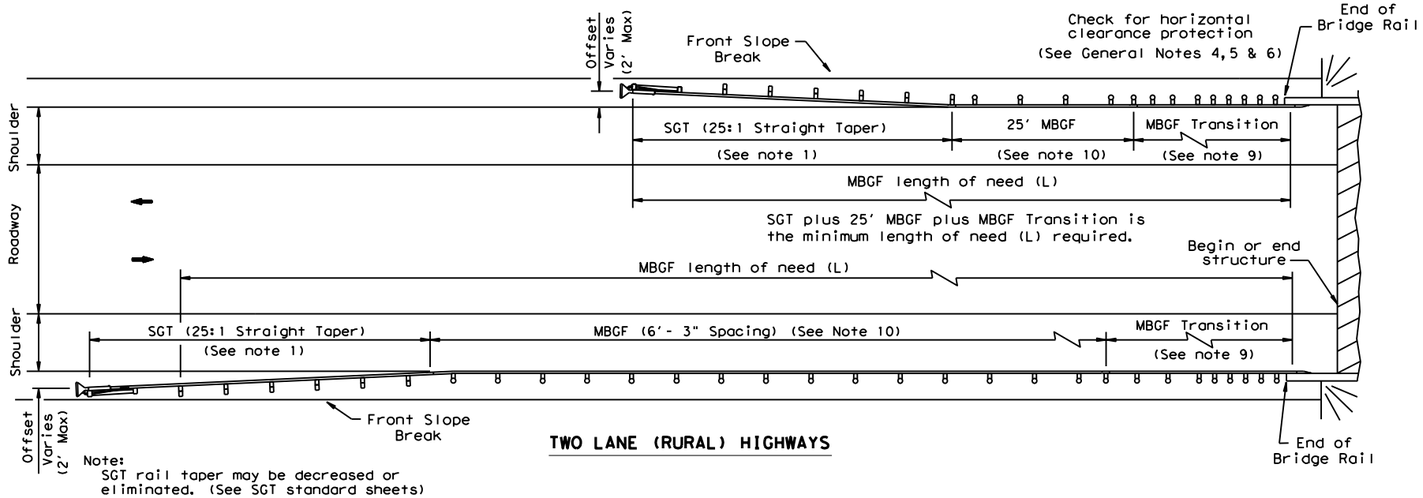
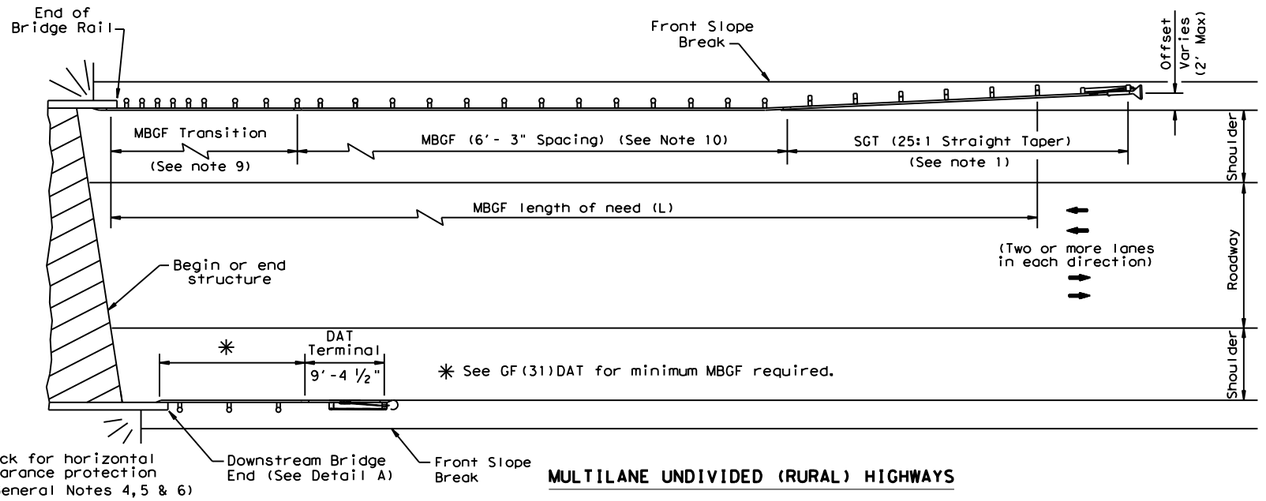
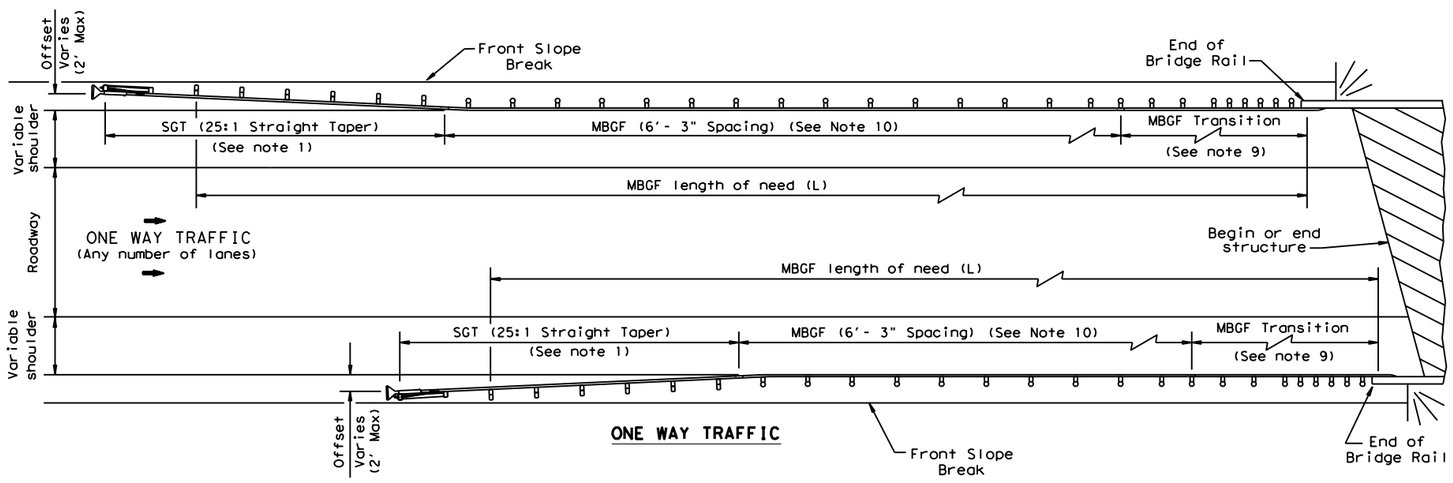


TWO LANE (RURAL) HIGHWAYS

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



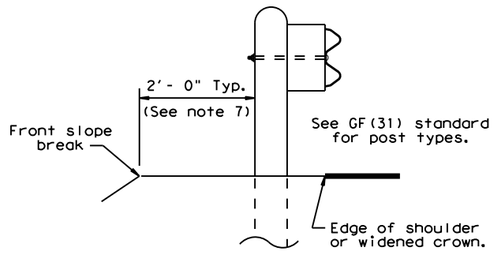
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



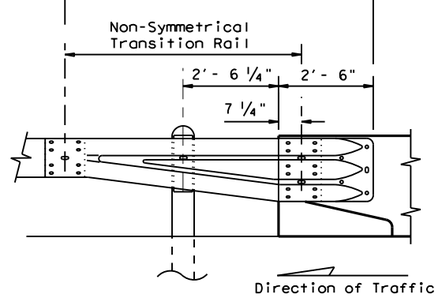
ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF



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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation — Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		54

DATE: 3/17/2023
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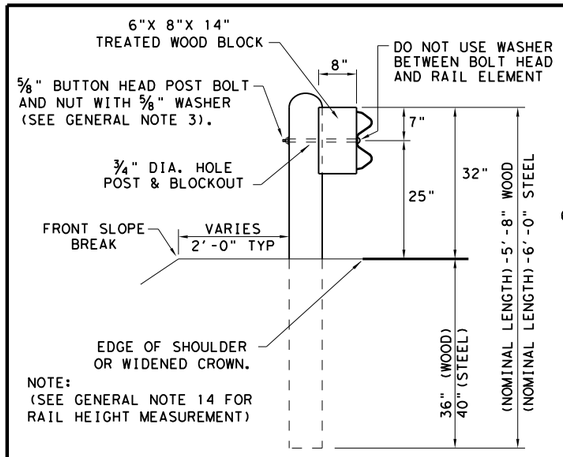
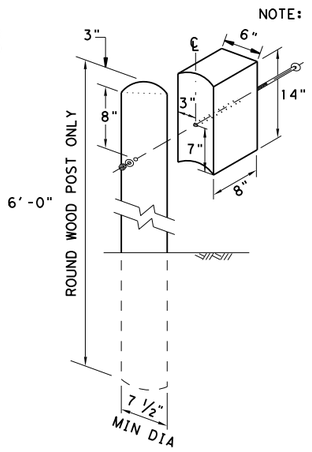
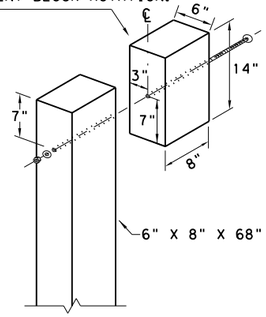


TYPICAL POST PLACEMENT

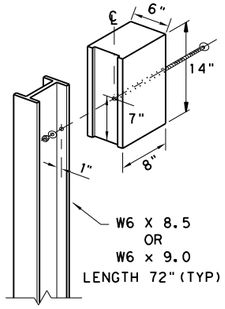


WOOD BLOCK TO ROUND WOOD POST

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

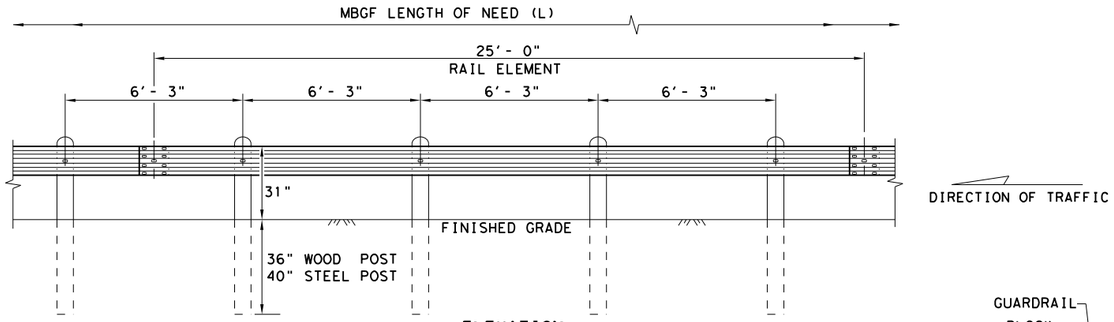


WOOD BLOCK TO RECTANGULAR WOOD POST



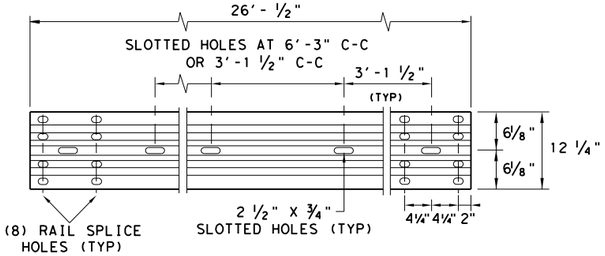
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

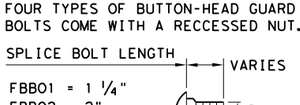
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

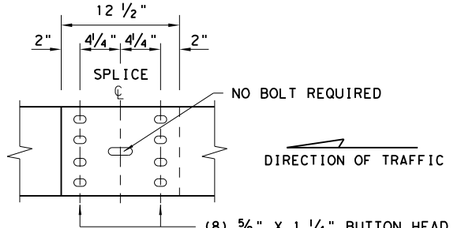
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



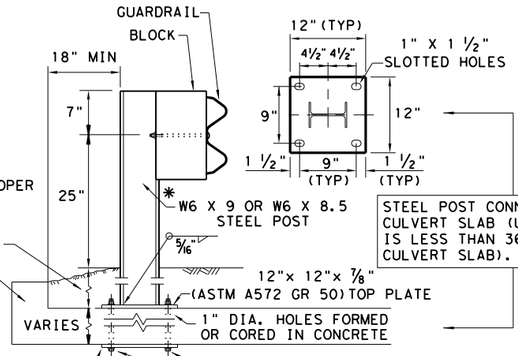
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



* POST(S) MAY REQUIRE FIELD MODIFICATION TO ENSURE PROPER GUARDRAIL HEIGHT.

STEEL POST CONNECTION TO CULVERT SLAB (USE WHEN THERE IS LESS THAN 36" COVER OVER CULVERT SLAB).

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

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REVISIONS	2374	03	098	IH 20
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	DAL	DALLAS		55

DATE: 3/17/2023
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BREAKAWAY CABLE TERMINAL (BCT) CABLE ANCHOR ASSEMBLY WITH CABLE BRACKET, BEARING PLATE AND STANDARD HARDWARE.

C3 X 5 X 80" (3) GROUND STRUTS

7 ¼" x 5 ¼" x 46" (2) DAT TERMINAL POST

NON-SYMMETRICAL TRANSITION RAIL SECTION (SEE APPLICABLE TRANSITION STANDARD)

(11) (15) (17)

(5) SHELF ANGLE BRACKET (SEE NOTE 2)

(8) (14) (17) (11)

PLAN VIEW

END PAYMENT FOR DAT SYSTEM (EA.)

BEGIN PAYMENT FOR METAL BEAM GUARD FENCE (SEE GF(31)STANDARD)

DIRECTION OF TRAFFIC

(4) 9'- 4 ½" Rail Section (SEE GENERAL NOTE 2)

12'-6" (Min.) MBGF

PAYMENT FOR NON-SYMMETRICAL TRANSITION RAIL (EA)

(9) (ROUNDED) W-BEAM END SECTION

6'- 3" | 3'-1 ½" | 3'-1 ½" | BEGIN LENGTH OF NEED (LON)

(11) (12)

(7) BCT POST SLEEVE 2" x 5 ½" (SCH 40 GALV. PIPE)

(11) (13) (17)

31"

*

(11) (16) (17)

To properly install and maintain the anchor system, a 3 ¼"(±) ½" tube projection is required above the finished grade.

FINISHED GRADE

FINISHED GRADE

* 68 ¼" (MIN.) TUBE EMBEDMENT

(10) (8)

BCT CABLE ANCHOR AND ANCHOR BRACKET WITH HARDWARE

(1) STEEL FOUNDATION TUBES WITH HARDWARE (1)

ELEVATION VIEW

(SEE NOTE 1)

DOWNSTREAM ANCHOR TERMINAL (DAT)

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

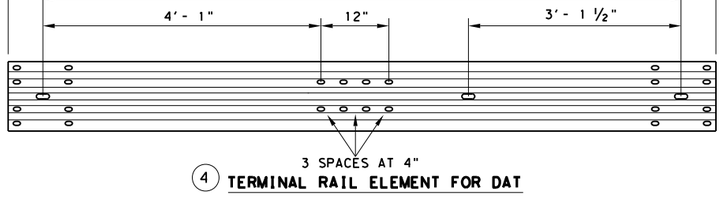
GENERAL NOTES

1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 3 ¾" ABOVE THE FINISHED GRADE.
4. ALL HARDWARE FOR DAT SHALL BE ASTM A307 UNLESS OTHERWISE SHOWN.
5. REFER TO GF(31) SHEET FOR TERMINAL CONNECTION DETAILS.

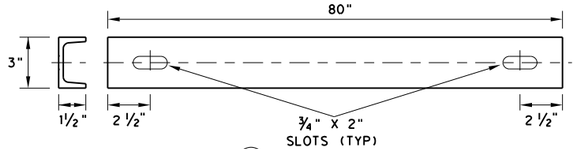
MOW STRIP INSTALLATION

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

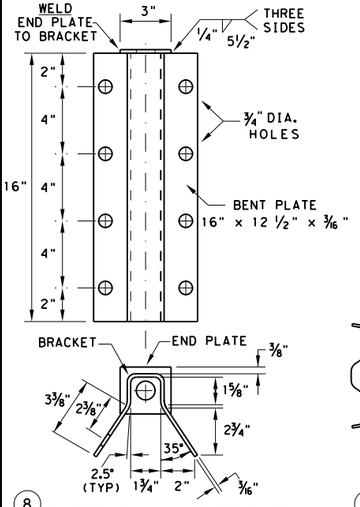
#	(DAT) PARTS LIST	QTY
(1)	STEEL FOUNDATION TUBE	2
(2)	DAT TERMINAL POST	2
(3)	CHANNEL STRUT	2
(4)	TERMINAL RAIL ELEMENT	1
(5)	SHELF ANGLE BRACKET	1
(6)	BCT BEARING PLATE	1
(7)	BCT POST SLEEVE	1
(8)	GUARDRAIL ANCHOR BRACKET	1
(9)	(ROUNDED) W-BEAM END SECTION	1
(10)	BCT CABLE ANCHOR	1
(11)	RECESSED NUT, GUARDRAIL	20
(12)	1 ¼" BUTTON HEAD BOLT	4
(13)	10" BUTTON HEAD BOLT	2
(14)	⅝" X 2" HEX HEAD BOLT	8
(15)	⅝" X 8" HEX HEAD BOLT	4
(16)	⅝" X 10" HEX HEAD BOLT	2
(17)	⅝" FLAT WASHER	18



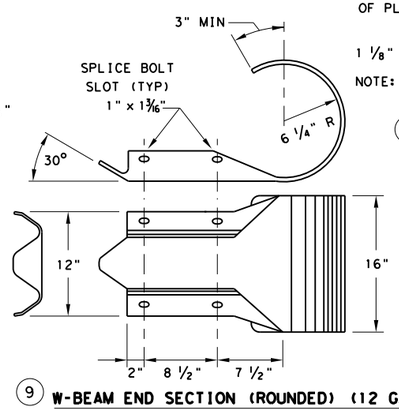
(4) TERMINAL RAIL ELEMENT FOR DAT



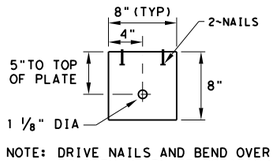
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

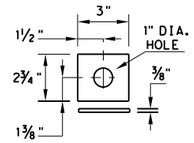


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

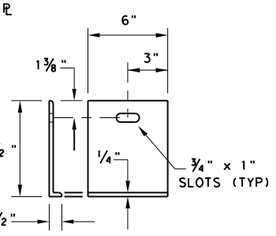


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

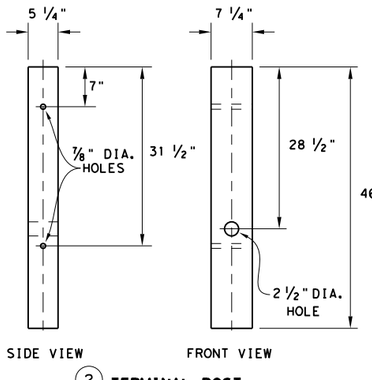
(6) BEARING PLATE
8"x 8"x ⅝" ℄



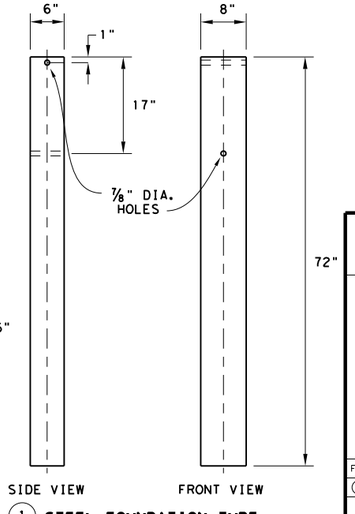
END PLATE



(5) SHELF ANGLE BRACKET



(2) TERMINAL POST
7 ¼"x 5 ¼"x 46" WOOD POST



(1) STEEL FOUNDATION TUBE
6"x 8"x ⅛" x 72" STEEL TUBE

Texas Department of Transportation

Design Division Standard

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

GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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	DIST	COUNTY		SHEET NO.
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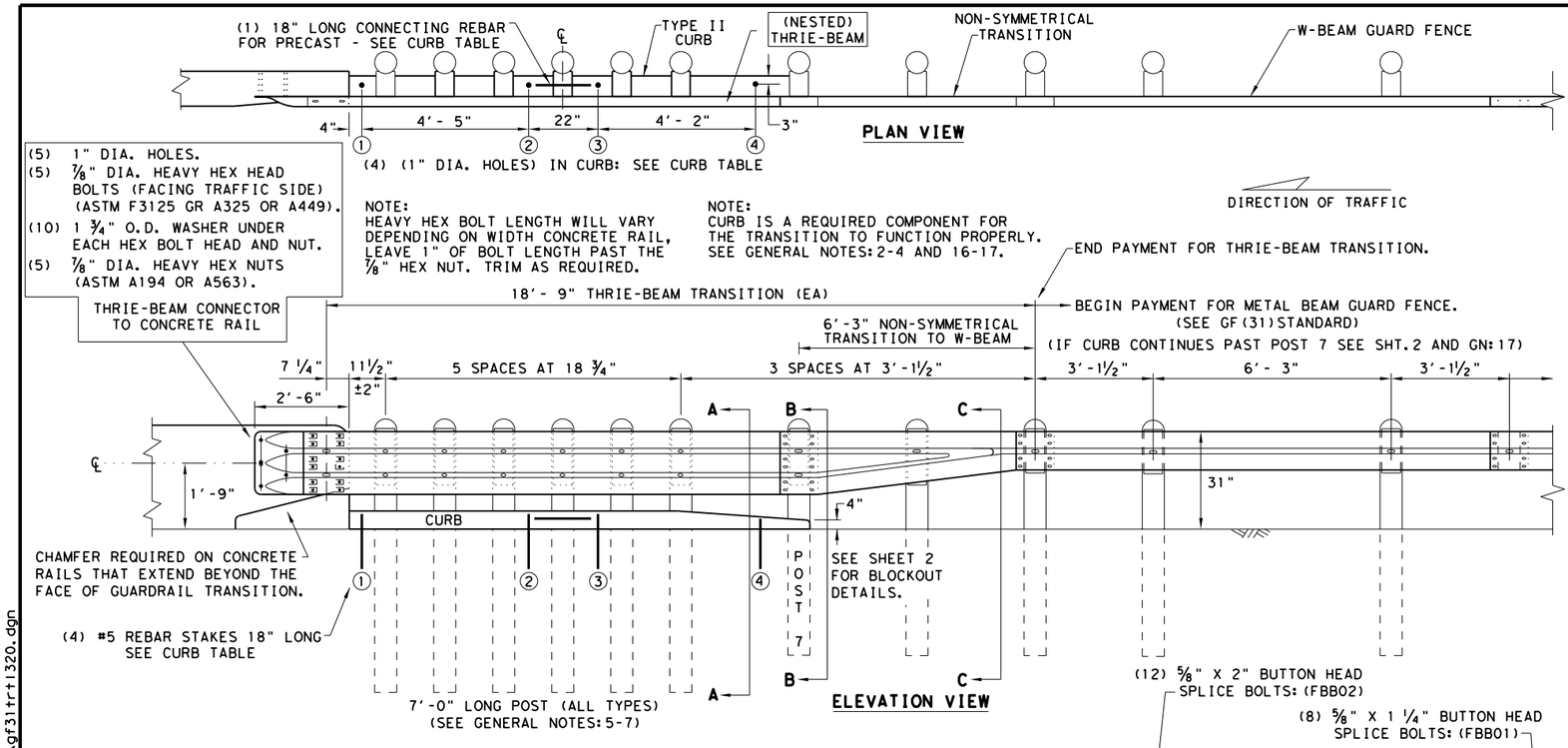
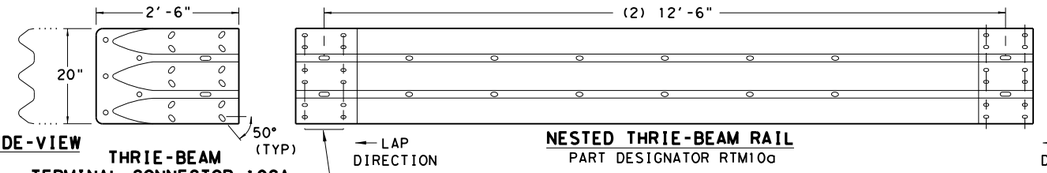
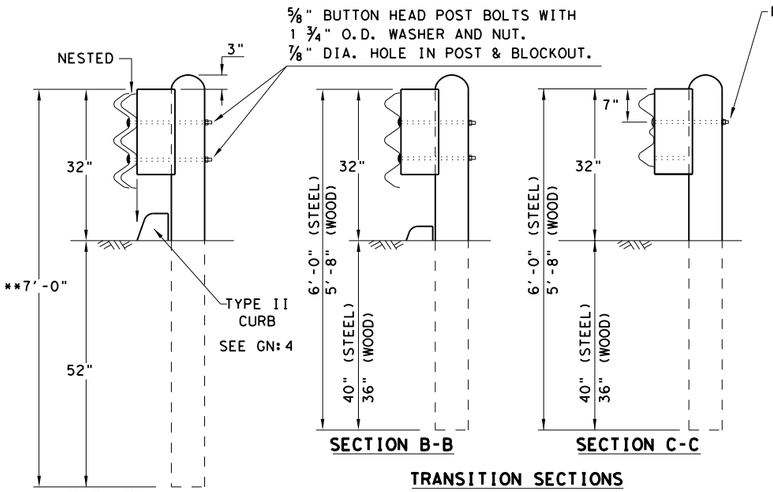
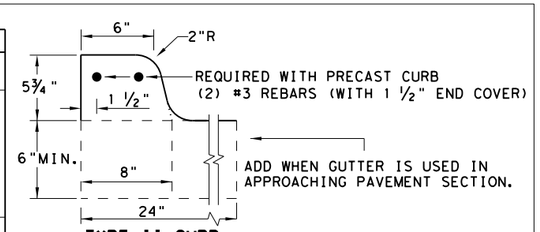






THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8" CURB (2) LENGTH 6'- 6" TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7 CONNECTING PRECAST CURB SECTIONS (1) & (2): FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB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



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

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

TYPE II CURB DETAILS

GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- ¾" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST ⅝" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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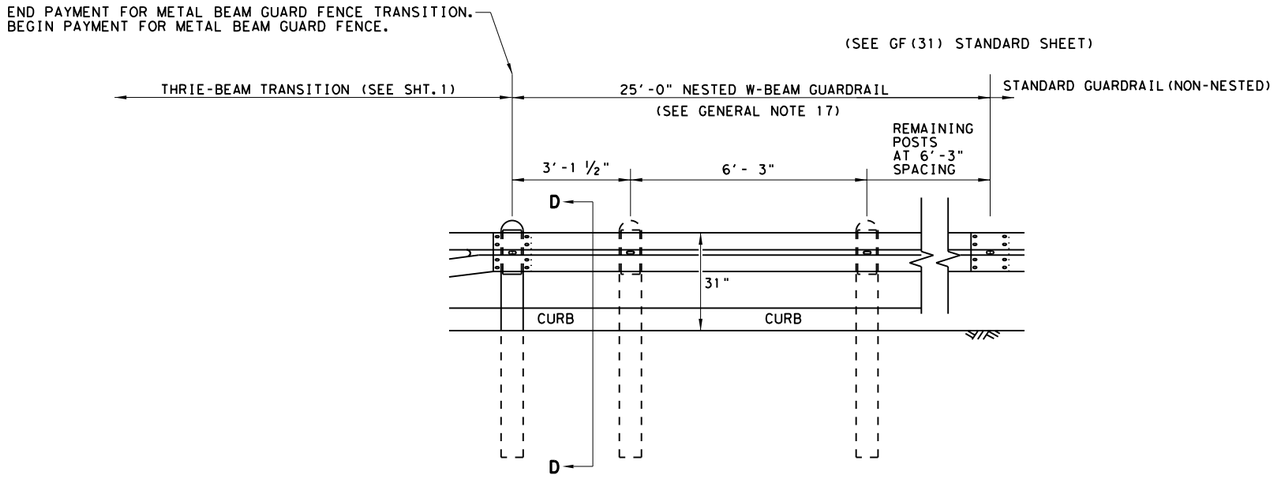
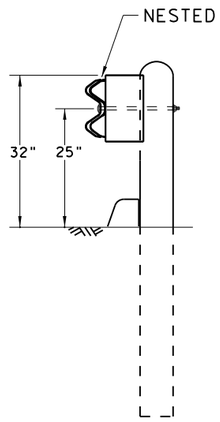
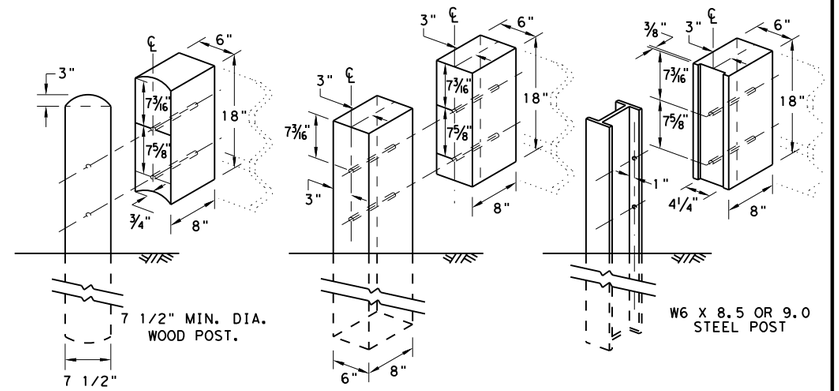
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
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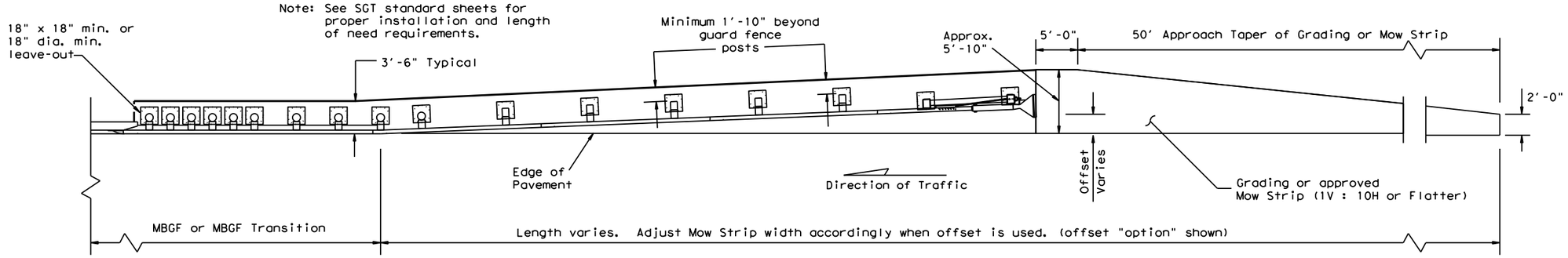
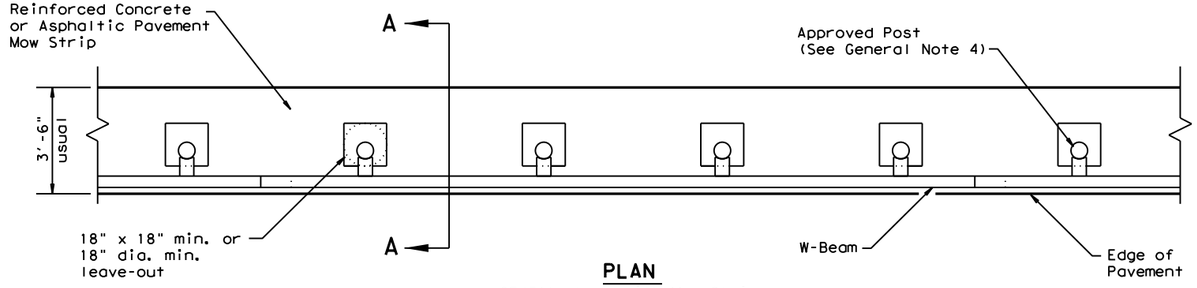
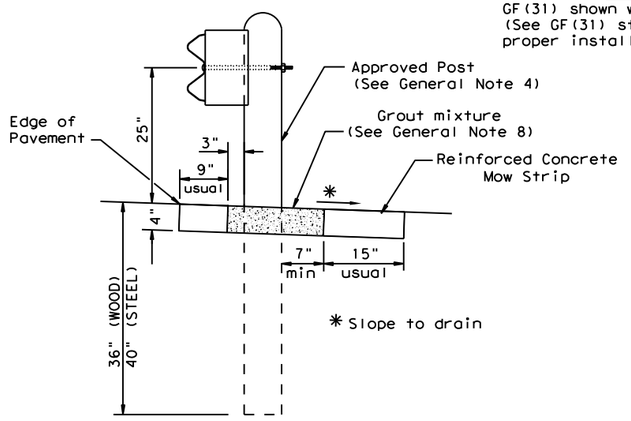


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



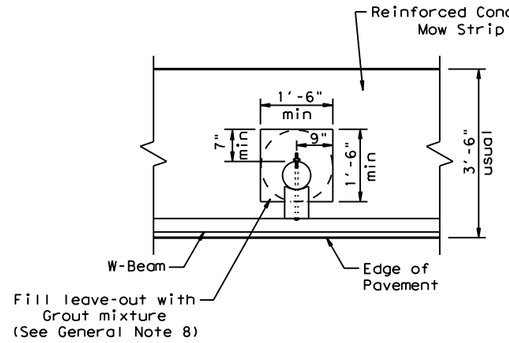
PLAN

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



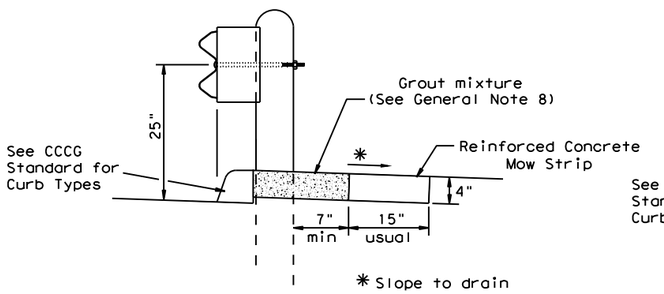
SECTION A-A

Typical



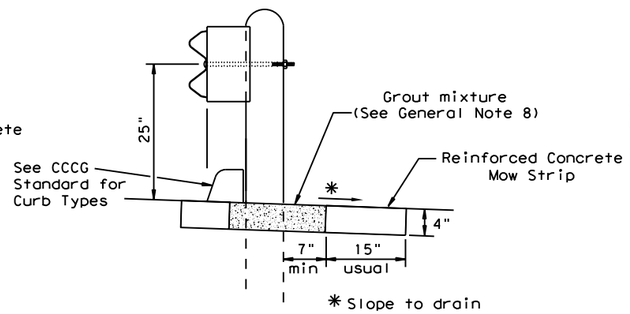
MOW STRIP DETAIL

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



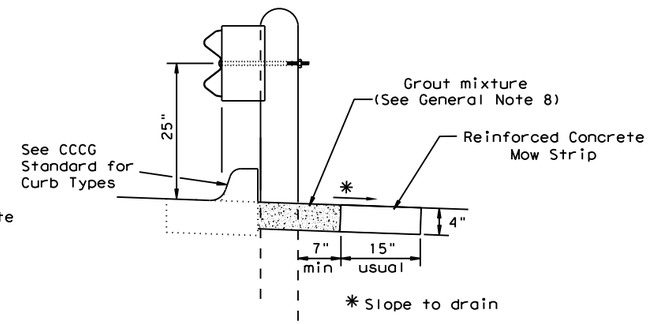
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation | Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		59

DATE: 3/17/2023
FILE: T:\DALAO\PROJECTS\On\IH20\237403098\Sheets\STND\RDWY\sgt10s3116.dgn

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

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) POST(1) POST(0)

PLAN VIEW

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

BEGIN LENGTH OF NEED

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

TRAFFIC FLOW

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

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT
(2) 1½" X 6'-9 ⅝"

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

SoftStop FACE SEE GN(3) & NOTE: B

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

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

SEE NOTE: C

POST 32" HEIGHT

31" RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

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

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

POST 40" DEPTH (TYP 1-8)

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

6'-1⅜"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) 6'-0" (SYTP) PN: 15000G POST(1) 4'-9 ½" SYTP PN: 15203G POST(0) 6'-5 ⅜" PN: 15205A

ELEVATION VIEW

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

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

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

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

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

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

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

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

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

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR. DH PN: 3245G

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

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

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

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

TRAFFIC FLOW

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

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

FINISHED GRADE

SECTION VIEW B-B

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

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

POST(2)

FINISHED GRADE

SECTION VIEW A-A

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

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

POST 17"- ½" HEIGHT

4'-9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

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

2'-0" MAX. RAIL OFFSET

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP		
©TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	2374	03	098		IH 20	
	DIST	COUNTY			SHEET NO.	
	DAL	DALLAS			60	

DATE: 3/17/2023
FILE: I:\DALAO\PROJECTS\On\IH20\237403098\Sheets\STND\RDWY\sgt11s3118.dgn

(SEE GN NOTE 15)
STANDARD 31" MBGF

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

FIELD-SIDE
(RAIL 3)

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

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

POST 1 OFFSET DISTANCE MEASURED
7-⅝" FROM REFERENCE LINE

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

RAIL 4 | RAIL 3 | RAIL 2 | RAIL 1

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

NO BLOCKOUT
AT (POST 1)

CABLES

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

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

PLAN VIEW

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

MBGF
RAIL 2

INSTALL GUARD FENCE RECESSED
HEX NUTS ON TRAFFIC-SIDE

MBGF
RAIL 1

DETAIL (C)

TRAFFIC FLOW

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

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

BEGIN LENGTH OF NEED

INSTALLATION LENGTH 55'- ½"

49'-8 9/16"

6'-3" | 6'-3" | 6'-3" | 6'- ¾" | 6'-3" | 6'-3" | 6'-3" | 37 ½" | 5'-3 11/16"

RAIL
HEIGHT
31"

ARROWS

RAIL
HEIGHT
31"

HEAD
HEIGHT

DETAIL (B)

32-¼"

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

DETAIL (D)

FINISHED
GRADE

CABLES

FINISHED
GRADE

ITEM (10)
CABLE
ASSEMBLY

ITEM (2)
GROUNDSTRUT

68-⅛"

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

ITEM (4)
I-BEAM
W6 X 9

NO BLOCKOUT
AT (POST 1)

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

ELEVATION VIEW

**SOIL
ANCHOR POST**
ITEM (1)

A

A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

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

TSS PANEL AND RSS PLATE
DETAIL (D)

HEAD
HEIGHT
32-¼"

TOP OF POST

31-⅞"

FINISHED
GRADE

40-⅛"

68-⅛"
ANCHOR POST
DEPTH

ITEM (1)
ANCHOR

ITEM (11)
LINE POSTS
2 THRU 9
(NOTE: ITEM (4) POST 1 (NOT SHOWN),
TO BE INSTALLED AT SAME DEPTH
AS LINE POSTS.)

**SOIL ANCHOR, POST 1
& LINE POST 2 THRU 9**

SECTION VIEW A-A

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

7 5/16"

2 1/8"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

NOTE:
INSTALL ⅝" RECESSED HEX
NUTS ON TRAFFIC SIDE.

ITEM (24)

ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

(RAIL 1)

ITEM (22)
BRACKET
SHIPPED FLAT

ITEM (3)

ITEM (16)
4X

* ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING

NOTE: DELINEATION MARKER IN
ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

STANDARD
MBGF

2'-0"

EDGE OF PAVEMENT

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

2'-0" MAX.
RAIL OFFSET

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

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

GENERAL NOTES

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

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	⅝" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	¾" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	⅝" X 1 ¼" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	⅝" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	⅝" WASHER F436 STRUCTURAL MGAL	2
20	4001116	⅝" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	⅝" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	¼" X ¾" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
* 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
** 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
** 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

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

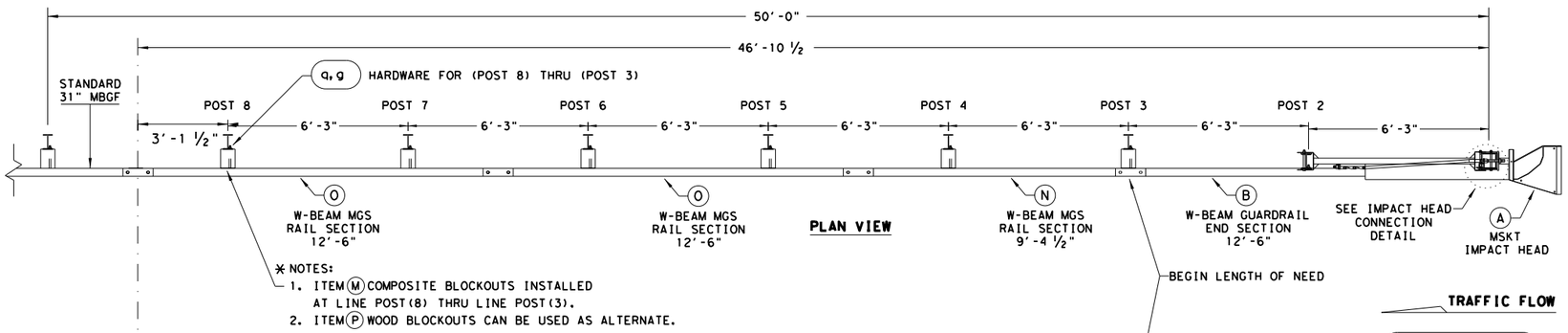
Texas Department of Transportation

Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		61

DATE: 3/17/2023
FILE: T:\DALAO\PROJECTS\On\IH20\237403098\Sheets\STND\RDWY\sgt12s3118.dgn



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

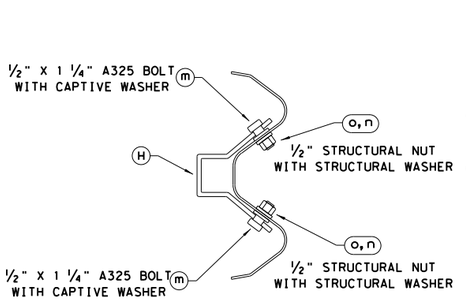
GENERAL NOTES

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

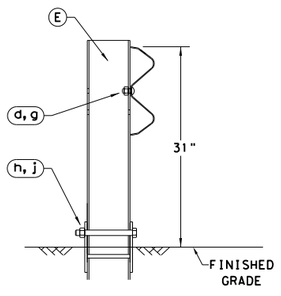
ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X ⅛" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 ½")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	⅝" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	⅝" WASHER	W0516
c	2	⅝" HEX NUT	N0516
d	25	⅝" Dia. x 1 ¼" SPLICE BOLT (POST 2)	B580122
e	2	⅝" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	⅝" WASHER	W050
g	33	⅝" Dia. H.G.R NUT	N050
h	1	¾" Dia. x 8 ½" HEX BOLT (GRD A449)	B340854A
j	1	¾" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	½" x 1 ¼" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	½" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x ⅜" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	⅝" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

SEE NOTES: *

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



SECTION B-B
ANCHOR BRACKET



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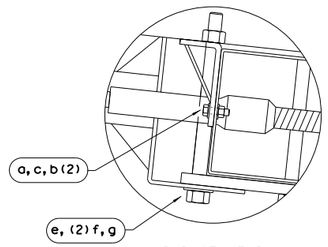
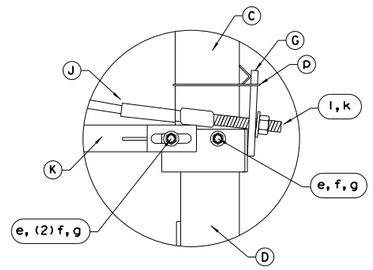
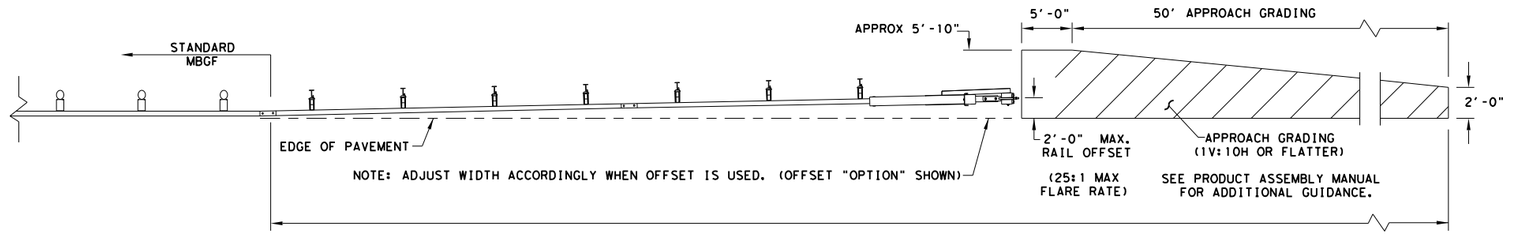
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3
SGT(12S)31-18

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© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
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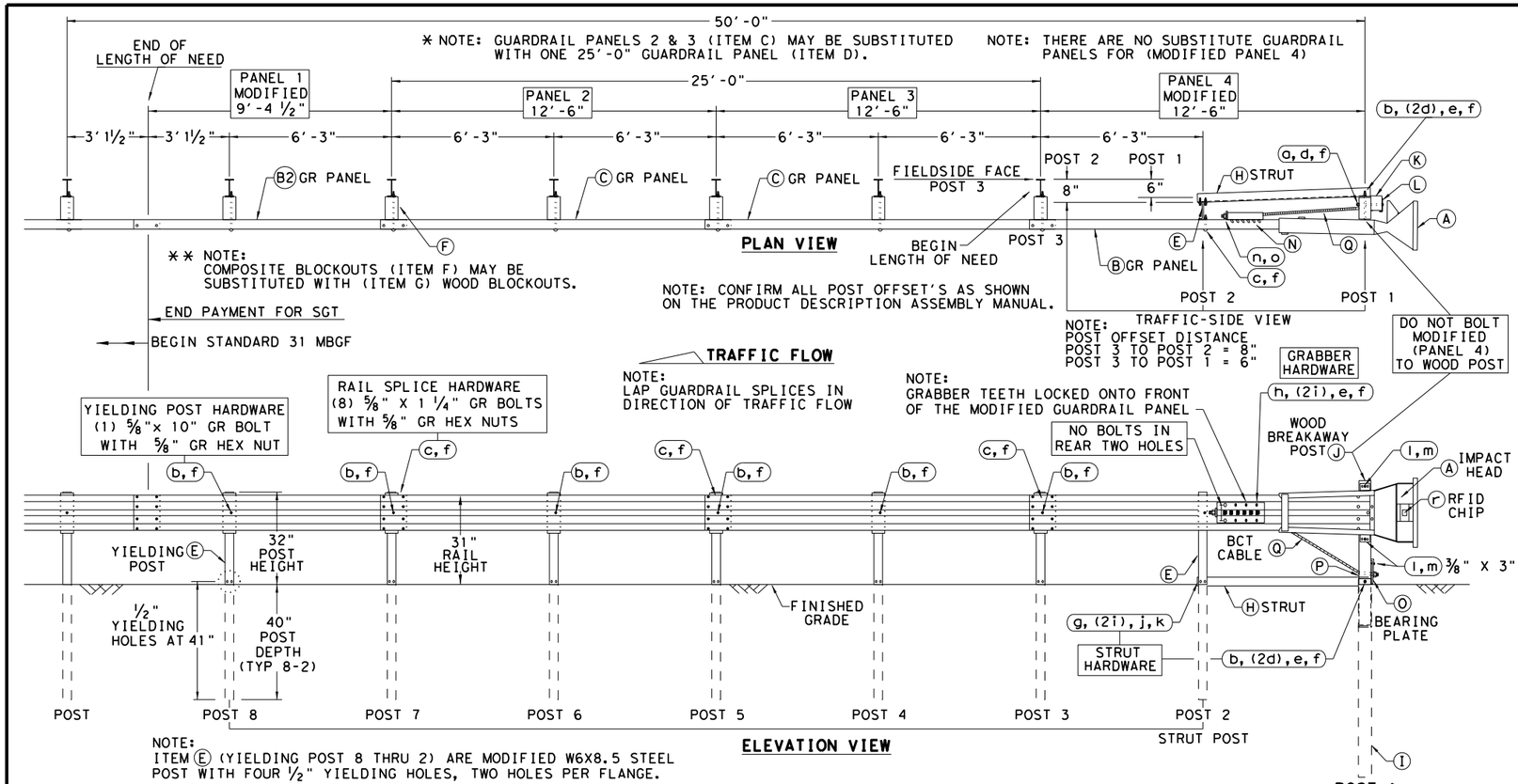
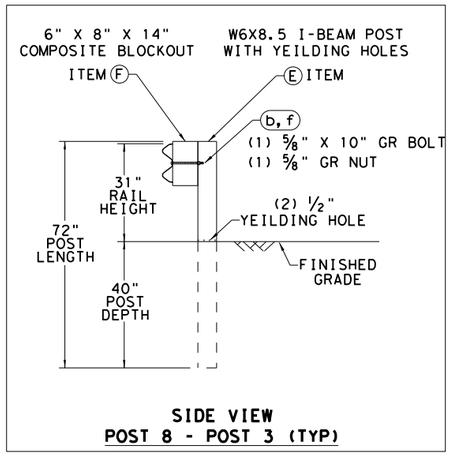


GENERAL NOTES

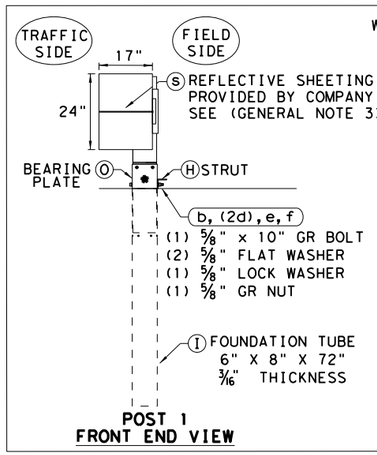
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

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

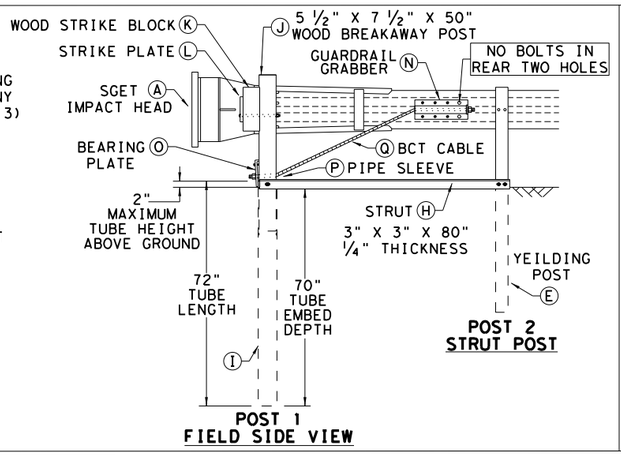
ALTERNATIVE ITEMS
NOTE: SEE PLAN VIEW
* D
** G



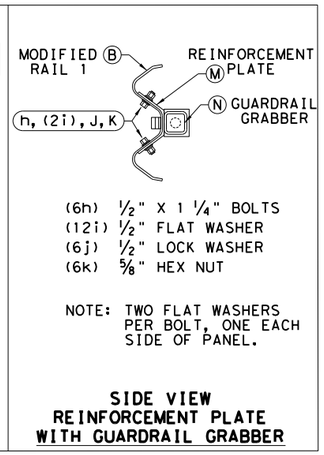
SIDE VIEW
POST 8 - POST 3 (TYP)



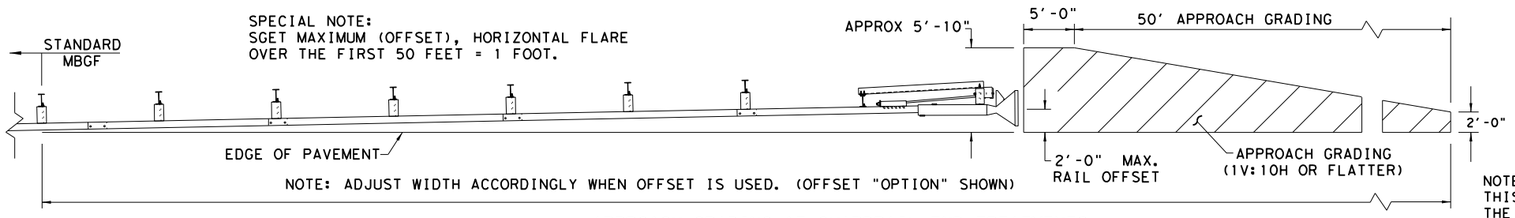
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW
POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

Texas Department of Transportation
Design Division Standard

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

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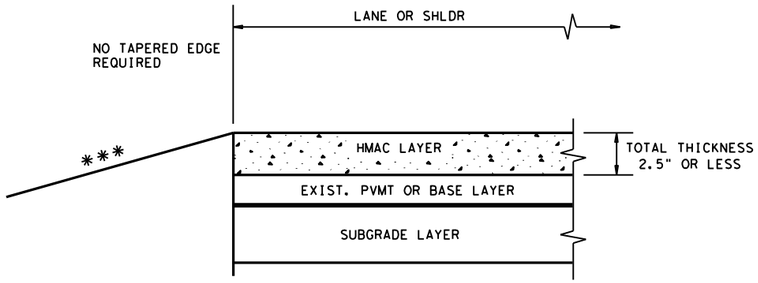
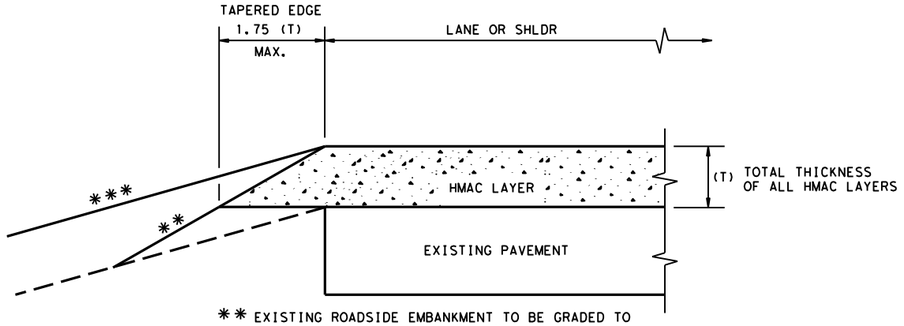


*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

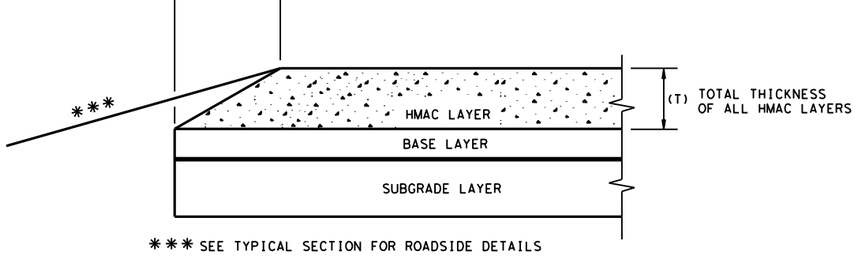
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

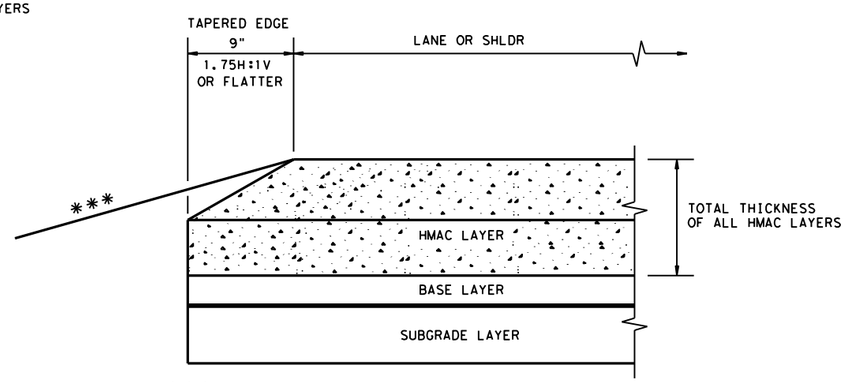
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2
OVERLAY OF EXISTING PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 5" OR GREATER

(NOT TO SCALE)

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, A VERTICAL EDGE IS PERMISSIBLE FOR HMAC PLACED GREATER THAN 5" BELOW THE EDGE OF PAVEMENT AND FOR THICKNESS OF HMAC LESS THAN 2.5".
2. FOR FURTHER INFORMATION REGARDING THE ROADSIDE AND PAVEMENT DETAILS, SEE TYPICAL SECTIONS.
3. PAYMENT FOR TAPERED EDGE WILL BE IN ACCORDANCE WITH APPLICABLE ITEMS IN THE CONTRACT.
4. THE SLOPE OF THE TAPERED EDGE SHALL BE 1.75H:1V OR FLATTER.
5. THE TAPERED EDGE SHALL BE PRODUCED BY USE OF A SCREED ATTACHMENT CAPABLE OF PRODUCING A SMOOTH COMPACTED SURFACE. ADDITIONAL COMPACTING EFFORT BEHIND THE SCREED IS NOT REQUIRED.

Texas Department of Transportation

Design Division Standard

TAPERED EDGE DETAILS HMAC PAVEMENT

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	DAL	DALLAS			64	

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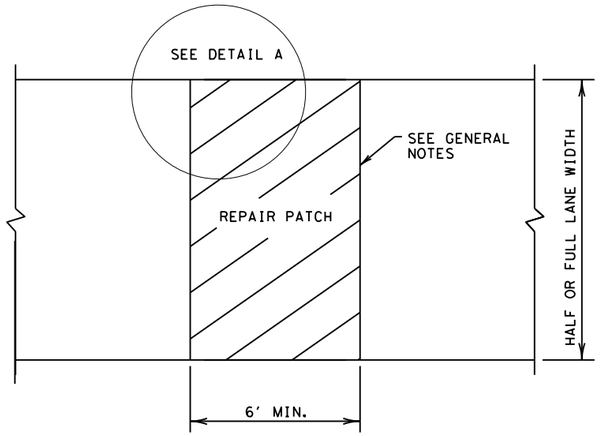
TABLE NO.1 STEEL BAR SIZE AND SPACING						
TYPE PAVEMENT	SLAB THICKNESS AND BAR SIZE		LONGITUDINAL*		TRANSVERSE*	
			REGULAR BARS	TIEBARS	BARS	TIEBARS
	T (IN.)	BAR SIZE	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)
CRCP	6.0	#5	7.5	7.5	24	24
	6.5		7.0	7.0		
	7.0		6.5	6.5		
	7.5		6.0	6.0		
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

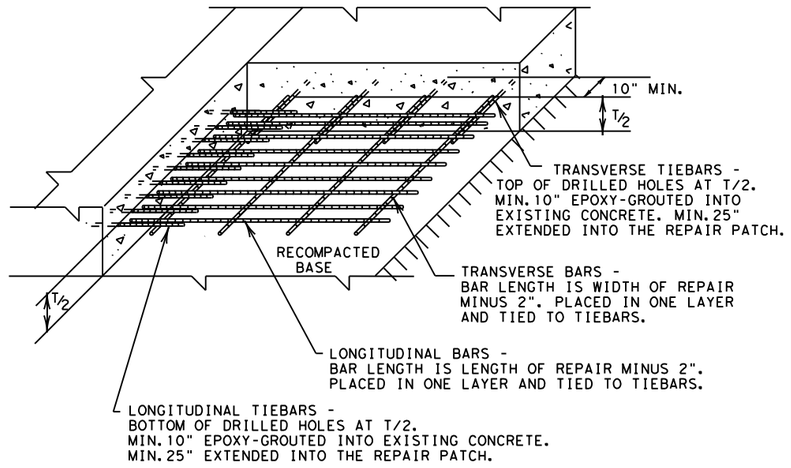
* USE 12" SPACING AS FIRST AND LAST SPACING AT END OR SIDE FOR ALL BARS.

GENERAL NOTES

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



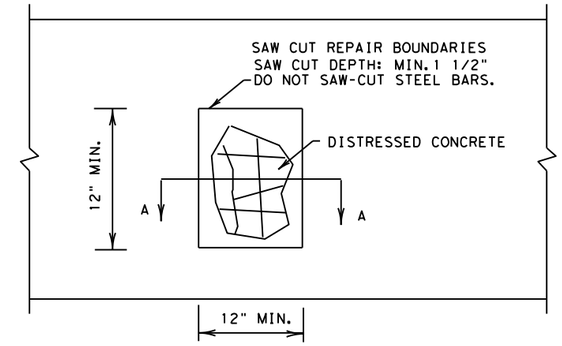
PLAN VIEW



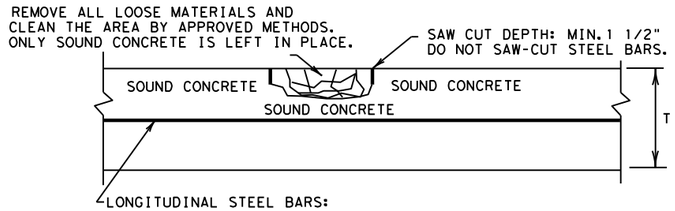
DETAIL A
GROUTED TIEBARS & REINFORCEMENT

GENERAL NOTES

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



PLAN VIEW



LONGITUDINAL STEEL BARS:

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

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

SECTION A-A

HALF-DEPTH REPAIR

FULL-DEPTH REPAIR OF CRCP, JRCP, AND CPCD

Texas Department of Transportation | Design Division Standard

REPAIR OF CONCRETE PAVEMENT

REPCP-14

FILE: repcp14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
© TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		65

DATE: 3/17/2023
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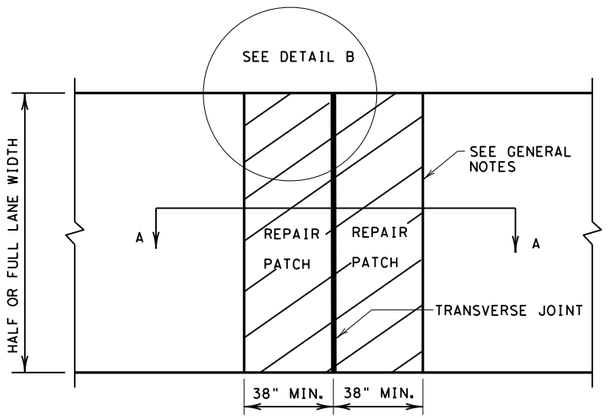
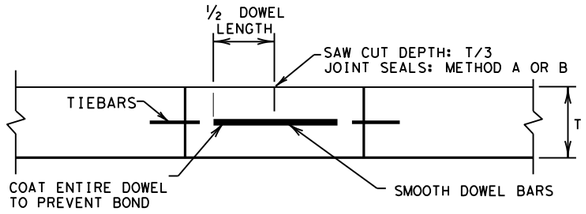
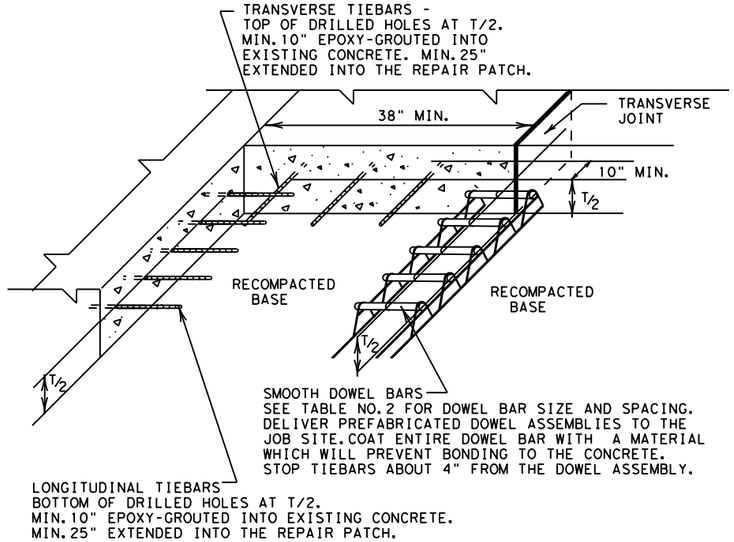


PLAN VIEW



SECTION A-A



DETAIL B
GROUTED TIEBARS & DOWELS

GENERAL NOTES

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

TABLE NO. 2 DOWELS (SMOOTH BARS)

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

REPAIR OF TRANSVERSE JOINT OF CPCD

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

REPAIR OF CONCRETE PAVEMENT

REPCP-14

FILE: repcp14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
© TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		66

DATE: 3/17/2023 3:05:08 PM
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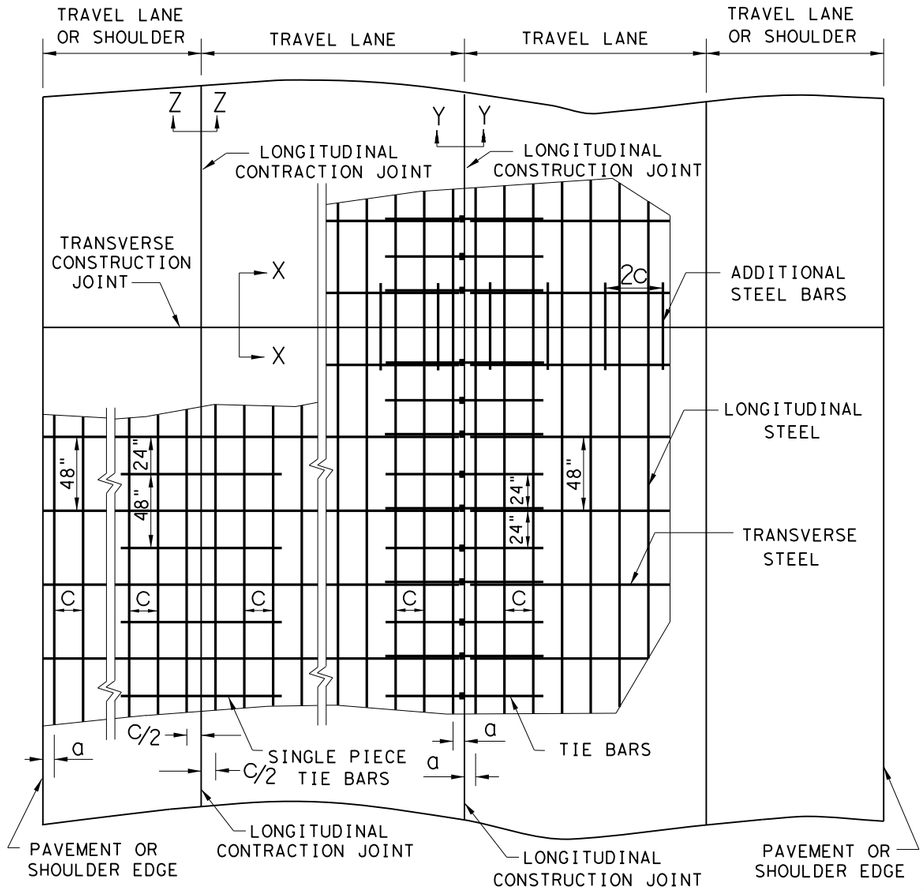
TABLE NO. 1 LONGITUDINAL STEEL					
SLAB THICKNESS AND BAR SIZE		REGULAR STEEL BARS	FIRST SPACING AT EDGE OR JOINT	ADDITIONAL STEEL BARS AT TRANSVERSE CONSTRUCTION JOINT (SECTION X-X)	
T (IN.)	BAR SIZE	SPACING C (IN.)	SPACING a (IN.)	SPACING 2 X C (IN.)	LENGTH L (IN.)
7.0	#5	6.5	3 TO 4	13	50
7.5	#5	6.0	3 TO 4	12	50
8.0	#6	9.0	3 TO 4	18	50
8.5	#6	8.5	3 TO 4	17	50
9.0	#6	8.0	3 TO 4	16	50
9.5	#6	7.5	3 TO 4	15	50
10.0	#6	7.0	3 TO 4	14	50
10.5	#6	6.75	3 TO 4	13.5	50
11.0	#6	6.5	3 TO 4	13	50
11.5	#6	6.25	3 TO 4	12.5	50
12.0	#6	6.0	3 TO 4	12	50
12.5	#6	5.75	3 TO 4	11.5	50
13.0	#6	5.5	3 TO 4	11	50

TABLE NO. 2 TRANSVERSE STEEL AND TIE BARS						
SLAB THICKNESS (IN.)	TRANSVERSE STEEL		TIE BARS AT LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z)		TIE BARS AT LONGITUDINAL CONSTRUCTION JOINT (SECTION Y-Y)	
	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
7.0 - 7.5	#5	48	#5	48	#5	24
8.0 - 13.0	#5	48	#6	48	#6	24

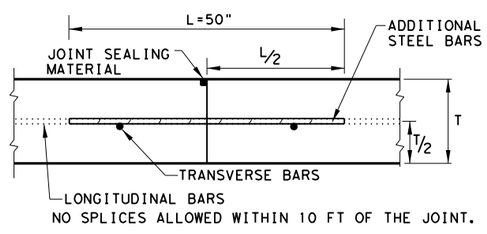


TYPICAL PAVEMENT LAYOUT

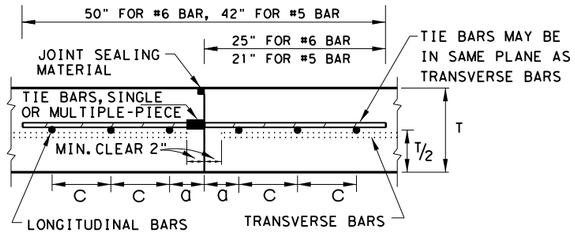
PLAN VIEW (NOT TO SCALE)

GENERAL NOTES

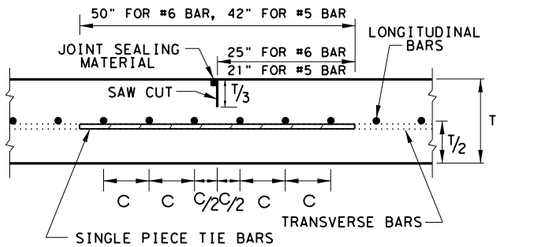
1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT ARE NOT COVERED BY THIS STANDARD.
2. USE COARSE AGGREGATES WITH A RATED COEFFICIENT OF THERMAL EXPANSION (CoTE) OF NOT MORE THAN 5.5 X 10^{-6} IN/IN/ °F AS LISTED IN THE CONCRETE RATED SOURCE QUALITY CATALOG (CRSQC).
3. ALL THE REINFORCING STEEL AND TIE BARS SHALL BE DEFORMED STEEL BARS CONFORMING TO ASTM A 615 (GRADE 60) OR ASTM A 996 (GRADE 60) OR ABOVE. STEEL BAR SIZES AND SPACINGS SHALL CONFORM TO TABLE NO. 1 AND TABLE NO. 2.
4. STEEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1 IN. HORIZONTALLY AND +/- 0.5 IN. VERTICALLY. CALCULATED AVERAGE BAR SPACING (CONCRETE PLACEMENT WIDTH / NUMBER OF LONGITUDINAL BARS) SHALL CONFORM TO TABLE NO. 1
5. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
6. THE SAW CUT DEPTH FOR THE LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z) SHALL BE ONE THIRD OF THE SLAB THICKNESS (T/3).
7. WHEN TYING CONCRETE GUTTER AT A LONGITUDINAL JOINT, THE TIE BAR LENGTH OR POSITION MAY BE ADJUSTED. PROVIDE 3 IN. OF CONCRETE COVER FROM THE BACK OF GUTTER TO THE END OF TIE BAR.
8. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN. 10 IN. DEEP AND GROUTING TIE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
9. OMIT TIE BARS LOCATED WITHIN 18-IN. OF THE TRANSVERSE CONSTRUCTION JOINTS (SECTION X-X). USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL FORMED JOINTS.
10. LONGITUDINAL REINFORCING STEEL SPLICES SHALL BE A MINIMUM OF 25 IN. STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT.
11. THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



TRANSVERSE CONSTRUCTION JOINT
SECTION X - X



LONGITUDINAL CONSTRUCTION JOINT
SECTION Y - Y



LONGITUDINAL CONTRACTION JOINT
SECTION Z - Z

Texas Department of Transportation | Design Division Standard

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

ONE LAYER STEEL BAR PLACEMENT T - 7 to 13 INCHES

CRCP(1)-20

FILE: crcp120.dgn	DN: TxDOT	CK: KM	DW: AN	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
10/10/2011 ADD GN #12	DIST	COUNTY		SHEET NO.
04/09/2013 REMOVE 6" AND 6.5" ADD CTE REQUIREMENTS	DAL	DALLAS		67
05/05/2017 CoTE AS RATED 4.3				

DATE: 3/17/2023 3:05:08 PM
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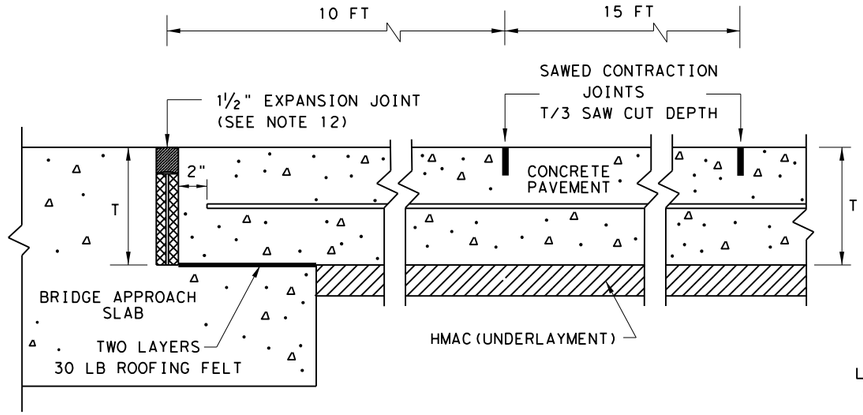
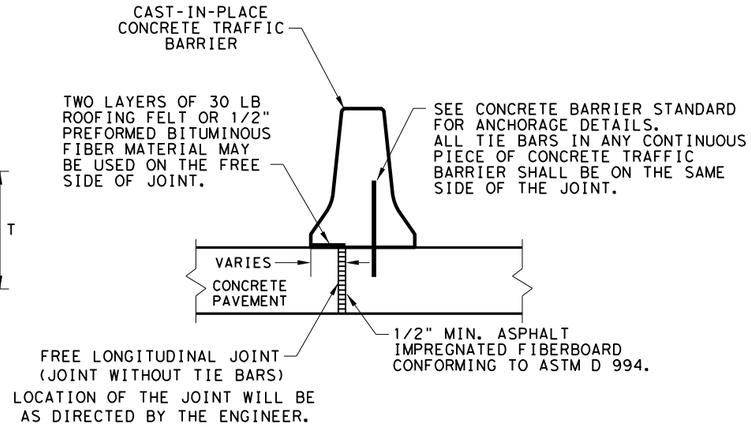
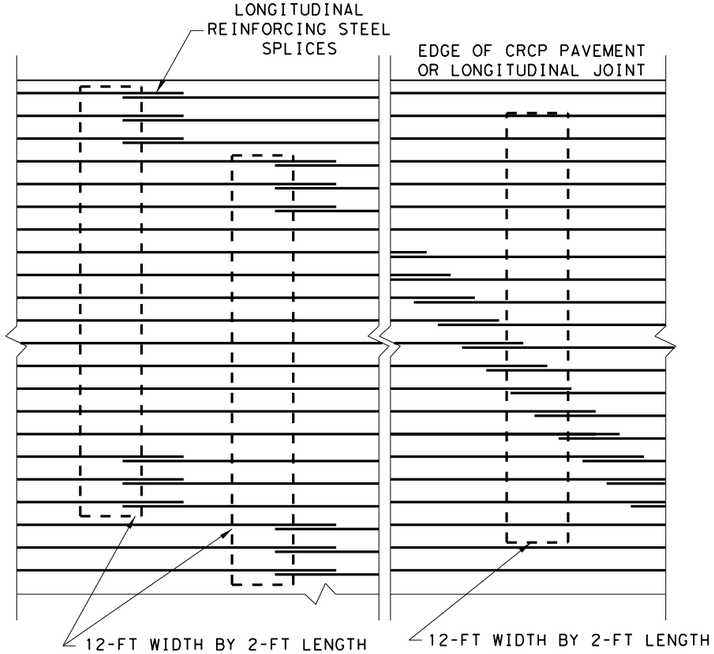


TRANSVERSE EXPANSION JOINT DETAIL
AT BRIDGE APPROACH

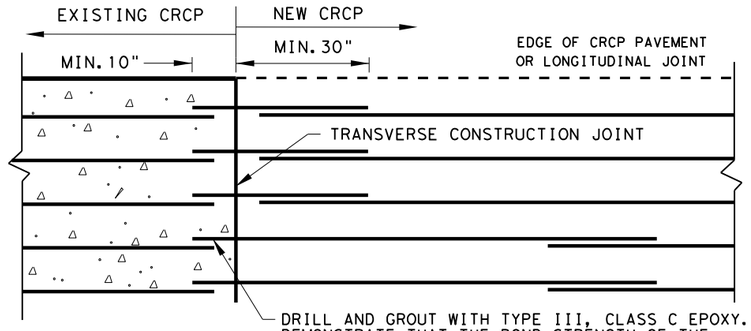


FREE LONGITUDINAL JOINT DETAIL

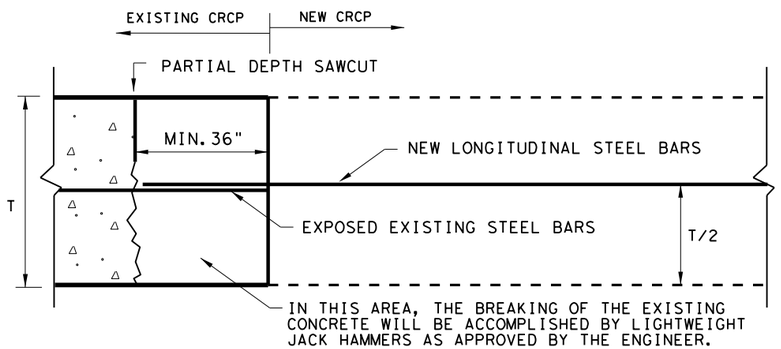


STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT. ANY OTHER LAP CONFIGURATION MEETING THIS REQUIREMENT WILL BE ALLOWED.

EXAMPLES OF LAP CONFIGURATION
PLAN VIEW (NOT TO SCALE)

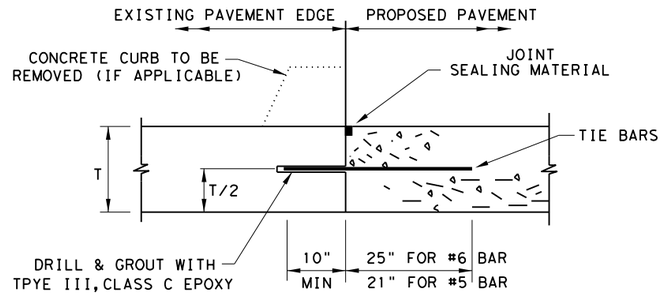


OPTION A: DRILL AND EPOXY
PLAN VIEW (NOT TO SCALE)



OPTION B: BREAKBACK AND LAP

TRANSVERSE TIE JOINT DETAIL
EXISTING CRCP TO NEW CRCP



1. BEFORE WIDENING WORK, DEMONSTRATE THAT THE BOND STRENGTH OF THE EPOXY-GROUTED TIE BARS MEETS THE REQUIRMENTS OF PULL-OUT TEST SPECIFIED IN ITEM 361.
2. SPACE TIE BARS AT 24" SPACING. USE #6 TIE BARS FOR 8" AND THICKER SLABS, USE #5 TIE BARS FOR LESS THAN 8" THICK SLABS.

LONGITUDINAL WIDENING JOINT DETAIL

Texas Department of Transportation — Design Division Standard

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

ONE LAYER STEEL BAR PLACEMENT
T - 7 to 13 INCHES

CRCP(1)-20

FILE: crcp120.dgn	DN: TxDOT	CK: KM	DW: AN	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 03/16/2020 REMOVED TABLE 1A	2374	03	098	IH 20
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	DAL	DALLAS		68

DATE: 3/17/2023 3:05:10 PM
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TABLE NO. 1 LONGITUDINAL STEEL

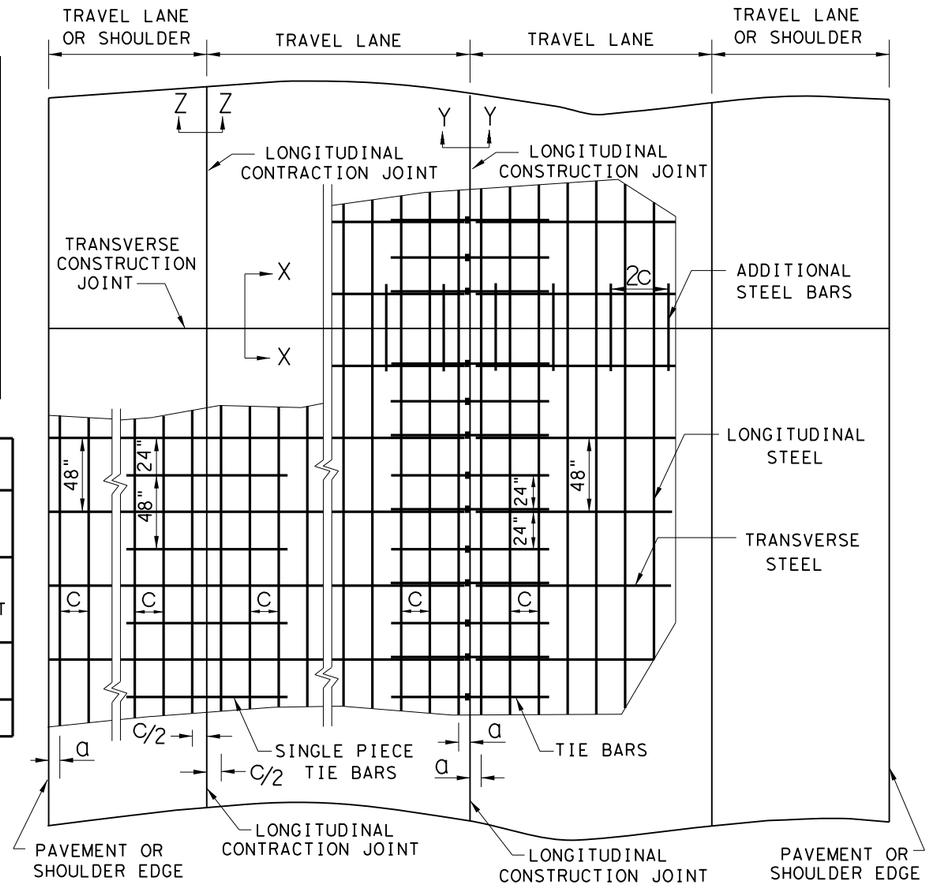
SLAB THICKNESS AND BAR SIZE		FOR BOTH STEEL MATS		FOR TOP STEEL MAT ONLY	
		REGULAR STEEL BARS	FIRST SPACING AT EDGE OR JOINT	ADDITIONAL STEEL BARS AT TRANSVERSE CONSTRUCTION JOINT (SECTION X-X)	
T (IN.)	BAR SIZE	SPACING c (IN.)	SPACING a (IN.)	SPACING 2 x c (IN.)	LENGTH L (IN.)
14	#6	9.5	3 TO 4	19	50
15	#6	8.5	3 TO 4	17	50

TABLE NO. 2 TRANSVERSE STEEL AND TIE BARS

SLAB THICKNESS T (IN.)	FOR BOTH STEEL MATS		FOR LOWER STEEL MAT ONLY		FOR BOTH STEEL MATS	
	TRANSVERSE STEEL		TIE BARS AT LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z)		TIE BARS AT LONGITUDINAL CONSTRUCTION JOINT (SECTION Y-Y)	
	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
14 - 15	#5	48	#6	48	#6	24

TABLE NO. 3
TWO LAYER STEEL PLACEMENT HEIGHT OF STEEL MATS

SLAB THICKNESS T (IN.)	LOWER STEEL MAT HEIGHT T1 (IN.)	TOP STEEL MAT HEIGHT T2 (IN.)
14	4.5	8.0
15	5.0	8.5

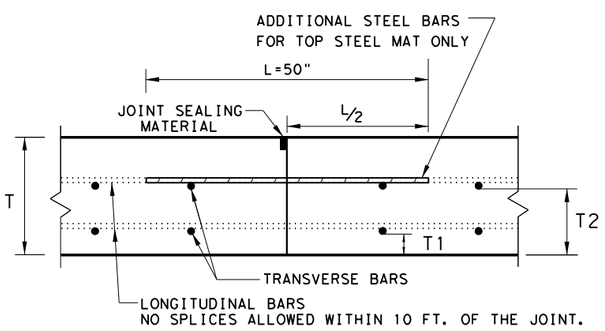


TYPICAL PAVEMENT LAYOUT

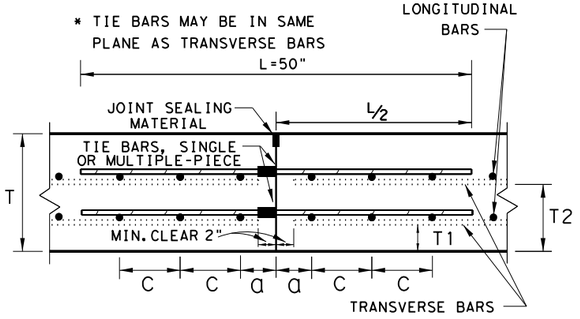
PLAN VIEW (NOT TO SCALE)

GENERAL NOTES

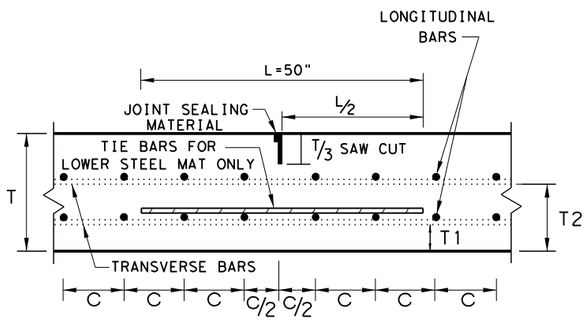
1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT ARE NOT COVERED BY THIS STANDARD.
2. USE COARSE AGGREGATES WITH A RATED COEFFICIENT OF THERMAL EXPANSION (CoTE) OF NOT MORE THAN 5.5 X 10^{-6} IN/IN/°F AS LISTED IN THE CONCRETE RATED SOURCE QUALITY CATALOG (CRSQC).
3. ALL THE REINFORCING STEEL AND TIE BARS SHALL BE DEFORMED STEEL BARS CONFORMING TO ASTM A 615 (GRADE 60) OR ASTM A 996 (GRADE 60) OR ABOVE. STEEL BAR SIZES ANS SPACINGS SHALL CONFORM TO TABLE NO. 1, TABLE NO. 2 AND TABLE NO. 3.
4. STEEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1 IN. HORIZONTALLY AND +/- 0.5 IN. VERTICALLY. CALCULATED AVERAGE BAR SPACING (CONCRETE PLACEMENT WIDTH / NUMBER OF LONGITUDINAL BARS) SHALL CONFORM TO TABLE NO. 1.
5. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
6. THE SAW CUT DEPTH FOR THE LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z) SHALL BE ONE THIRD OF THE SLAB THICKNESS (T/3).
7. WHEN TYING CONCRETE GUTTER AT A LONGITUDINAL JOINT, THE TIE BAR LENGTH OR POSITION MAY BE ADJUSTED. PROVIDE 3 IN. OF CONCRETE COVER FROM THE BACK OF GUTTER TO THE END OF TIE BAR.
8. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN. 10 IN. DEEP AND GROUTING TIE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
9. OMIT TIE BARS LOCATED WITHIN 18 IN. OF THE TRANSVERSE CONSTRUCTION JOINTS (SECTION X-X). USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL FORMED JOINTS.
10. LONGITUDINAL REINFORCING STEEL SPLICES SHALL BE A MINIMUM OF 25 IN. STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT.
11. THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



TRANSVERSE CONSTRUCTION JOINT
SECTION X - X



LONGITUDINAL CONSTRUCTION JOINT
SECTION Y - Y



LONGITUDINAL CONTRACTION JOINT
SECTION Z - Z

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

TWO LAYER STEEL BAR PLACEMENT T - 14 & 15 INCHES

CRCP(2)-20

FILE: crcp220.dgn	DN: TxDOT	CK: KM	DW: AN	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS 10/10/2011 ADD ON #12 04/09/2013 REMOVE 6" AND 6.5" ADD CTE REQUIREMENTS 04/19/2017 CoTE AS RATED 4.3	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		69

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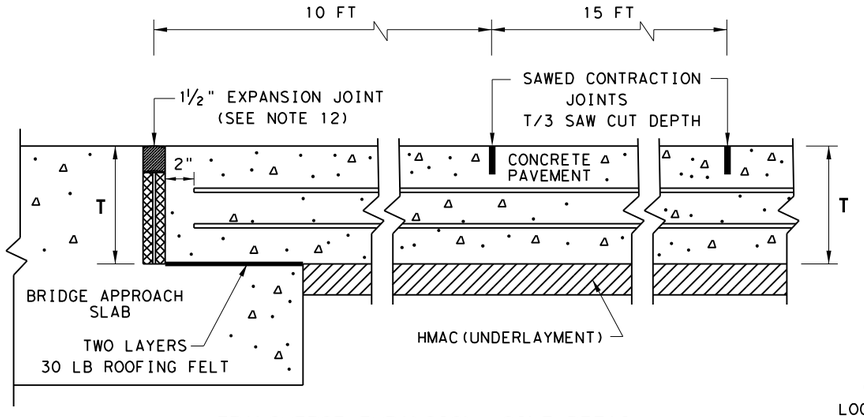
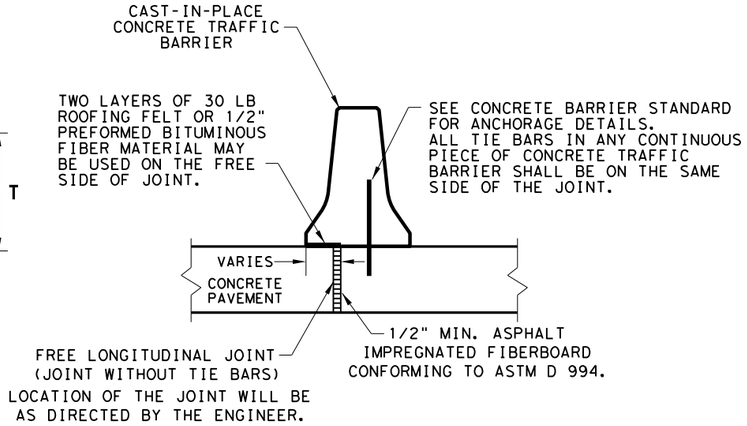
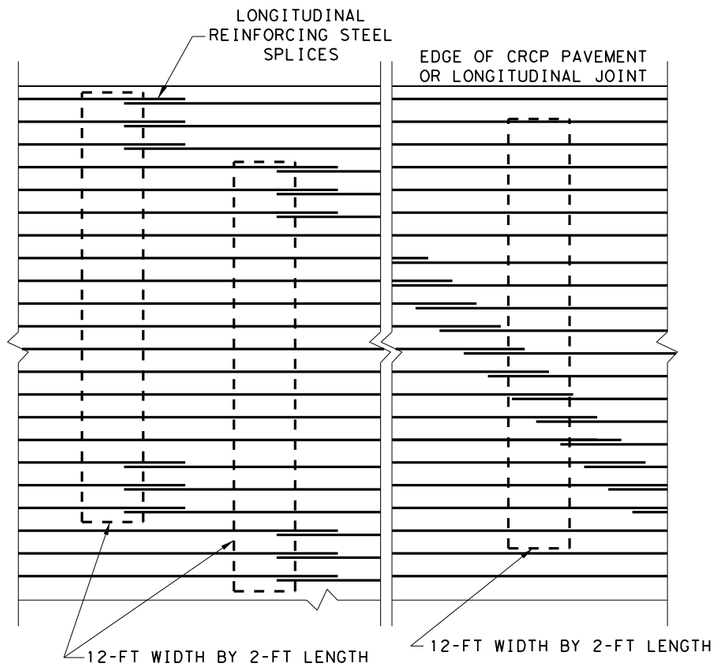


TRANSVERSE EXPANSION JOINT DETAIL
AT BRIDGE APPROACH

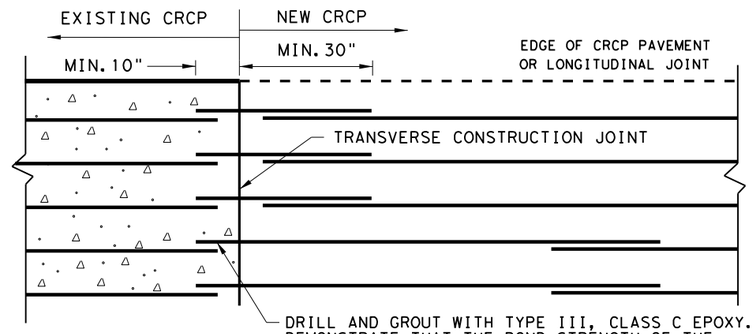


FREE LONGITUDINAL JOINT DETAIL

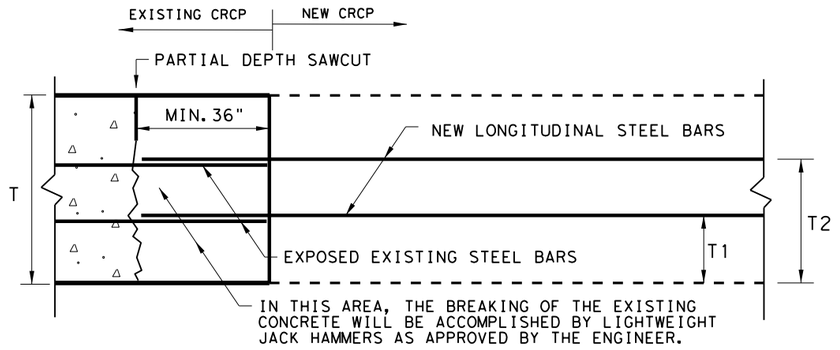


STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT. ANY OTHER LAP CONFIGURATION MEETING THIS REQUIREMENT WILL BE ALLOWED.

EXAMPLES OF LAP CONFIGURATION
PLAN VIEW (NOT TO SCALE)

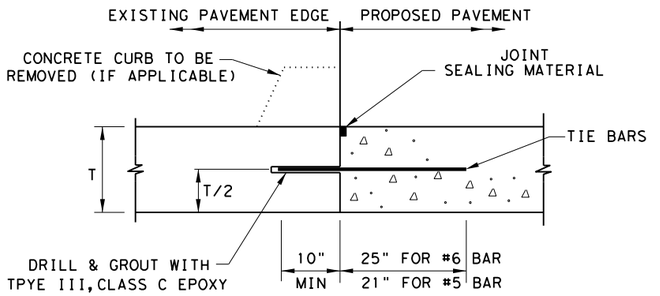


OPTION A: DRILL AND EPOXY
PLAN VIEW (NOT TO SCALE)



OPTION B: BREAKBACK AND LAP

TRANSVERSE TIE JOINT DETAIL
EXISTING CRCP TO NEW CRCP



1. BEFORE WIDENING WORK, DEMONSTRATE THAT THE BOND STRENGTH OF THE EPOXY-GROUTED TIE BARS MEETS THE REQURIMENTS OF PULL-OUT TEST SPECIFIED IN ITEM 361.
2. SPACE TIE BARS AT 24" SPACING. USE #6 TIE BARS FOR 8" AND THICKER SLABS, USE #5 TIE BARS FOR LESS THAN 8" THICK SLABS.

LONGITUDINAL WIDENING JOINT DETAIL

Texas Department of Transportation
Design Division Standard

CONTINUOUSLY REINFORCED CONCRETE PAVEMENT

TWO LAYER STEEL BAR PLACEMENT T - 14 & 15 INCHES

CRCP(2)-20

FILE: crcp220.dgn	DN: TxDOT	CK: KM	DW: AN	CK: VP		
© TxDOT: APRIL 2020	CONT	SECT	JOB		HIGHWAY	
REVISIONS	2374	03	098		IH 20	
03/16/2020 REMOVED TABLE 1A	DIST	COUNTY			SHEET NO.	
	DAL	DALLAS			70	

DATE: 3/17/2023
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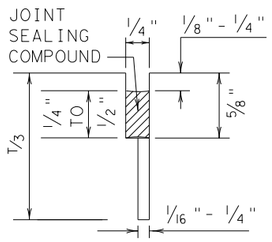
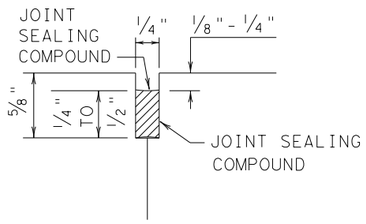
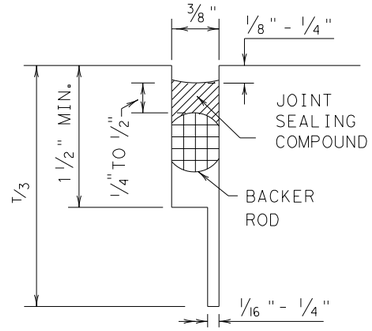
METHOD B: JOINT SEALING COMPOUND



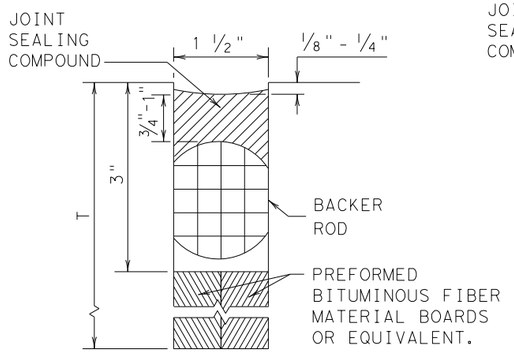
LONGITUDINAL SAWED CONTRACTION JOINT



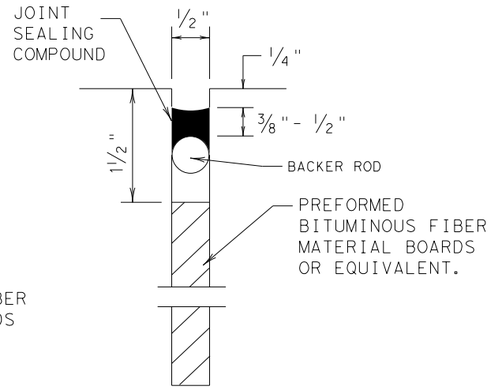
LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT

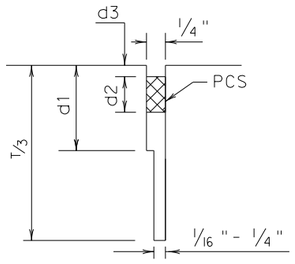


TRANSVERSE FORMED EXPANSION JOINT



FORMED ISOLATION JOINT

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



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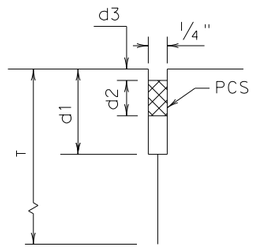
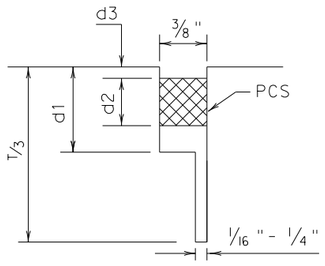


LONGITUDINAL CONSTRUCTION JOINT



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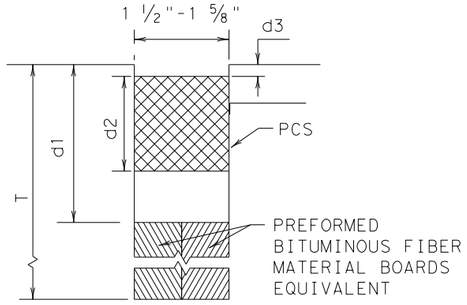


TRANSVERSE FORMED EXPANSION JOINT

GENERAL NOTES

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

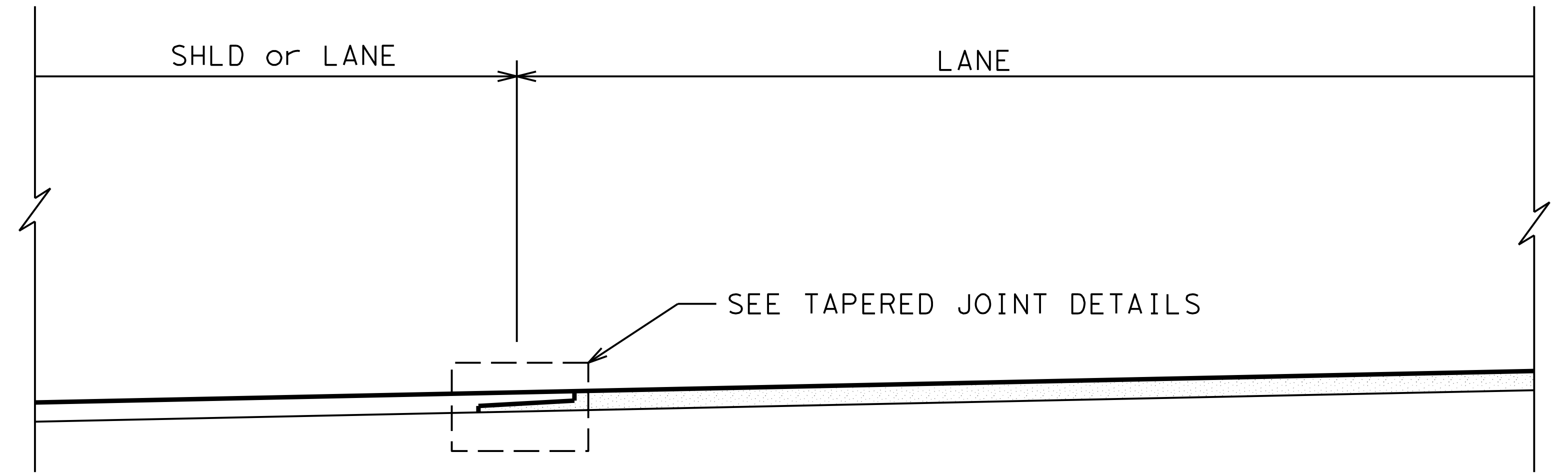
Texas Department of Transportation — Design Division Standard

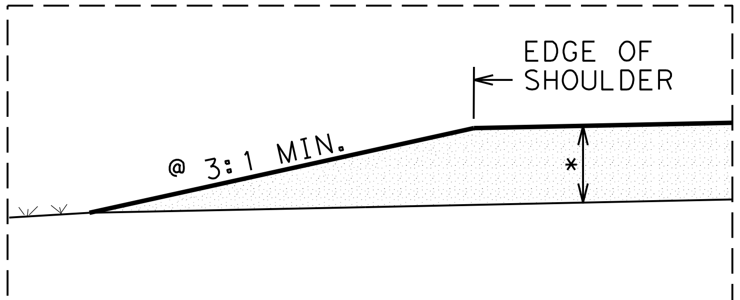
CONCRETE PAVING DETAILS

JOINT SEALS

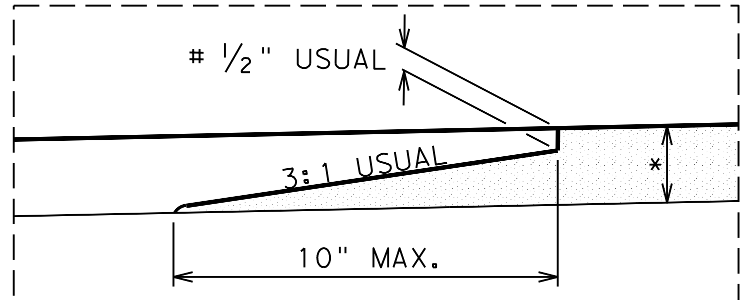
JS-14

FILE: js14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
©TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		71

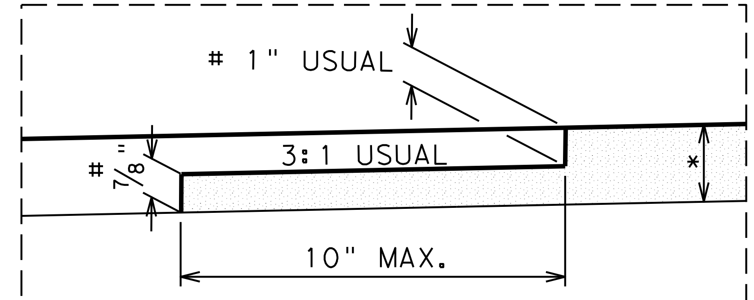




TAPERED OUTSIDE EDGE DETAIL



TAPERED JOINT DETAIL 1.5" TO 4" LIFTS



TAPERED JOINT DETAIL OVER 4" LIFTS

@ IF BACKFILLED SLOPE IS LESS THAN 3:1, COVER WEDGE WITH APPROVED BACKFILL.

* SEE TYPICAL SECTION FOR DEPTH AND TYPE OF HMA.
# NOTCH DEPTH SHALL NOT BE LESS THAN NOMINAL AGGREGATE SIZE.

NOTES:

1. THE ABOVE DETAILS SHALL BE CONSTRUCTED BY TAPERING THE BITUMINOUS MAT. THE TAPERED PORTION SHALL EXTEND BEYOND THE NORMAL LANE WIDTH AND BE LAID MONOLITHICALLY WITH ADJOINING MAT. THE TAPERED PORTION OF THE MAT SHALL BE CONSTRUCTED BY THE USE OF AN APPROVED STRIKE-OFF DEVICE THAT WILL PROVIDE A UNIFORM SLOPE AND WILL NOT RESTRICT THE MAIN SCREED. CLEAN WEDGE PRIOR TO PLACEMENT OF TACK COAT. TACK COAT SHALL BE APPLIED UNIFORMLY TO THE IN-PLACE TAPER WITH A DISTRIBUTOR BEFORE THE ADJACENT MAT IS PLACED. FINAL DENSITY REQUIREMENTS FOR THE ENTIRE PAVEMENT, INCLUDING THE TAPER AREA, WILL REMAIN UNCHANGED. COMPACTION OF THE INITIAL TAPER SECTION WILL BE REQUIRED AS NEAR TO FINAL DENSITY AS POSSIBLE. ROLL ADJACENT MAT FROM HOT SIDE TO COLD.

2. THE TYPE OF DEVICE TO PRODUCE ABOVE REFERENCED DETAILS SHALL PROVIDE INITIAL COMPACTION EQUIVALENT TO LAYDOWN MACHINE, WITH FINAL DENSITY ADHERING TO NOTE 1, AND BE APPROVED BY THE ENGINEER.

3. HOT MIX MATERIAL AND PLACEMENT SHALL BE PAID FOR UNDER THE PERTINENT ITEM. ANY ADDITIONAL SURFACE PREPARATION, TACK COAT, TACK COAT PLACEMENT, EQUIPMENT, LABOR, TOOLS AND INCIDENTALS TO PRODUCE TAPERED EDGE AND JOINTS AS DESCRIBED ABOVE SHALL BE CONSIDERED SUBSIDIARY TO THE HOT MIX ITEM.

4. THE TAPERED JOINT DETAIL IS NOT INTENDED FOR USE ON 2 WAY 2 LANE ROADBED CENTERLINE WITH LESS THAN 22' OVERALL WIDTH.

5. FULL PAVING OF ALL LANES AND SHOULDRS BY THE END OF EACH DAY PRODUCTION WILL NOT REQUIRE A TAPERED JOINT.

REVISED ON 9/10/08

 Texas Department of Transportation

HOT MIX EDGE AND LONGITUDINAL JOINT DETAILS DALLAS DISTRICT STANDARD

LJD(1-1)-07

FED. RD. DIV. NO.	PROJECT NUMBER			SHEET NUMBER
18	(SEE TITLE SHEET)			72
STATE	DISTRICT		COUNTY	
TEXAS	DALLAS		DALLAS	
CONTROL	SECTION	JOB	HIGHWAY NUMBER	
2374	03	098	IH 20	

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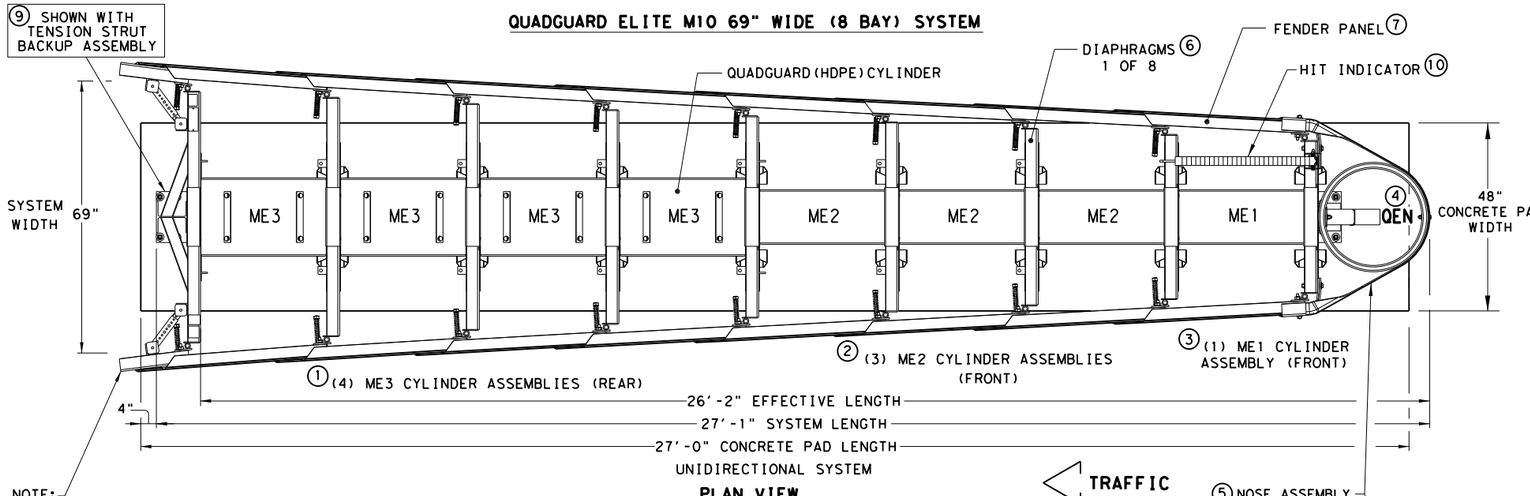
QUADGUARD ELITE M10 69" WIDE (8 BAY) SYSTEM



NOTE:
A TRANSITION MAY BE REQUIRED TO INSTALL THE QUADGUARD ELITE M10 TO THE OBJECT BEING SHIELDED.

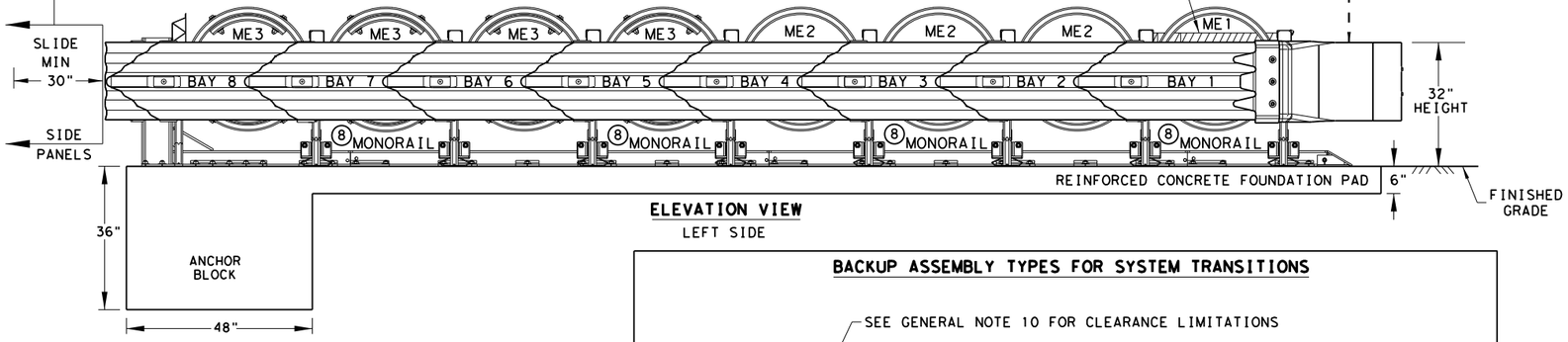
PLAN VIEW

KEY		KEY	
①	ME3 CYLINDER ASSEMBLIES	⑥	DIAPHRAGMS
②	ME2 CYLINDER ASSEMBLIES	⑦	FENDER PANELS
③	ME1 CYLINDER ASSEMBLY	⑧	MONORAILS
④	QEN CYLINDER	⑨	TYPE OF BACKUP
⑤	NOSE BELT ASSEMBLY	⑩	HIT INDICATOR

④ QEN CYLINDER INSTALLED INSIDE OF NOSE BELT ASSEMBLY ⑤

NOTE:
HIT INDICATOR WILL RAISE UPON IMPACT.
⑩ HIT INDICATOR

NOTE:
PROVISION SHALL BE MADE FOR REAR FENDER SIDE PANELS TO SLIDE REARWARD UPON IMPACT, 30" MIN.



ELEVATION VIEW
LEFT SIDE

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR CONCRETE PAD AND ANCHOR BLOCK INSTALLATION REQUIREMENTS.

A MANUFACTURER'S DRAWING PACKAGE UNIQUE AND SPECIFIC FOR THE QUADGUARD ELITE WIDE M10 FIELD INSTALATION AND INFORMATION REGARDING THE TYPE OF BACKUP ASSEMBLY REQUIRED FOR THE TRANSITION WILL BE PROVIDED BY THE MANUFACTURER TO THE ENGINEER AND INSTALLER.

6" REINFORCED CONCRETE PAD REQUIRES THE INSTALLATION OF AN ANCHOR BLOCK AS SHOWN ON THE MANUFACTURER'S DRAWING PACKAGE.

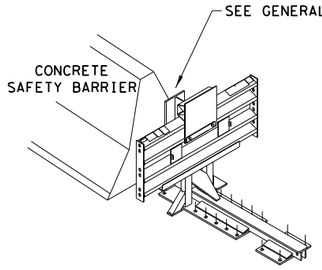
8" NON-REINFORCED CONCRETE PAD MAY NOT REQUIRE AN ANCHOR BLOCK, IF THE PAD IS INSTALLED AGAINST AN IMMOVABLE CONCRETE BACKUP.

CONCRETE PAD AND ANCHOR BLOCK COMBINATIONS SHALL BE CONFIRMED WITH THE MANUFACTURER BASED UPON SITE SPECIFIC DATA (SSD).

NOTE:
THE QUADGUARD ELITE M10 WIDE 8-BAY SYSTEM TESTED TO MASH TEST LEVEL 3.

TL-3 MODEL #	QM10069E	CYLINDER TYPES IN BAYS			
BAYS	8	TYPE-ME3	TYPE-ME2	TYPE-ME1	TYPE-QEN
DIAPHRAGMS	8	4	3	1	1
WIDTH	69"	REAR	FRONT		NOSE

BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS



⑨ TENSION STRUT BACKUP

SYSTEM TRANSITIONS TYPES	
1	QUAD-BEAM TO CONCRETE SAFETY BARRIER
2	QUAD-BEAM TO CONCRETE BRIDGE RAIL
3	QUAD-BEAM TO SINGLE SLOPE OFFSET
4	QUAD-BEAM TO CONCRETE END SHOE
5	QUAD-BEAM TO THRIE-BEAM RAIL
6	QUAD-BEAM TO W-BEAM RAIL

NOTE:
TRANSITION ASSEMBLIES FOR THE QUADGUARD ELITE M10 TO THRIE-BEAM OR W-BEAM FENCE REQUIRES I-BEAM POSTS:

ALL POSTS W6X8.5/9 I-BEAMS (78" LONG).

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR THE CORRECT BACKUP ASSEMBLY AND TRANSITION PANELS OR SIDE PANELS USED FOR STANDARD AND BI-DIRECTIONAL INSTALLATIONS: AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM ONE OR TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE QUADGUARD ELITE M10 WIDE SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION INC. AT 1(888)323-6374.
2. SEE THE RECENT QUADGUARD ELITE M10 WIDE PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS AND THE DRAWING PACKAGE FOR THE WIDE 69" SYSTEM BEFORE INSTALLING THE QUADGUARD ELITE M10 AT ANY GIVEN LOCATION.
3. FOR BI-DIRECTIONAL TRAFFIC: THE LOCATION AND OR WIDTH OF THE QUADGUARD ELITE M10 WIDE 69" IS RESTRICTED. AS BI-DIRECTIONAL TRAFFIC APPROACHES THE REAR OF THE QUADGUARD ELITE M10 WIDE 69", THE QUADGUARD ELITE M10 SHOULD NOT EXTEND FURTHER INTO THE TRAFFIC-SIDE OF THE BARRIER THAN THE OBSTACLE. ANY TRANSITION INSTALLED MUST EITHER BE TANGENT TO BOTH QUADGUARD ELITE M10 AND OBSTACLE OR MUST ANGLE TOWARD FIELD SIDE OF THE BARRIER.
4. SYSTEM TRANSITION: APPROPRIATE TRANSITION PANELS OR SIDE PANELS WILL BE REQUIRED FOR PROPER IMPACT PERFORMANCE. THE CORRECT PANEL(S) TO USE WILL DEPEND ON THE DIRECTION OF TRAFFIC FLOW AND WHAT TYPE OF BARRIER OR ROAD FEATURE THE QUADGUARD ELITE M10 SYSTEM IS SHIELDING. SEE THE QUADGUARD ELITE M10 WIDE [69"] PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
5. COMPONENTS FOR THE QUADGUARD ELITE (M10) BACKUP AND REINFORCING DETAILS ARE SHOWN ON THE QUADGUARD ELITE M10 WIDE PRODUCT DESCRIPTION & ASSEMBLY MANUAL.
6. CONCRETE PAD SHALL BE 6" MIN. REINFORCED 28MPa [4,000 PSI] (P.C.) OR 8" MIN. NON-REINFORCED 28MPa [4,000 PSI] CONCRETE ROADWAY MEASURING AT LEAST 12'-0" WIDE BY 50'-0" LONG. ANCHOR BLOCK IS NOT REQUIRED WHEN USING 8" CONCRETE PAD INSTALLED AGAINST AN IMMOVABLE STRUCTURE, E.G. CONCRETE WALL.
7. IF THE CROSS-SLOPE VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
8. THE INSTALLATION AREA SHOULD BE FREE OF CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
9. THE QUADGUARD ELITE M10 SYSTEM SHOULD BE INSTALLED APPROXIMATELY PARALLEL WITH THE BARRIER.
10. FOR THE TENSION STRUT BACKUP, THE DISTANCE BETWEEN THE BACK OF BACKUP AND THE BARRIER WALL SHOULD NOT EXCEED 7" IN ANY CASE.
11. THE WIDE QUADGUARD ELITE M10 SYSTEM IS ONLY AVAILABLE IN A 69" WIDTH.

FOUNDATION & ANCHORING REQUIREMENTS
FOUNDATION TYPES: A, B, C, & D

FOUNDATION TYPE: A	REINFORCED CONCRETE PAD OR ROADWAY
FOUNDATION:	6" MINIMUM DEPTH (P.C.C.)
ANCHORAGE:	7" STUDS EMBEDDED 5 ½" - APPROVED ADHESIVE
FOUNDATION TYPE: B	ASPHALT OVER P.C.C.
FOUNDATION:	3" MIN. (A.C.) OVER 3" MIN. (P.C.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 ½" - APPROVED ADHESIVE
FOUNDATION TYPE: C	ASPHALT OVER SUBBASE
FOUNDATION:	6" MIN. (A.C.) OVER 6" MIN. (C.S.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 ½" - APPROVED ADHESIVE
FOUNDATION TYPE: D	ASPHALT ONLY
FOUNDATION:	8" MIN. (A.C.)
ANCHORAGE:	18" THREADED ROD EMBEDDED 16 ½" - APPROVED ADHESIVE

KEY:
ASPHALT CONCRETE (A.C.)
COMPACTED SUBBASE (C.S.)
PORTLAND CEMENT CONCRETE (P.C.C.)

NOTE: SEE TRINITY'S PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR THE APPROVED ADHESIVE.

IF THE UNIT IS ANCHORED TO ASPHALTIC CONCRETE, IT SHOULD BE RELOCATED TO FRESH, UNDISTURBED ASPHALT AND RE-ANCHORED AFTER EACH IMPACT TO ENSURE ADEQUATE FUTURE PERFORMANCE.

TENSION STRUT BACKUP MAY BE USED IN CONSTRUCTION ZONES ON ASPHALT CONCRETE (A.C.) FOR TEMPORARY USE ONLY.

LOW MAINTENANCE

Texas Department of Transportation — Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION QUADGUARD ELITE M10 WIDE (MASH TL-3)

QGELITE(M10)(W)-20

FILE: qgelitem10w20.dgn	DN: TxDOT	CK: KM	DW: SS	CK: AG
© TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		73

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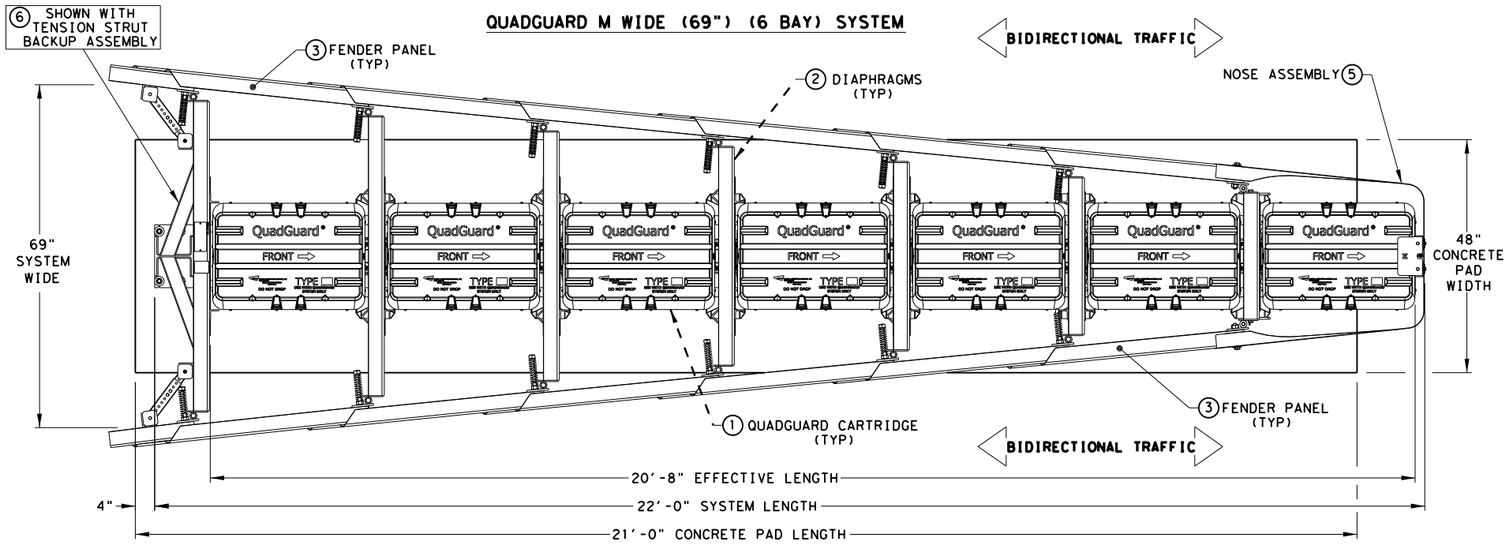
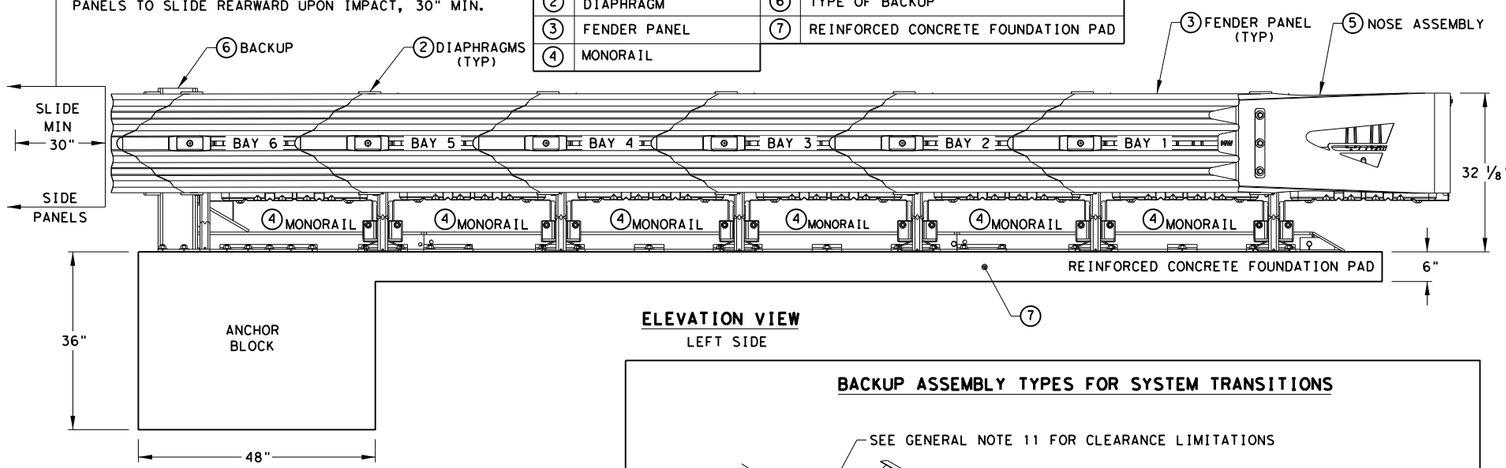
QUADGUARD M WIDE (69") (6 BAY) SYSTEM



PLAN VIEW

KEY	DESCRIPTION	KEY	DESCRIPTION
①	QUADGUARD CARTRIDGE	⑤	NOSE ASSEMBLY
②	DIAPHRAGM	⑥	TYPE OF BACKUP
③	FENDER PANEL	⑦	REINFORCED CONCRETE FOUNDATION PAD
④	MONORAIL		



ELEVATION VIEW
LEFT SIDE

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR CONCRETE PAD AND ANCHOR BLOCK INSTALLATION REQUIREMENTS.

A MANUFACTURER'S DRAWING PACKAGE UNIQUE AND SPECIFIC FOR THE QUADGUARD M WIDE FIELD INSTALATION AND INFORMATION REGARDING THE TYPE OF BACKUP ASSEMBLY REQUIRED FOR THE TRANSITION WILL BE PROVIDED BY THE MANUFACTURER TO THE ENGINEER AND INSTALLER.

6" REINFORCED CONCRETE PAD REQUIRES THE INSTALLATION OF AN ANCHOR BLOCK AS SHOWN ON THE MANUFACTURER'S DRAWING PACKAGE.

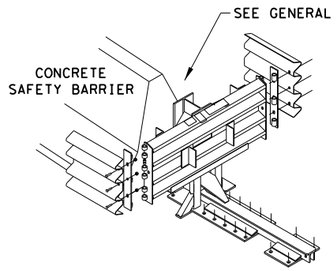
8" NON-REINFORCED CONCRETE PAD MAY NOT REQUIRE AN ANCHOR BLOCK, IF THE PAD IS INSTALLED AGAINST AN IMMOVABLE CONCRETE BACKUP.

CONCRETE PAD AND ANCHOR BLOCK COMBINATIONS SHALL BE CONFIRMED WITH THE MANUFACTURER BASED UPON SITE SPECIFIC DATA (SSD).

NOTE:
THE QUADGUARD M WIDE 6-BAY SYSTEM TESTED TO MASH TL-3.

TL-3 MODEL#	QM10069 (627515)	CARTRIDGE TYPES IN BAYS	
BAYS	6	TYPE I	TYPE II
DIAPHRAGMS	6	4	3
WIDTH	69"	REAR	FRONT

BACKUP ASSEMBLY TYPES FOR SYSTEM TRANSITIONS



⑥ TENSION STRUT BACKUP

SYSTEM TRANSITIONS TYPES	
1	QUAD-BEAM TO W-BEAM RAIL
2	QUAD-BEAM TO THRIE-BEAM RAIL
3	QUAD-BEAM TO CONCRETE SAFETY BARRIER
4	QUAD-BEAM TO SINGLE SLOPE BARRIER
5	QUAD-BEAM TO CONCRETE END SHOE
6	QUAD-BEAM TO CONCRETE BRIDGE RAIL

NOTE:
TRANSITION ASSEMBLIES FOR THE QUADGUARD M WIDE TO THRIE-BEAM OR W-BEAM FENCE REQUIRES I-BEAM POSTS:

ALL POSTS W6X8.5/9 I-BEAMS (78" LONG).

NOTES:
CONTACT THE MANUFACTURER WITH SITE SPECIFIC DATA (SSD) FOR THE CORRECT BACKUP ASSEMBLY AND TRANSITION PANELS OR SIDE PANELS USED FOR STANDARD AND BI-DIRECTIONAL INSTALLATIONS: AT DIVIDED-HIGHWAY MEDIANS OR UNDIVIDED ROADWAYS WHERE THE SYSTEM IS EXPOSED TO IMPACTS FROM ONE OR TWO DIFFERENT DIRECTIONS OF TRAFFIC FLOW.

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY - ENERGY ABSORPTION INC. AT 1(888)323-6374 OR WEBSITE www.trinityhighway.com.
2. SEE THE RECENT QUADGUARD M WIDE PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS AND THE DRAWING PACKAGE FOR THE SIX (6) BAY WIDE [69"] SYSTEM BEFORE INSTALLING THE QUADGUARD M WIDE AT ANY GIVEN LOCATION.
3. COMPONENTS FOR THE QUADGUARD M WIDE BACKUP AND REINFORCING DETAILS ARE SHOWN ON THE QUADGUARD M WIDE PRODUCT DESCRIPTION & ASSEMBLY MANUAL.
4. THE INSTALLATION AREA SHOULD BE FREE OF CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
5. FOR PERMANENT APPLICATIONS, QUADGUARD M WIDE SHOULD BE ASSEMBLED ON AN EXISTING OR FRESHLY PLACED AND CURED CONCRETE BASE 28MPa [4,000 PSI] MINIMUM. QUADGUARD M WIDE SYSTEM MAY ALSO BE ASSEMBLED ON REINFORCED OR NON-REINFORCED CONCRETE ROADWAY (MINIMUM 8" THICK).
6. CONCRETE PAD SHALL BE 6" MIN. REINFORCED 28MPa [4,000 PSI] (P.C.) OR 8" MIN. NON-REINFORCED 28MPa [4,000 PSI] CONCRETE ROADWAY MEASURING AT LEAST 12'-0" WIDE BY 50'-0" LONG. ANCHOR BLOCK IS NOT REQUIRED WHEN USING 8" CONCRETE PAD INSTALLED AGAINST AN IMMOVABLE STRUCTURE, E.G. CONCRETE WALL.
7. IF THE CROSS-SLOPE VARIES MORE THAN 2% OVER THE LENGTH OF THE SYSTEM, THE CONCRETE PAD WILL REQUIRE LEVELING. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
8. FOR BI-DIRECTIONAL TRAFFIC: THE LOCATION AND OR WIDTH OF THE QUADGUARD M WIDE IS RESTRICTED. AS BI-DIRECTIONAL TRAFFIC APPROACHES THE REAR OF THE QUADGUARD M WIDE, THE QUADGUARD M WIDE SHOULD NOT EXTEND FURTHER INTO THE TRAFFIC-SIDE OF THE BARRIER THAN THE OBSTACLE. ANY TRANSITION INSTALLED MUST EITHER BE TANGENT TO BOTH QUADGUARD M WIDE AND OBSTACLE OR MUST ANGLE TOWARD FIELD SIDE OF THE BARRIER.
9. SYSTEM TRANSITION: APPROPRIATE TRANSITION PANELS OR SIDE PANELS WILL BE REQUIRED FOR PROPER IMPACT PERFORMANCE. THE CORRECT PANEL(S) TO USE WILL DEPEND ON THE DIRECTION OF TRAFFIC FLOW AND WHAT TYPE OF BARRIER OR ROAD FEATURE THE QUADGUARD M WIDE SYSTEM IS SHIELDING. SEE THE QUADGUARD M WIDE PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
10. THE QUADGUARD M WIDE SYSTEM SHOULD BE INSTALLED APPROXIMATELY PARALLEL WITH THE BARRIER.
11. FOR THE TENSION STRUT BACKUP, THE DISTANCE BETWEEN THE BACK OF BACKUP AND THE BARRIER WALL SHOULD NOT EXCEED 7" IN ANY CASE.
12. THE WIDE QUADGUARD M WIDE SYSTEM IS ONLY AVAILABLE IN A 69" WIDTH AND HAS A 6-BAY SYSTEM THAT HAS BEEN TESTED TO MASH TEST LEVEL 3.
13. IF THE OUTSIDE WIDTH OF OBSTACLE(S) BEING SHIELDED IS 53" OR GREATER, THE OUTSIDE OF OBSTACLE(S) MUST BE CHAMFERED. SEE THE QUADGUARD M WIDE PRODUCT DESCRIPTION & ASSEMBLY MANUAL FOR FURTHER DETAILS.
14. SEE THE "QUADGUARD M WIDE SYSTEM PRODUCT MANUAL" FOR A DESCRIPTION OF ITS IMPACT PERFORMANCE CHARACTERISTICS AND DESIGN LIMITATIONS BEFORE PLACING A SYSTEM AT A GIVEN SITE. INFORMATION AND COPIES OF ABOVE MANUAL ARE AVAILABLE BY CALLING CUSTOMER SERVICE DEPARTMENT AT (888) 323-6374.

FOUNDATION & ANCHORING REQUIREMENTS FOUNDATION TYPES: A & B	
FOUNDATION TYPE: A	REINFORCED CONCRETE PAD OR ROADWAY
FOUNDATION:	6" MINIMUM DEPTH WITH ANCHOR BLOCK (P.C.C.)
ANCHORAGE:	7" STUDS EMBEDDED 5 1/2" - APPROVED ADHESIVE
FOUNDATION TYPE: B	REINFORCED OR NON-REINFORCED CONCRETE PAD OR ROADWAY
FOUNDATION:	8" MINIMUM DEPTH (P.C.C.)
ANCHORAGE:	7" STUDS EMBEDDED 5 1/2" - APPROVED ADHESIVE

KEY:
COMPACTED SUBBASE (C.S.)
PORTLAND CEMENT CONCRETE (P.C.C.)

NOTE: SEE TRINITY'S PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR THE APPROVED ADHESIVE.

TENSION STRUT BACKUP MAY NOT BE USED IN ASPHALT CONCRETE (A.C.). SEE TRINITY'S PRODUCT DESCRIPTION ASSEMBLY MANUAL FOR MORE INFORMATION.

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE QUADGUARD QG M WIDE SYSTEM AND IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

REUSABLE

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION QUADGUARD M WIDE (MASH TL-3)

QG(M)(W)-21

FILE: qgmw21.dgn	DN: TXDOT	CK: KM	DW: SS	CK: CL
©TxDOT: JULY 2021	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		74

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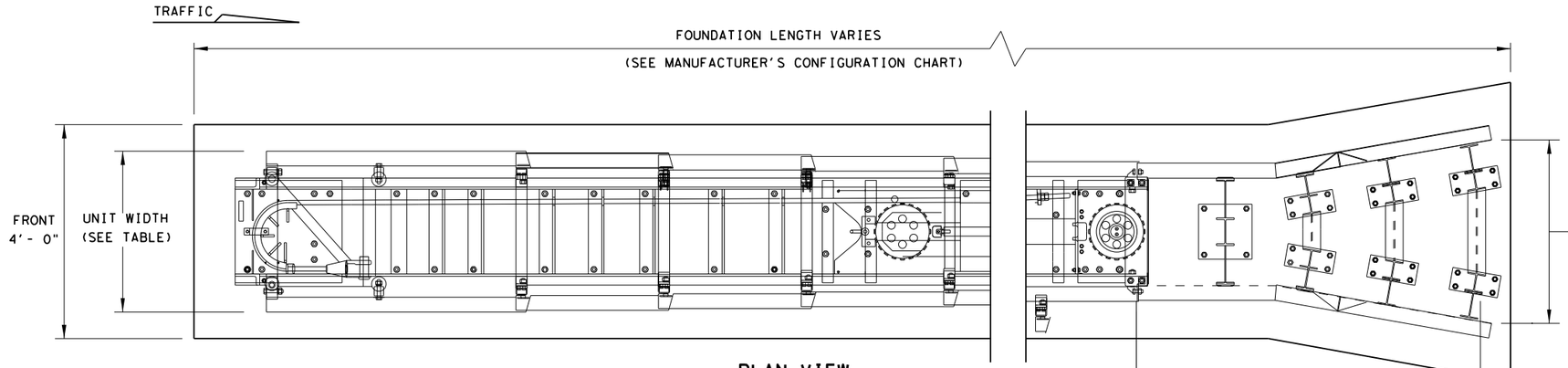
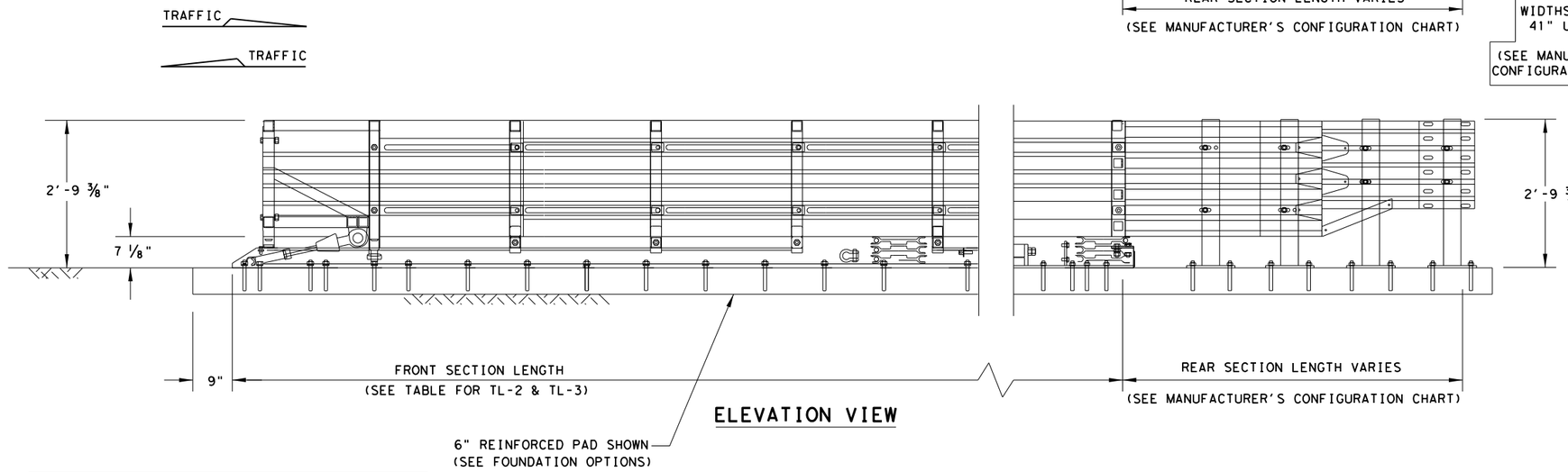


PLAN VIEW



ELEVATION VIEW

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: WORK AREA PROTECTION, CORP. AT (800) 327-4417, OR (630) 377-9100.
2. FOR BI-DIRECTIONAL TRAFFIC, APPROPRIATE TRANSITION PANELS WILL BE REQUIRED.
3. ADDITIONAL DETAILS FOR THE TRANSITION OPTIONS AND FOUNDATION OPTIONS WILL BE SHOWN ON THE MANUFACTURER'S SHOP DRAWINGS FURNISHED TO THE ENGINEER.
4. CONCRETE SHALL BE CLASS "S" WITH A MINIMUM COMPRESSIVE STRENGTH OF 4,000 PSI.
5. MAXIMUM PERMISSIBLE CROSS-SLOPE IS 8%.
6. THE INSTALLATION AREA SHOULD BE FREE FROM CURBS, ELEVATED OBJECTS, OR DEPRESSIONS.
7. THE SCI100GM & SCI70GM SYSTEMS SHOULD BE APPROXIMATELY PARALLEL WITH THE BARRIER OR ℄ OF MERGING BARRIERS.

NOTE: FOR ATTACHMENT AND TRANSITIONS TO OTHER SHAPES, BARRIERS RAILINGS AND BI-DIRECTIONAL TRAFFIC FLOWS ARE AVAILABLE. (SEE MANUFACTURER'S PRODUCT MANUAL)

NOTE: SIDE PANELS CAN TRAVEL 30" BEYOND THE LAST TERMINAL BRACE AT THE REAR OF THE CUSHION. ALL OBJECTS THAT MAY INTERFERE WITH THIS MOTION CAN AFFECT PERFORMANCE OF AND MAY CAUSE UNDUE DAMAGE TO THE CRASH CUSHION.

WIDE TRANSITION LENGTHS		
GORE WIDTH	TL-2 OVERALL SYSTEM LENGTH	TL-3 OVERALL SYSTEM LENGTH
41"	20'-1"	28'-1"
48"	21'-10"	29'-10"
55"	23'-5"	31'-5"
60"	24'-7"	32'-7"
68"	26'-6"	34'-6"
69"	26'-8"	34'-8"
81"	29'-7"	37'-7"
88"	31'-2"	39'-2"
94"	32'-7"	40'-7"
100"	34'-1"	42'-1"
107"	35'-8"	43'-8"
112"	36'-11"	44'-11"
120"	38'-10"	46'-10"
126"	40'-2"	48'-2"
133"	41'-11"	49'-11"

FOUNDATION OPTIONS
6" Reinforced Concrete (5 1/2" Anchor Embedment)
8" Unreinforced Concrete (5 1/2" Anchor Embedment)
3" Min. Asphalt over 3" Min. Concrete (16 1/2" Anchor Embed.)
6" Asphalt over 6" Compact Subbase (16 1/2" Anchor Embed.)
8" Minimum Asphalt (16 1/2" Anchor Embedment)

FOR STEEL PLACEMENT IN CONCRETE FOUNDATIONS, SEE MANUFACTURER'S PRODUCT MANUAL.

TRANSITION OPTIONS
Concrete Vertical Wall
Concrete Traffic Barriers
Guardrail (W-Beam)
Guardrail (Thrie-Beam)

TRANSITION TYPES ARE SHOWN ELSEWHERE ON THE PLANS (I.E. ATTENUATOR LOCATION DETAILS OR IN THE GENERAL NOTES).

FOR BI-DIRECTIONAL TRANSITION PANEL AND END SHOE DETAILS, SEE MANUFACTURER'S PRODUCT MANUAL.

MODEL (WIDE)	TEST LEVEL	FRONT SECTION LENGTH	UNIT WIDTH	FOUNDATION LENGTH	GORE WIDTH
SCI70GM	TL-2	13'-6"	2'-10 5/8"	OVERALL LENGTH PLUS 1'-6"	41" TO 133"
SCI100GM	TL-3	21'-6"	3'-1 1/2"	OVERALL LENGTH PLUS 1'-6"	41" TO 133"

SYSTEM AND PAD LENGTHS VARY DEPENDING ON BACKUP TYPE.

LOW MAINTENANCE

Texas Department of Transportation

Design Division Standard

WORK AREA PROTECTION CORP (SMART-WIDE)

SMTC(W)-16

FILE: smtcw16.dgn	DN: TxDOT	CK: KM	DW: BD/VP	CK: VP
© TxDOT: FEBRUARY 2006	CONT	SECT	JOB	HIGHWAY
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REVISED 06, 2013 VP REVISED 03, 2016 VP REVISED 04, 2018 VP	DIST	COUNTY		SHEET NO.
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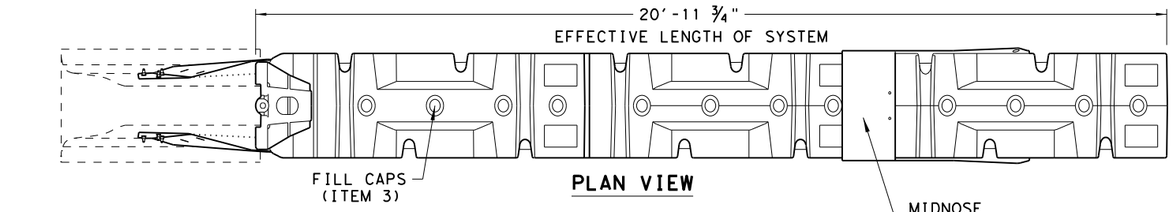
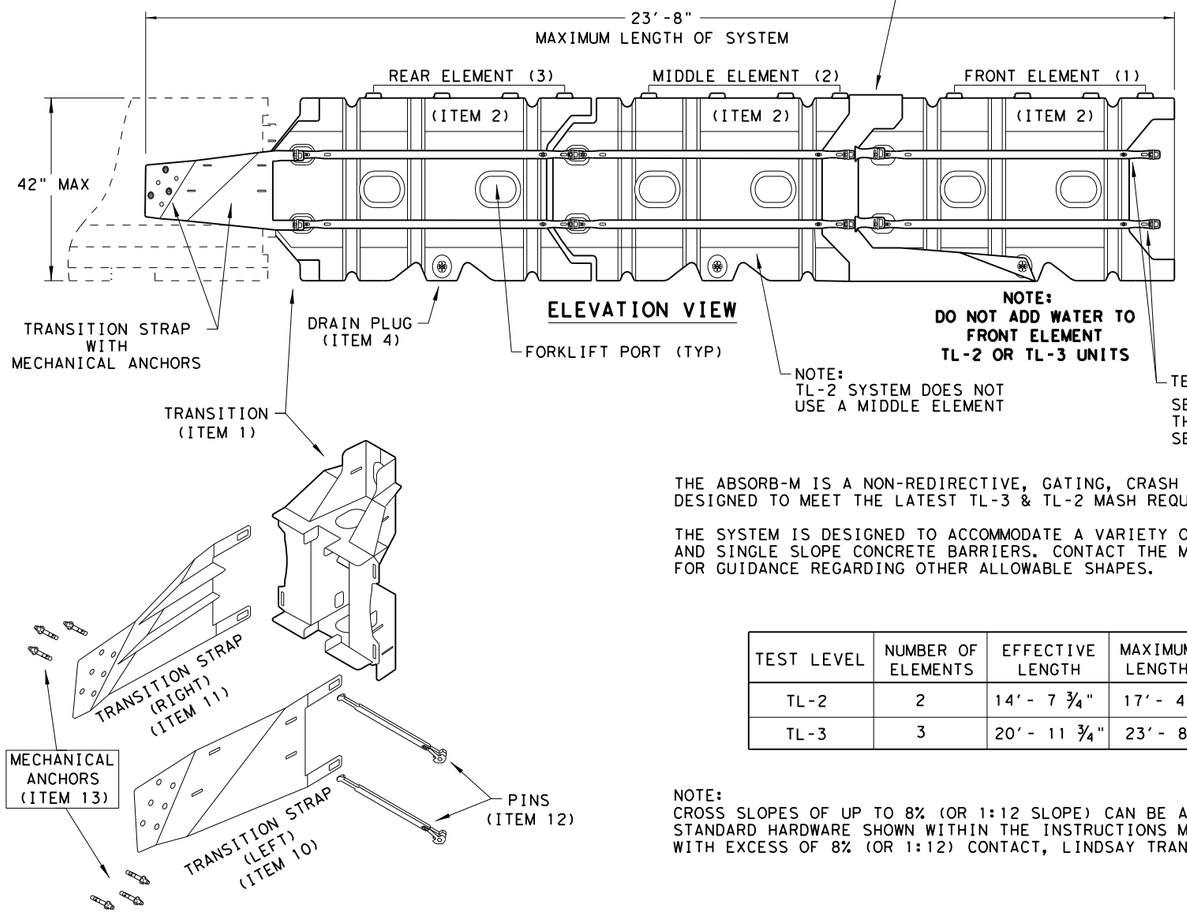
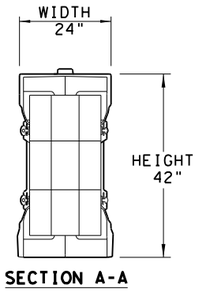
SYSTEM SHOWN - ABSORB-M TL-3







THE ABSORB-M IS A NON-REDIRECTIVE, GATING, CRASH CUSHION DESIGNED TO MEET THE LATEST TL-3 & TL-2 MASH REQUIREMENTS.

THE SYSTEM IS DESIGNED TO ACCOMMODATE A VARIETY OF F-SHAPE AND SINGLE SLOPE CONCRETE BARRIERS. CONTACT THE MANUFACTURER FOR GUIDANCE REGARDING OTHER ALLOWABLE SHAPES.

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

NOTE:
CROSS SLOPES OF UP TO 8% (OR 1:12 SLOPE) CAN BE ACCOMMODATED WITH STANDARD HARDWARE SHOWN WITHIN THE INSTRUCTIONS MANUAL. FOR SLOPES WITH EXCESS OF 8% (OR 1:12) CONTACT, LINDSAY TRANSPORTATION SOLUTIONS.

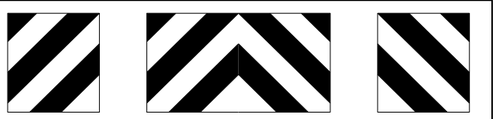
GENERAL NOTES

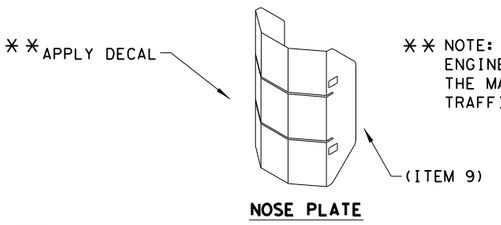
1. FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
2. THE ABSORB-M SYSTEM IS ONLY APPROVED FOR USE IN (TEMPORARY WORK ZONE) LOCATIONS.
3. THE ABSORB-M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

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

*COMPONENTS PRE-ASSEMBLED WITH ELEMENT ASSEMBLY

DELINEATION DECAL PLACEMENT GUIDE





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

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

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

SACRIFICIAL

Texas Department of Transportation — Design Division Standard

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

FILE: absorbm19	DN: TxDOT	CK: KM	DW: VP	CK:
© TxDOT: JULY 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
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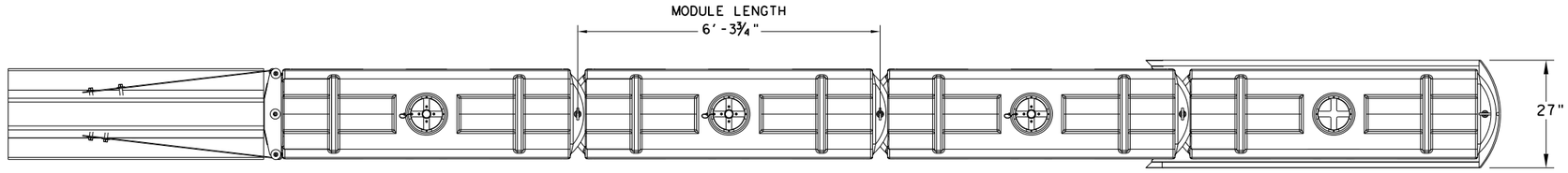
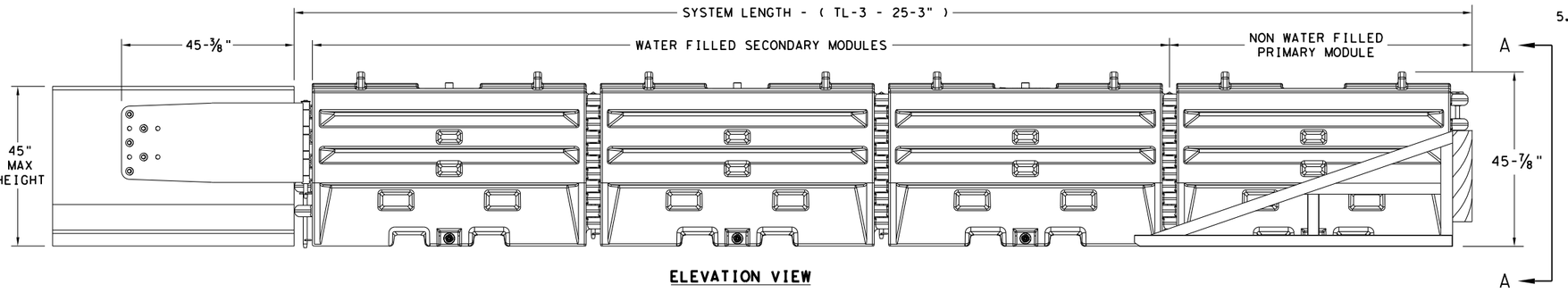
	DAL	DALLAS		76



PLAN VIEW



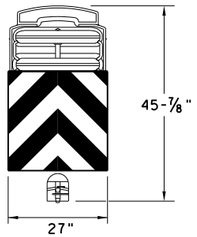
ELEVATION VIEW

GENERAL NOTES

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

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

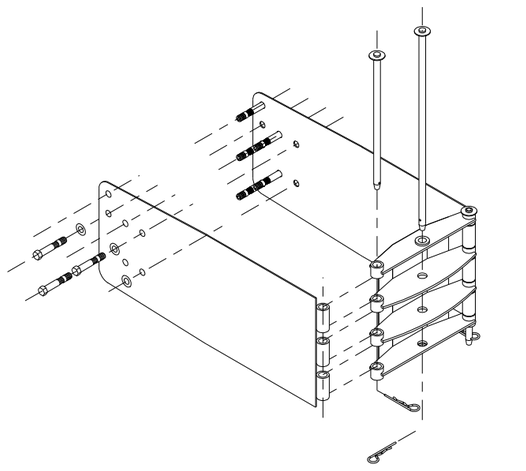
TEST LEVEL	NUMBER OF SECONDARY MODULES	SYSTEM LENGTH
TL-3	3	25' 3"



SECTION A-A

NOSE SHEETING PANEL DELINEATION

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



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

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

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

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

SACRIFICIAL

BILL OF MATERIAL

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

Texas Department of Transportation — Design Division Standard

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

FILE: sled19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
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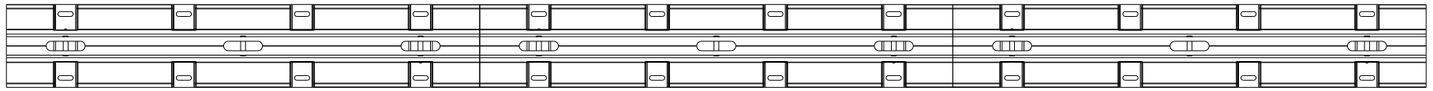
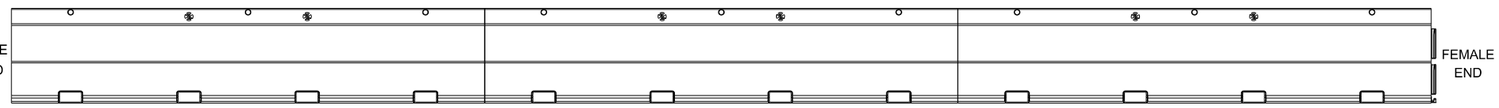
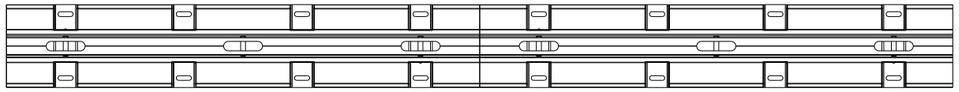


PLAN VIEW



ELEVATION VIEW
ZONEGUARD STANDARD UNIT x 50'-0"



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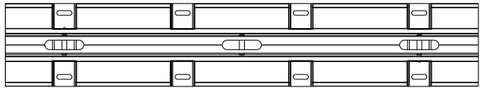

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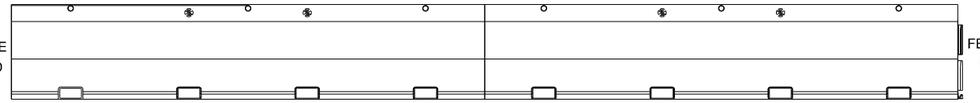
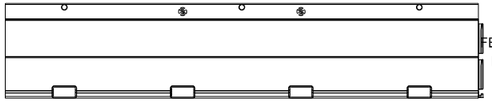
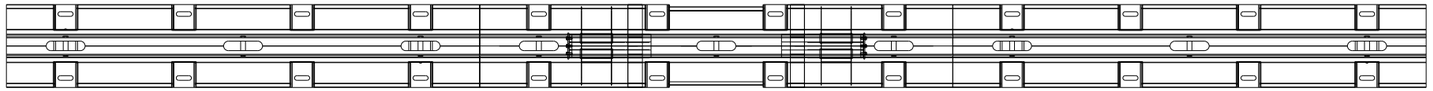


ELEVATION VIEW
ZONEGUARD STANDARD UNIT x 33'-4"



ELEVATION VIEW
ZONEGUARD STANDARD UNIT x 16'-8"



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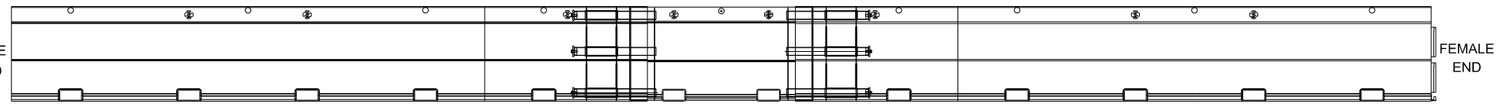
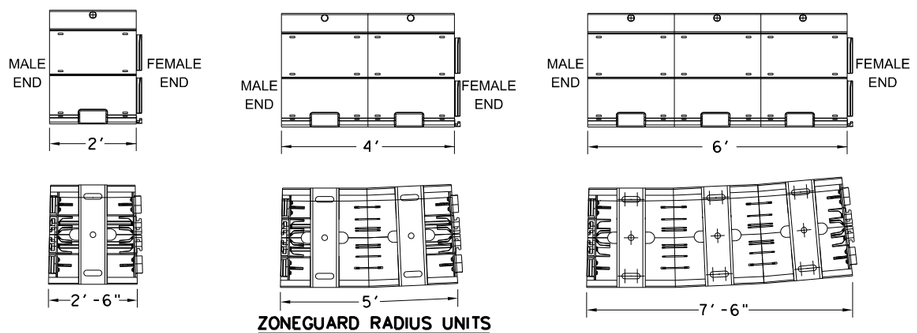
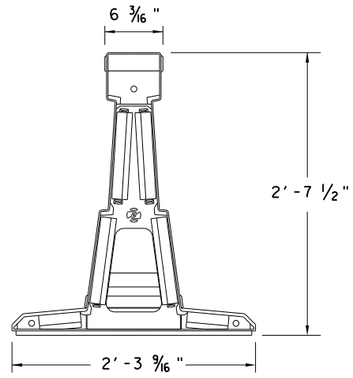


ELEVATION VIEW
ZONEGUARD EXPANSION UNIT x 46'-5½"
(SEE GENERAL NOTE 5)



ZONEGUARD RADIUS UNITS



ZONEGUARD TYPICAL SECTION

GENERAL NOTES

1. FOR TECHNICAL AND APPLICATION SUPPORT PLEASE CONTACT HILL & SMITH INC. AT 614-340-6294.
2. ZONEGUARD HAS BEEN ACCEPTED BY FHWA AS A MASH TL-3 LONGITUDINAL BARRIER.
3. STANDARD INSTALLATIONS REQUIRE ANCHORING AT EACH END OF THE RUN. MINIMUM DEFLECTION INSTALLATIONS REQUIRE ANCHORING AT 33'-4 CENTERS. NO MODIFICATIONS ARE NECESSARY OTHER THAN INCREASED ANCHORING.
4. 50-0' UNITS CAN BE USED TO ACHIEVE DOWN TO AN 800' RADIUS CURVE. 16'-8" UNITS CAN BE USED TO ACHIEVE CURVES DOWN TO 250' RADIUS. SPECIAL SHORT UNITS (SHOWN) IN 2.5 DEGREE INCREMENTS CAN BE USED TO ACHIEVE DIRECTION CHANGES OR AT A FIXED RADIUS OF 47'-0".
5. HILL & SMITH OFFERS AN EXPANSION UNIT THAT CAN BE USED ACROSS A BRIDGE EXPANSION JOINT OR TO ACCOMMODATE THERMAL EXPANSION. THE UNIT IS ANCHORED IN THE MIDDLE, AND ADJUSTED ACCORDING TO THE TEMPERATURE AT THE TIME OF INSTALLATION. THE EXPANSION JOINT CAN BE USED WITH ENGINEER APPROVAL. THE EXPANSION UNIT HAS NOT BEEN ASSESSED TO MASH CRITERIA.
6. ANCHOR PINS ARE 1 ¼" DIAMETER. LENGTH IS 1'-8" FOR ASPHALT AND 1'-0" FOR CONCRETE. SEE ANCHORING TABLE FOR ADDITIONAL DETAILS.

	STANDARD INSTALLATION	MINIMUM DEFLECTION INSTALLATION CONCRETE	MINIMUM DEFLECTION INSTALLATION ASPHALT
	FOUR ANCHORS AT END OF THE RUN	TWO ANCHORS (ONE EACH SIDE) EVERY 33'-4"	TWO ANCHORS (ONE EACH SIDE) EVERY 33'-4"
MASH TL-3 DEFLECTION (2270 KG TRUCK @ 25° & 100 KM/HR)	6'-10"	5"	2'-0"

EXPECTED DEFLECTION TABLE

DESCRIPTION	ASPHALT	CONCRETE
1 1/4" PIN ANCHOR	1'-8" LONG, MINIMUM ASPHALT COVER OF 3"	1'-0" LONG, MINIMUM CONCRETE COVER OF 6"
1 1/4" ALL THREAD ANCHOR	-	1'-0" LONG, MINIMUM EMBEDMENT OF 6"

ANCHORING TABLE

ALTERNATE ANCHORING METHODS CERTIFIED BY HILL & SMITH, INC. ARE AVAILABLE PER FHWA APPROVAL LETTER.

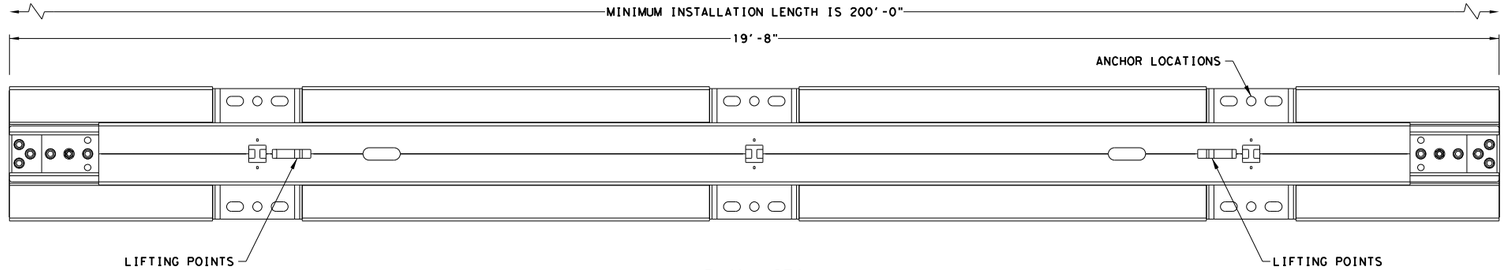
Texas Department of Transportation

Design Division Standard

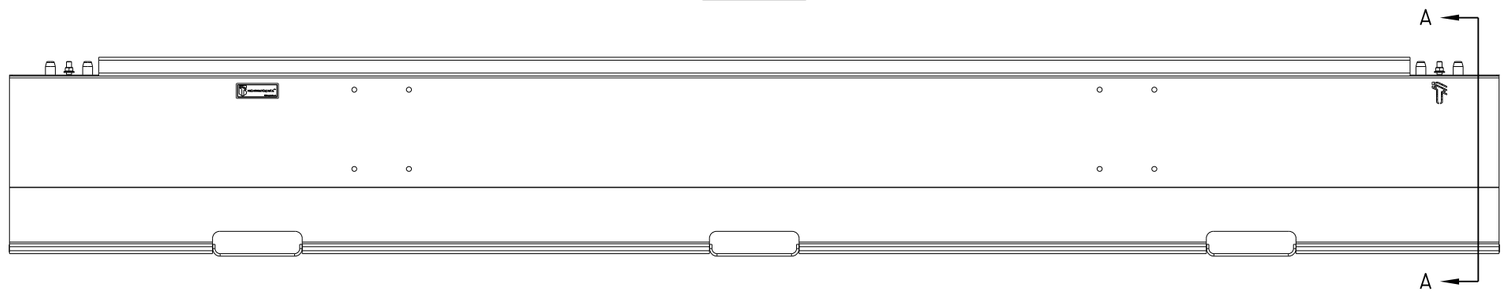
ZONEGUARD SYSTEM
STEEL BARRIER
MASH TL-3
ZONEGUARD-19

FILE: zoneguard19	DN: TxDOT	CK: KM	DW: VP	CK: CGL
© TxDOT: JULY 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		78

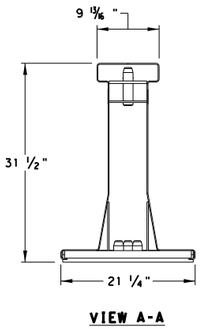
DATE: 3/17/2023
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DAL\O\PROJECTS\On\IH20\237403098\Sheets\STND\RDWY\highwayguard21.dgn



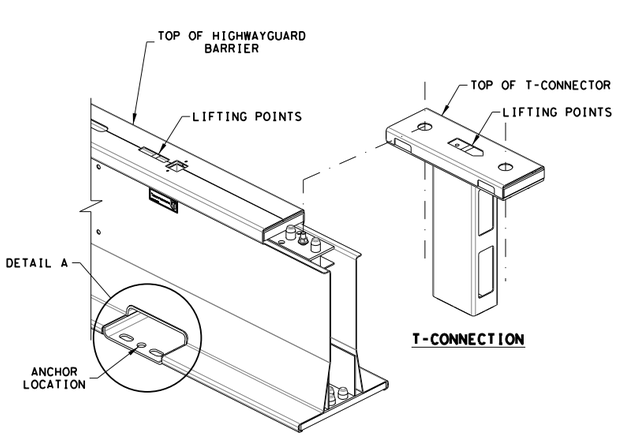
PLAN VIEW



ELEVATION VIEW
LEFT SIDE

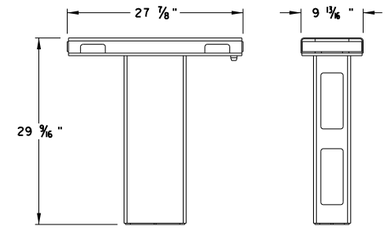


VIEW A-A

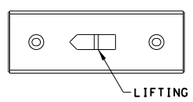


T-CONNECTION

ISOMETRIC VIEW



ELEVATION VIEW SIDE VIEW

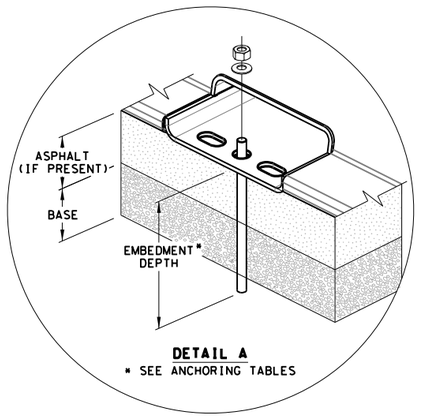


PLAN VIEW

T-CONNECTOR DETAILS

HIGHWAYGUARD BARRIER T-CONNECTOR TABLE *		
METHOD	DESCRIPTION	APPROX. RADIUS (FT)
1	20FT BARRIER SECTION WITH STANDARD T-CONNECTIONS AT MAXIMUM ANGLE	581
2	20FT BARRIER SECTION WITH 2.5° T-CONNECTION	460
3	20FT BARRIER SECTION WITH 5° T-CONNECTION	230
4	20FT BARRIER SECTION WITH 10° T-CONNECTION	115
5	20FT BARRIER SECTION WITH 10° BARRIER SECTION AND STANDARD T-CONNECTION	135
6	10° BARRIER SECTION WITH STANDARD T-CONNECTIONS	22
7	10° BARRIER SECTION WITH 10° T-SECTION	12

* SEE PRODUCT MANUAL OR CONTACT HIGHWAY CARE LTD. FOR MORE INFORMATION ON ANGLE T-CONNECTORS



DETAIL A
* SEE ANCHORING TABLES

GENERAL NOTES

1. THE SYSTEM SHOWN ON THIS DRAWING IS A PROPRIETARY BARRIER TRADED AS HIGHWAYGUARD AND HIGHWAYGUARD LDS AND HAS BEEN DESIGNED AND MANUFACTURED BY HIGHWAY CARE LTD. FOR TECHNICAL ASSISTANCE AND APPLICATION SUPPORT CONTACT AT (888) 323-6374 OR engineering@highwaycare.com
2. THE HIGHWAYGUARD HAS BEEN CRASH TESTED TO MASH AND HAS FHWA APPROVAL AS A TL-3 & TL-4 BARRIER. THE DEFLECTION TABLE OUTLINES BASIC SYSTEM PERFORMANCE AND COMPONENT ANCHORING REQUIREMENTS.
3. THIS DRAWING PACKAGE PROVIDES THE RELEVANT INFORMATION AND GENERAL GRAPHICS REQUIRED TO IDENTIFY THE COMPONENT PARTS OF HIGHWAYGUARD AND THEIR INCORPORATION AS A WHOLE SYSTEM FOR DEPARTMENTAL STANDARD APPLICATIONS.
4. INSTALLATION OF HIGHWAYGUARD BARRIER OR HIGHWAYGUARD LDS BARRIER, NORMALLY STARTS WITH AN END CAP THAT MUST BE PROTECTED WITH A SUITABLE CRASH CUSHION END TREATMENT IF EXPOSED TO ONCOMING TRAFFIC. THE CRASH CUSHION CONNECTIONS ARE NOT DETAILED WITHIN THESE DRAWINGS, PLEASE CONTACT HIGHWAY CARE LTD. FOR MORE DETAILS.
5. THE FULL HEIGHT OF HIGHWAYGUARD BARRIER 20FT SEGMENT IS 31.5". EACH SEGMENT IS LOWERED INTO POSITION WITH THE T-CONNECTION ALREADY ATTACHED TO THE END OF THE BARRIER THAT IS BEING JOINED TO THE RUN OF BARRIER. ENSURE ORIENTATION OF T-CONNECTOR ALLOWS ALIGNMENT PINS TO BE LOWERED ONTO NEXT SECTION. THE T-CONNECTOR ALLOWS THE BARRIER FOR ADJUSTMENTS, QUICK INSTALLATION, QUICK REMOVAL AND REPLACEMENT OF DAMAGED BARRIERS. MINIMUM INSTALLATION LENGTH OF HIGHWAYGUARD BARRIER IS 200'-0".
6. THERE ARE SEVERAL METHODS OF ACHIEVING RADIUS IN A LENGTH OF HIGHWAYGUARD BARRIER. RADIUS CAN BE ACHIEVED USING VARIOUS T-CONNECTORS AND THUS ALLOWING THE HIGHWAYGUARD BARRIER TO FOLLOW THE DESIRED CURVATURE IN THE INSTALLATION, THESE TYPE OF T-CONNECTORS ARE, 2.5°, 5° AND 10° ANGLES. FOR FURTHER INFORMATION AND ADVICE CONTACT HIGHWAY CARE LTD.
7. USING HIGHWAYGUARD BARRIER OR HIGHWAYGUARD BARRIER LDS ON BRIDGE STRUCTURES, POSSIBLE ANCHORING SHOULD TAKE PLACE OFF BRIDGE DECKS. ANY ANCHORING ON BRIDGE DECKS NEEDS TO BE AGREED IN ADVANCE WITH THE TECHNICAL EXPERT RESPONSIBLE FOR THE BRIDGE TO ENSURE IT IS NOT DAMAGED. IF ANCHORING EITHER SIDE OF A BRIDGE DECK EXPANSION JOINT, THEN THIS MOVEMENT MUST BE MIRRORED IN THE BARRIER. FOR FURTHER INFORMATION AND ADVICE CONTACT HIGHWAY CARE LTD.
8. THE HIGHWAYGUARD BARRIER SECTIONS CAN BE EQUIPPED WITH OPTIONAL WHEELSETS THAT ALLOW THE BARRIERS TO BE MANEUVERED WITHOUT LIFTING THE MACHINERY/ EQUIPMENT SUCH AS INSTALLING IN TUNNELS OR AREAS WITH OVERHEAD RESTRICTIONS. THE WHEELSETS CAN BE RAISED AND LOWERED FROM THE TOP OF THE BARRIER USING A MANUAL WRENCH AND 1" SOCKET.
9. THE HIGHWAYGUARD BARRIER HAS BEEN MASH TESTED, USING 1 3/16" DIA. DROP IN PIN ANCHORS AND EMBEDDED 1'-6" INTO ASPHALT. ALTERNATIVE GROUND EMBEDMENT CONDITIONS MAY BE ACCEPTABLE BUT MIGHT REQUIRE DIFFERENT ANCHOR SOLUTIONS, PLEASE CONTACT HIGHWAY CARE LTD. FOR FURTHER INFORMATION.
10. ALL COMPONENTS ARE FULLY GALVANIZED.
11. HIGHWAYGUARD BARRIER SYSTEMS SHALL BE ASSEMBLED AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS DETAILED DRAWINGS, PROCEDURES AND SPECIFICATIONS. FOR ANY INSTALLATIONS OUTSIDE OF THE SCOPE OF THESE DRAWINGS, PLEASE CONTACT HIGHWAY CARE LTD. FOR DETAILS.
12. FOR ANCHORING LAYOUTS FOR HIGHWAYGUARD AND HIGHWAYGUARD LDS, PLEASE SEE MANUFACTURER'S PRODUCT MANUAL OR CONTACT HIGHWAY CAR LTD. FOR INFORMATION.

STANDARD ANCHORING REQUIREMENTS (ASPHALT)**

	ANCHOR OPTIONS	ANCHOR LENGTH	EMBEDMENT DEPTH (MIN.)	DRILL DIAMETER
1	1" GALV. RESIN THREADED ANCHOR (WITH 1" GALV. WASHER & NUT)	1'-1"	11 3/4"	1 1/8"
2	1 3/16" GALV. DROP IN PIN (NOT DRIVEN PIN)	1'-2 3/8"	1'-1 3/4"	1 1/4"
3	1" GALV. RESIN THREADED ANCHOR (WITH 1" GALV. WASHER & NUT)	1'-6"	1'-4 1/2"	1 1/4"
4	1" GALV. CHEMICAL THREADED "LEFTY" KELKEN REMOVABLE ANCHOR (WITH 1" GALV. WASHER & NUT)	NA	1'-0"	1 1/4"

** 2" MIN. ASPHALT DEPTH ABOVE AN APPROPRIATELY COMPACTED DGA SUBBASE AND 2" MIN. ASPHALT DEPTH ABOVE A MIN. OF 6" REINFORCED CONCRETE SUBBASE.

NOTE:
ANCHORS ARE TO BE POSITIONED A MINIMUM OF 5 3/4" AWAY FROM THE EDGE OF AN EXCAVATION FOR RESIN ANCHORS OR 7 3/4" FOR DROP IN PINS.

STANDARD ANCHORING REQUIREMENTS (CONCRETE)***

	ANCHOR OPTIONS	ANCHOR LENGTH	EMBEDMENT DEPTH (MIN.)	DRILL DIAMETER
1	1" GALV. RESIN THREADED ANCHOR (WITH 1" GALV. WASHER & NUT)	9"	6"	1 1/8"
2	1" HILTI HSL-3 MECHANICAL ANCHOR	9 1/4"	****	****
3	1" GALV. CHEMICAL THREADED "LEFTY" KELKEN REMOVABLE ANCHOR (WITH 1" GALV. WASHER & NUT)	NA	6"	1 1/4"
4	1 3/16" GALV. DROP IN PIN (NOT DRIVEN PIN)	1'-2 3/8"	1'-1 3/4"	1 1/4"

*** 7 7/8" MINIMUM REINFORCED CONCRETE DEPTH.
10" MINIMUM UNREINFORCED CONCRETE DEPTH.
**** CONTACT: HIGHWAY CARE LTD. FOR SPECIFIC APPLICATION.

NOTE:
ANCHORS ARE TO BE POSITIONED A MINIMUM OF 11 7/8" FROM THE EDGE OF THE CONCRETE PAD.

HIGHWAYGUARD DEFLECTION TABLE

	STANDARD SYSTEM	MINIMUM DEFLECTION SYSTEMS (LDS)
DESCRIPTION	ONLY ANCHORED AT THE FIRST AND ENDS OF THE BARRIER LENGTH	ANCHORS ARE STAGGERED EVERY 39'-4 1/2"
DEFLECTION AT MASH TL-3	64"	2'-3"
DEFLECTION AT MASH TL-4	71"	2'-7"

NOTE:
SEE PRODUCT MANUAL OR CONTACT HIGHWAY CARE LTD. FOR MORE INFORMATION ON ANCHOR REQUIREMENTS FOR THE LENGTH OF BARRIER.

Texas Department of Transportation

Design Division Standard

HIGHWAYGUARD SYSTEM STEEL BARRIER

MASH TL-3 & TL-4

HIGHWAYGUARD-21

FILE: highwayguard21.dgn	DN: TXDOT	CK: KM	DW: SS	CK: XX
©TxDOT: JULY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		79

ESTIMATED QUANTITIES

ITEM NO.	104	401	429	429	432	432	438	451	495	529	780	785	785	4171	7000
DESCRIPTION CODE	6009	6001	6007	6009	6008	6033	6008	6024	6001	6036	6004	6004	6010	6001	6002
ITEM DESCRIPTION	REMOVING CONC (RIPRAP)	FLOWABLE BACKFILL	CONC STR REPAIR (VERTICAL & OVERHEAD)	CONC STR REPAIR (STANDARD)	RIPRAP (CONC)(CL B)(RR8&RR9)	RIPRAP (STONE PROTECTION)(18 IN)	CLEANING AND SEALING JOINTS (CL 7)	RETROFIT RAIL (TY SSTR)	RAISING EXIST STRUCT	CONCRETE CURB (SPECIAL)	CONC CRCK REPR(DISCRETE) (ROUT AND SEAL)	BRIDGE JOINT REPAIR (ARMOR)	BRIDGE JOINT REPLACEMENT (ARMOR)	INSTALL BRIDGE IDENTIFICATION NUMBERS	REML & DISPL DRIFTWOOD & DEBRIS
BRIDGE NO. - NBI NO.	SY	CY	SF	SF	CY	CY	LF	LF	LS	LF	LF	LF	LF	EA	LS
BRIDGE 6 - 18-057-0-2374-03-190		2		5		60									0.33
BRIDGE 7 - 18-057-0-2374-03-191		1				24									0.33
BRIDGE 12 - 18-057-0-2374-03-167			60				551	944.0				184		1	
BRIDGE 13 - 18-057-0-2374-03-166	6	1	78		1		482	944.0				170		1	
BRIDGE 14 - 18-057-0-2374-03-168	497	42	16	5	98										0.34
BRIDGE 19 - 18-057-0-2374-03-322		3	95				70			200.0					
BRIDGE 20 - 18-057-0-2374-03-323			105				198	330.0	1				12		
BRIDGE 21 - 18-057-0-2374-03-315			182				70						70		
BRIDGE 22 - 18-057-0-2374-03-316			52				140				35				
TOTAL	503	49	588	10	99	84	1511	2218.0	1	200.0	35	354	82	2	1

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
BRADLEY D. SHUEY
86490
LICENSED
PROFESSIONAL ENGINEER

04/13/2023

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

SUMMARY OF ESTIMATED QUANTITIES

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		80

ESTIMATED QUANTITIES

ITEM NO.	401	429	432	7000
DESCRIPTION CODE	6001	6009	6033	6002
ITEM DESCRIPTION	FLOWABLE BACKFILL	CONC STR REPAIR (STANDARD)	RIPRAP (STONE PROTECTION) (18 IN)	REML & DISPL DRIFTWOOD & DEBRIS
BRIDGE NO. - NBI NO.	CY	SF	CY	LS
BRIDGE 6 - 18-057-0-2374-03-190	2	5	60	0.33
TOTAL	2	5	60	0.33

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
BRADLEY D. SHUEY
86490
LICENSED
PROFESSIONAL ENGINEER

03/16/2023

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE
SUMMARY OF ESTIMATED QUANTITIES

BRIDGE 6 - 18-057-0-2374-03-190
IH 20 OVER DRAW

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		81

TABLE OF REPAIRS BRIDGE 06 (NBI # 18-057-0-2374-03-190) ~ IH 20 over DRAW

REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QUANTITY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
SB0601	0429 6009	CONC STR REPAIR (STANDARD)	SF	5	CULVERT NORTH END - REPAIR SPALLS AT CURB WALL	REFERENCE GENERAL SPALL REPAIR DETAILS
M0601	0401 6001	FLOWABLE BACKFILL	CY	2	CULVERT SOUTH END - PROVIDE FLOWABLE FILL AT CULVERT SLAB SCOUR HOLE AND UNDERMINING	SEE BRIDGE 6 RIPRAP LAYOUT SHEET FOR APPROXIMATE LOCATIONS, DIMENSIONS AND DETAILS
M0602	0432 6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	60	CULVERT SOUTH END - PROVIDE RIPRAP (STONE PROTECTION) 18 INCH AT CULVERT END	SEE SRR STANDARD AND BRIDGE 6 RIPRAP LAYOUT SHEET FOR APPROXIMATE LOCATIONS, DIMENSIONS AND DETAILS
M0603	7000 6002	REML & DISPL DRIFTWOOD & DEBRIS	LS	0.33	REMOVE DEBRIS AT BOTH ENDS OF CULVERT	

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
BRADLEY D. SHUEY
86490
LICENSED
PROFESSIONAL ENGINEER
03/16/2023

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

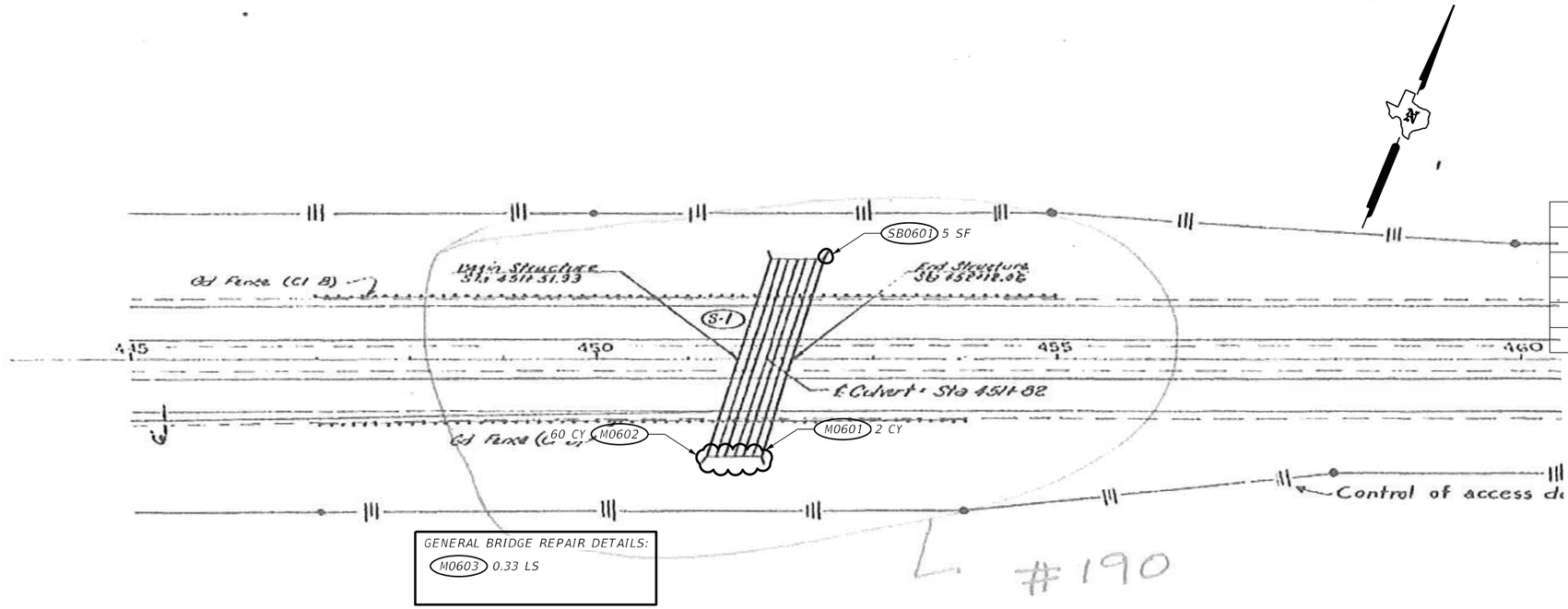
Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

TABLE OF REPAIRS

BRIDGE 6 - 18-057-0-2374-03-190
IH 20 OVER DRAW

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		82



REPAIR CALLOUT LEGEND:

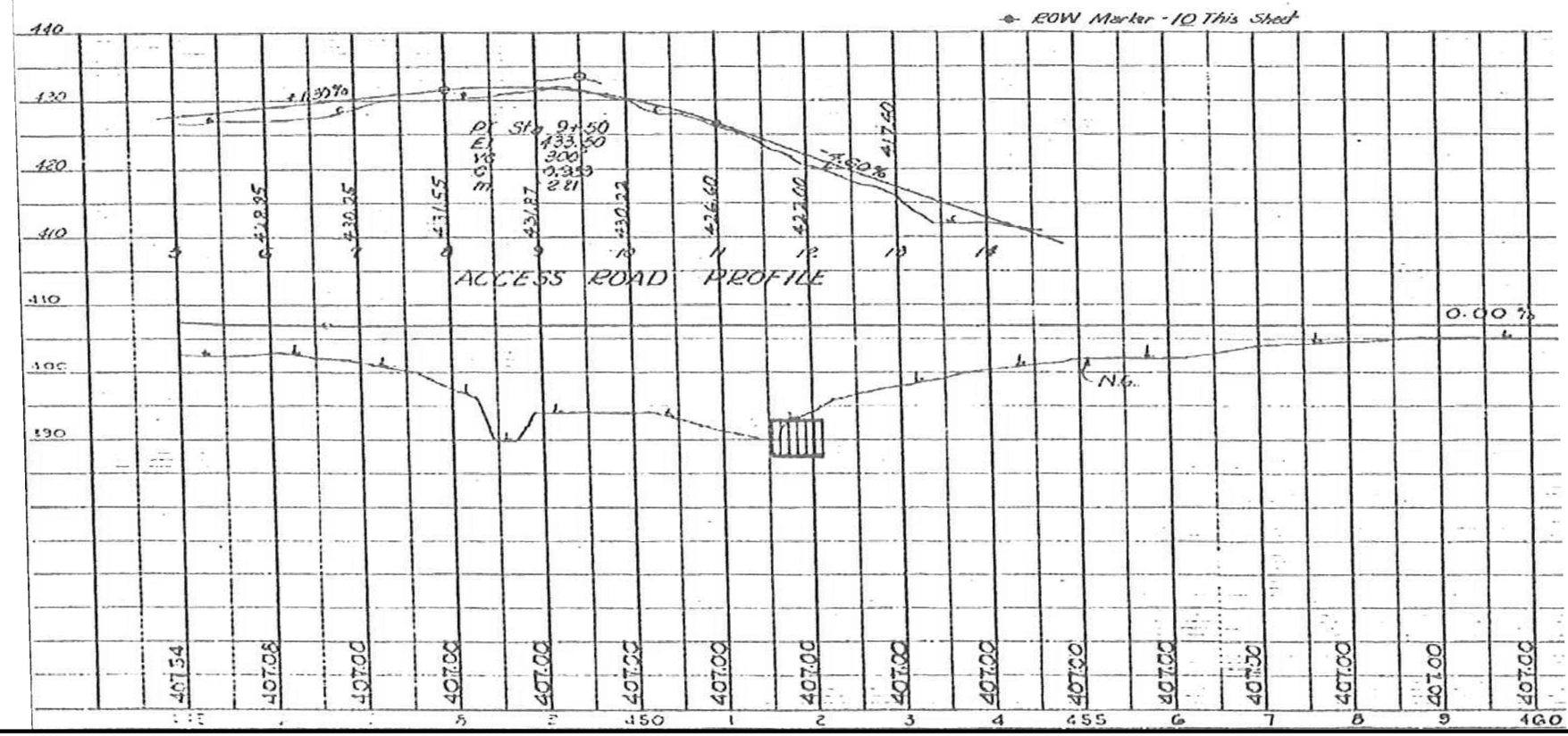
DVVXX YY ZZ

- DVVXX — REPAIR NUMBER – SEE "TABLE OF REPAIRS"
- YY — ESTIMATED REPAIR QUANTITY AT EACH LOCATION
- ZZ — UNIT OF MEASURE

SYMBOL	APPLICABLE REPAIR AREAS
D – #	DECK, JOINTS, OVERHANGS, APPROACH SLABS
R – #	RAILS, APPROACH MBGF
SP – #	SUPERSTRUCTURE ELEMENTS, BEARINGS
SB – #	SUBSTRUCTURE ELEMENTS
M – #	MISCELLANEOUS (RIPRAP, SHOULDER DRAINS, ETC)

GENERAL NOTES

1. LAYOUT, STATIONS, AND ELEVATIONS SHOWN ARE BASED ON AS-BUILT PLANS. COPIES OF AVAILABLE PORTIONS OF AS-BUILT PLANS MAY BE PROVIDED UPON REQUEST.
2. REPAIR LOCATIONS AND QUANTITIES ARE BASED ON CONDITION SURVEY DATED (06/2021). CURRENT CONDITIONS MAY VARY. FIELD VERIFY LOCATIONS AND EXTENT OF REPAIRS IN THE PRESENCE OF THE ENGINEER PRIOR TO ORDERING MATERIALS.
3. SEE TABLE OF REPAIRS SHEET FOR SPECIFIC DESCRIPTIONS, BID ITEMS, LOCATIONS AND REFERENCE DETAILS FOR THE REPAIRS BEING PERFORMED.



NO.	DATE	REVISION	APPROV.

BRADLEY D. SHUEY
86490
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS
03/16/2023

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

CULVERT LAYOUT

BRIDGE 6 - 18-057-0-2374-03-190
IH 20 OVER DRAW

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		83

REPAIR SB0601
NORTHEAST CORNER SPALL

REPAIR M0603
NORTH END OF CULVERT

NOTE:
PHOTOGRAPHS ARE PROVIDED FOR CONTRACTOR'S INFORMATION AND ARE INTENDED TO SHOW A GENERALIZED IDEA OF THE STRUCTURE'S CONDITIONS. EXTENT OF DAMAGE MAY VARY FROM WHAT IS SHOWN IN THE PHOTOS.

REPAIR M0603
SOUTH END OF CULVERT

REPAIR M0601/M0602
TOE SCOUR AT SOUTH END

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
BRADLEY D. SHUEY
86490
LICENSED PROFESSIONAL ENGINEER
03/16/2023

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

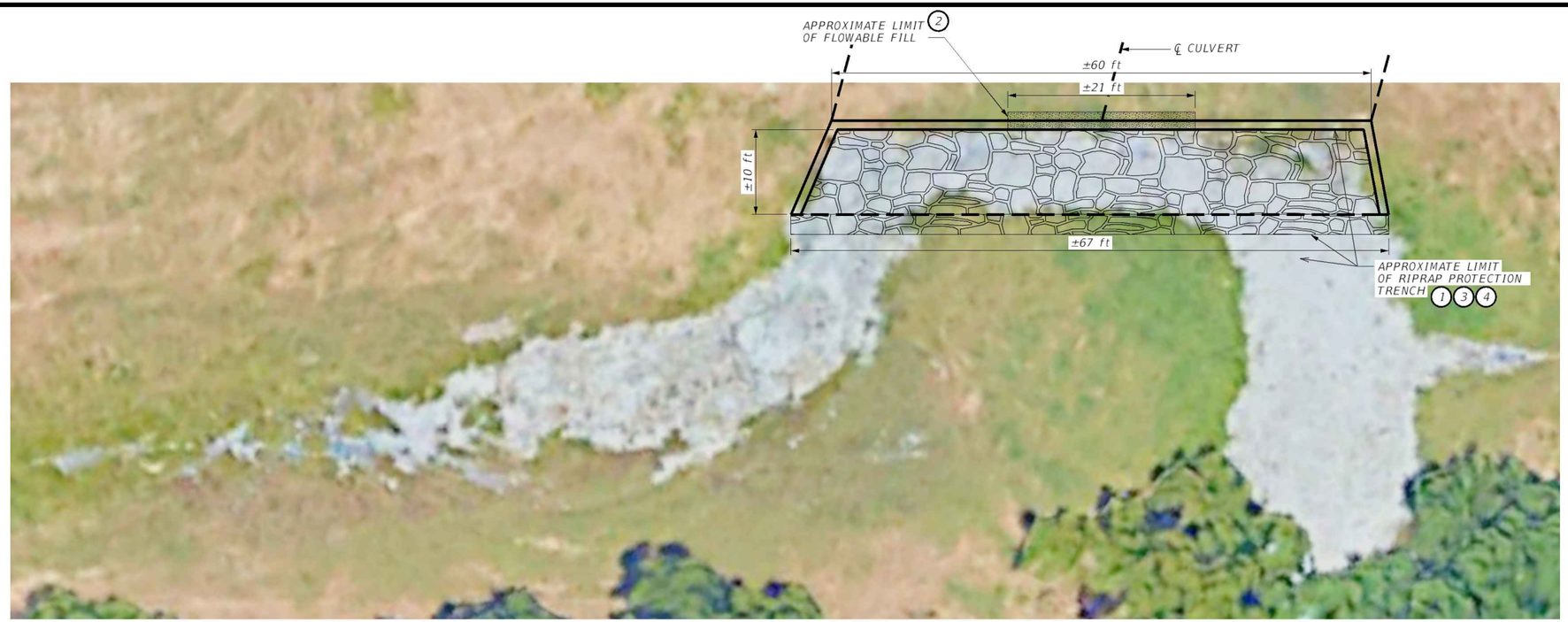
Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

PHOTO LOG

BRIDGE 6 - 18-057-0-2374-03-190
IH 20 OVER DRAW

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		84



PLAN - CULVERT SOUTH END RIPRAP (1)

GENERAL NOTES

1. CONTRACTOR TO FIELD VERIFY AND ADJUST EXTENTS OF ALL REPAIRS PRIOR TO CONSTRUCTION. CONFIRM CHANGES TO SCOPE OF REPAIRS WITH FIELD ENGINEER.
2. SEE TABLE OF REPAIRS SHEET FOR SPECIFIC DESCRIPTIONS, BID ITEMS, LOCATIONS, AND REFERENCE DETAILS FOR THE REPAIRS BEING PERFORMED.

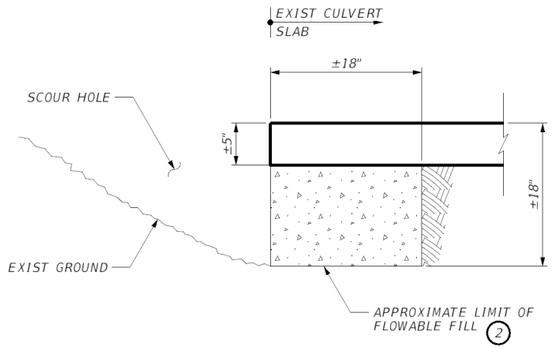
(1) DEWATER WORK AREA. DEWATERING THE WORK AREA IS SUBSIDIARY TO ITEM 432.

(2) PLACE FLOWABLE FILL TO FILL VOID UNDER EXISTING CULVERT SLAB PER ITEM 401.

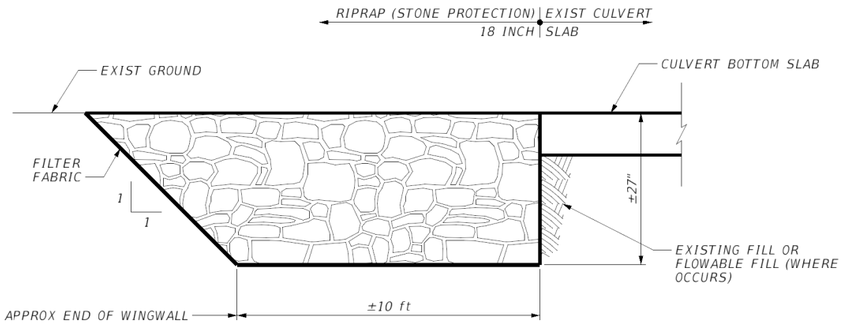
(3) INSTALL RIPRAP (STONE PROTECTION) 18 INCH PER SRR STANDARD.

(4) ALL EXCAVATION REQUIRED TO INSTALL STONE RIPRAP IS SUBSIDIARY TO ITEM 432.

CHANNEL GRADING AND TREE REMOVAL REQUIRED TO INSTALL THE RIPRAP IS SUBSIDIARY TO THE RIPRAP PAY ITEMS.



SECTION - FLOWABLE FILL AT CULVERT SLAB



SECTION - RIPRAP PROTECTION TRENCH (3) (4)

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
BRADLEY D. SHUEY
86490
LICENSED
PROFESSIONAL ENGINEER
03/16/2023

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

RIPRAP LAYOUT

BRIDGE 6 - 18-057-0-2374-03-190
IH 20 OVER DRAW

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		85

ESTIMATED QUANTITIES

ITEM NO.	401	432	7000
DESCRIPTION CODE	6001	6033	6002
ITEM DESCRIPTION / BRIDGE NO. – NBI NO.	FLOWABLE BACKFILL	RIPRAP (STONE PROTECTION) (18 IN)	REML & DISPL DRIFTWOOD & DEBRIS
	CY	CY	LS
BRIDGE 7 - 18-057-0-2374-03-191	1	24	0.33
TOTAL	1.0	24	0.33

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
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Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE
SUMMARY OF ESTIMATED QUANTITIES

BRIDGE 7 - 18-057-0-2374-03-191
IH 20 OVER DRAW

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		86

TABLE OF REPAIRS BRIDGE 07 (NBI # 18-057-0-2374-03-191) ~ IH 20 over DRAW

REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QUANTITY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
M0701	0401 6001	FLOWABLE BACKFILL	CY	1	CULVERT SOUTH END - PROVIDE FLOWABLE FILL AT CULVERT APRON SLAB SCOUR HOLE AND UNDERMINING	SEE BRIDGE 7 RIPRAP LAYOUT SHEET FOR APPROXIMATE LOCATIONS, DIMENSIONS AND DETAILS
M0702	0432 6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	24	CULVERT SOUTH END - PROVIDE RIPRAP (STONE PROTECTION) 18 INCH AT CULVERT APPROACH SLAB	SEE SRR STANDARD AND BRIDGE 7 RIPRAP LAYOUT SHEET FOR APPROXIMATE LOCATIONS, DIMENSIONS AND DETAILS
M0703	7000 6002	REML & DISPL DRIFTWOOD & DEBRIS	LS	0.33	REMOVE DEBRIS AT BOTH ENDS OF CULVERT	

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation

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BRIDGE MAINTENANCE

TABLE OF REPAIRS

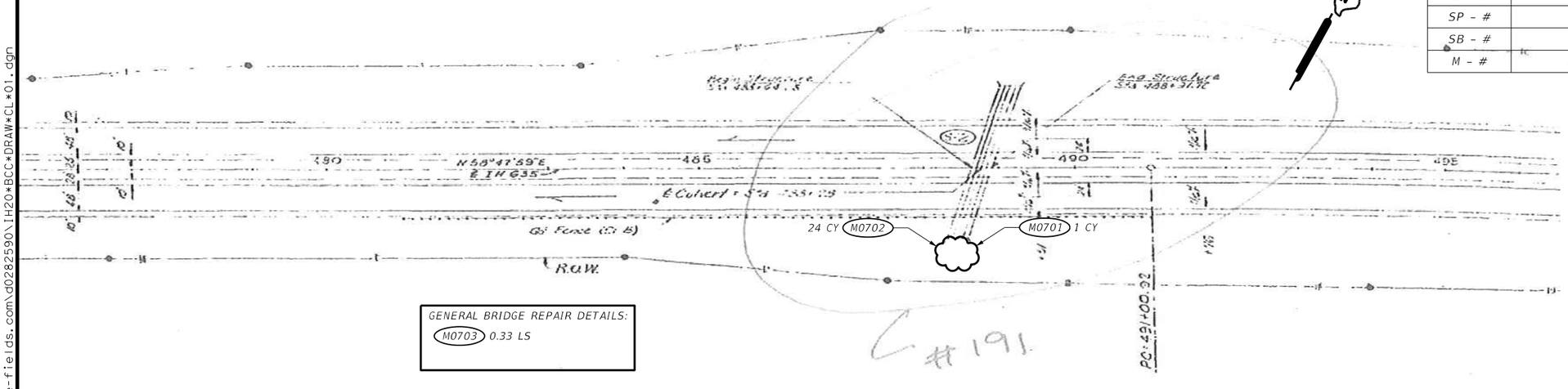
BRIDGE 7 - 18-057-0-2374-03-191
IH 20 OVER DRAW

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		87

REPAIR CALLOUT LEGEND:

DVVXX YY ZZ
- DVVXX — REPAIR NUMBER – SEE "TABLE OF REPAIRS"
- YY — ESTIMATED REPAIR QUANTITY AT EACH LOCATION
- ZZ — UNIT OF MEASURE

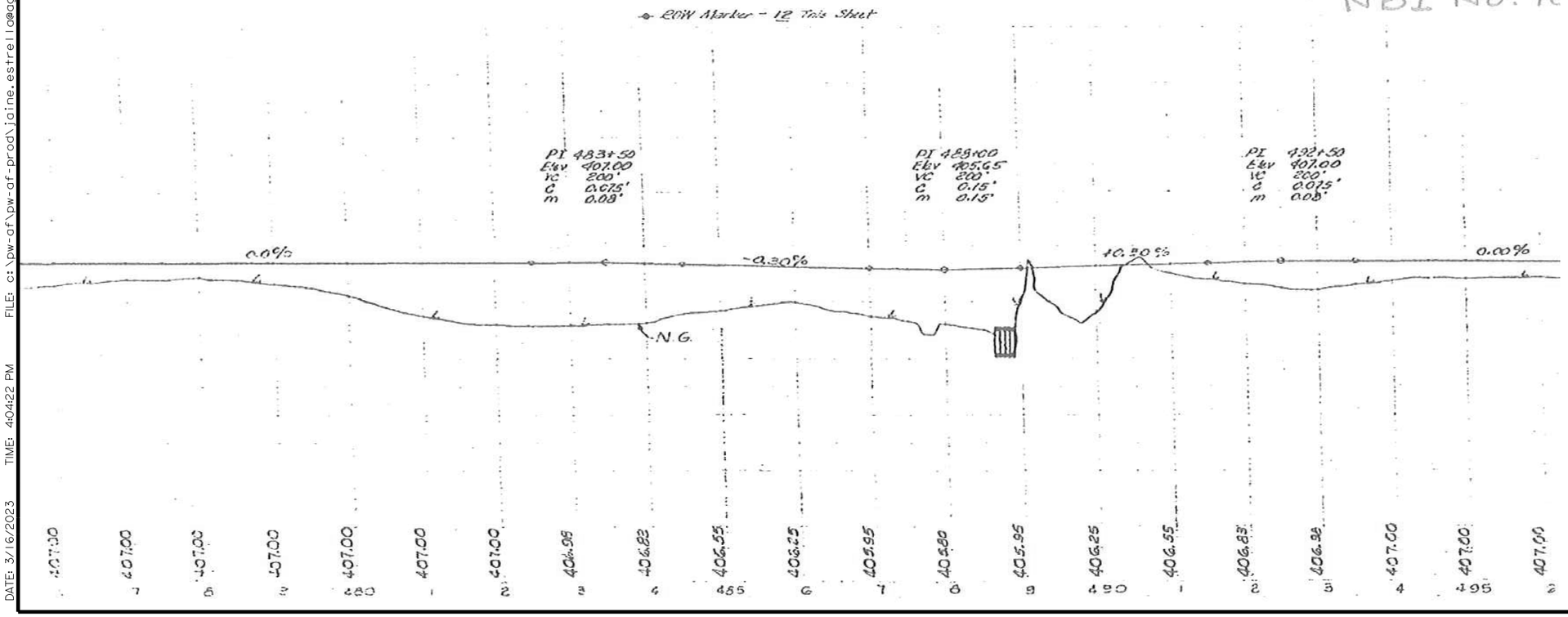
SYMBOL	APPLICABLE REPAIR AREAS
D – #	DECK, JOINTS, OVERHANGS, APPROACH SLABS
R – #	RAILS, APPROACH MBGF
SP – #	SUPERSTRUCTURE ELEMENTS, BEARINGS
SB – #	SUBSTRUCTURE ELEMENTS
M – #	MISCELLANEOUS (RIPRAP, SHOULDER DRAINS, ETC)



GENERAL BRIDGE REPAIR DETAILS:

M0703 0.33 LS

NBI NO. 18



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Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

CULVERT LAYOUT

BRIDGE 7 - 18-057-0-2374-03-191
IH 20 OVER DRAW

GENERAL NOTES

1. LAYOUT, STATIONS, AND ELEVATIONS SHOWN ARE BASED ON AS-BUILT PLANS. COPIES OF AVAILABLE PORTIONS OF AS-BUILT PLANS MAY BE PROVIDED UPON REQUEST.
2. REPAIR LOCATIONS AND QUANTITIES ARE BASED ON CONDITION SURVEY DATED (06/2021). CURRENT CONDITIONS MAY VARY. FIELD VERIFY LOCATIONS AND EXTENT OF REPAIRS IN THE PRESENCE OF THE ENGINEER PRIOR TO ORDERING MATERIALS.
3. SEE TABLE OF REPAIRS SHEET FOR SPECIFIC DESCRIPTIONS, BID ITEMS, LOCATIONS AND REFERENCE DETAILS FOR THE REPAIRS BEING PERFORMED.

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		88

REPAIR M0701/M0702
SOUTH END APRON SLAB SCOUR

REPAIR M0702
SOUTH END APRON SRR

NOTE:
PHOTOGRAPHS ARE PROVIDED FOR CONTRACTOR'S INFORMATION AND ARE INTENDED TO SHOW A GENERALIZED IDEA OF THE STRUCTURE'S CONDITIONS. EXTENT OF DAMAGE MAY VARY FROM WHAT IS SHOWN IN THE PHOTOS.

REPAIR M0703
SOUTH END APRON DEBRIS

REPAIR M0703
NORTH END DEBRIS AND SILT

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
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PROFESSIONAL ENGINEER
03/16/2023

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TBPE FIRM REGISTRATION # 739

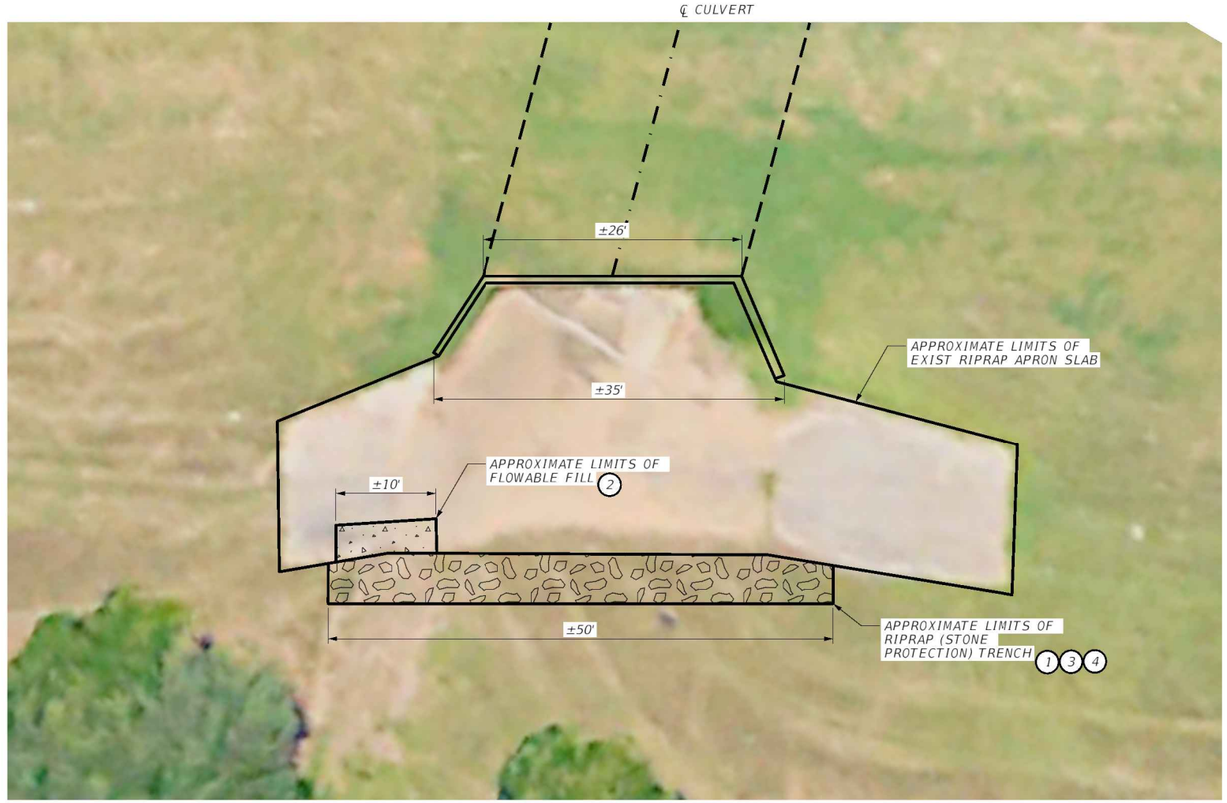
Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

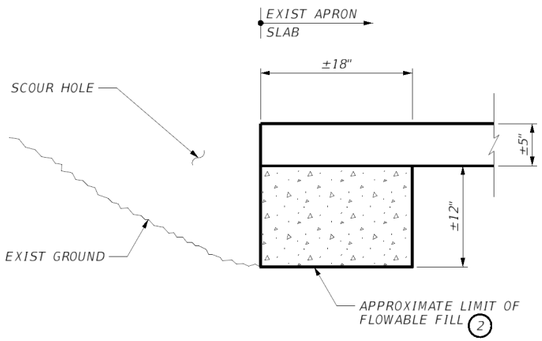
PHOTO LOG

BRIDGE 7 - 18-057-0-2374-03-191
IH 20 OVER DRAW

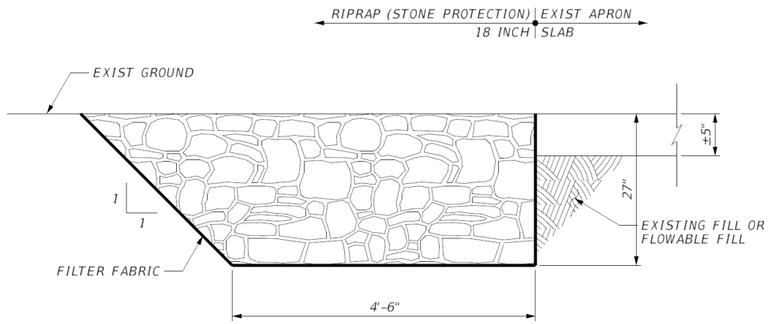
FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		89



PLAN - CULVERT SOUTH END RIPRAP (1)



SECTION - FLOWABLE FILL AT APRON SLAB



SECTION - RIPRAP PROTECTION TRENCH (3)(4)

GENERAL NOTES

1. CONTRACTOR TO FIELD VERIFY AND ADJUST EXTENTS OF ALL REPAIRS PRIOR TO CONSTRUCTION. CONFIRM CHANGES TO SCOPE OF REPAIRS WITH FIELD ENGINEER.
2. SEE TABLE OF REPAIRS SHEET FOR SPECIFIC DESCRIPTIONS, BID ITEMS, LOCATIONS, AND REFERENCE DETAILS FOR THE REPAIRS BEING PERFORMED.

(1) DEWATER WORK AREA. DEWATERING THE WORK AREA IS SUBSIDIARY TO ITEM 432.

(2) PLACE FLOWABLE FILL TO FILL VOID UNDER EXISTING APRON SLAB PER ITEM 401.

(3) INSTALL RIPRAP (STONE PROTECTION) 18 INCH PER SRR STANDARD.

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CHANNEL GRADING AND TREE REMOVAL REQUIRED TO INSTALL THE RIPRAP IS SUBSIDIARY TO THE RIPRAP PAY ITEMS.

NO.	DATE	REVISION	APPROV.

BRADLEY D. SHUEY
86490
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PROFESSIONAL ENGINEER
STATE OF TEXAS
03/16/2023

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

RIPRAP LAYOUT

BRIDGE 7 - 18-057-0-2374-03-191
IH 20 OVER DRAW

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		90

ESTIMATED QUANTITIES

ITEM NO.	429	438	451	785	4171
DESCRIPTION CODE	6007	6008	6024	6004	6001
ITEM DESCRIPTION	CONC STR REPAIR (VERTICAL & OVERHEAD)	CLEANING AND SEALING JOINTS (CL 7)	RETROFIT RAIL (TY SSTR)	BRIDGE JOINT REPAIR (ARMOR)	INSTALL BRIDGE IDENTIFICATION NUMBERS
BRIDGE NO. - NBI NO.	SF	LF	LF	LF	EA
BRIDGE 12 - 18-057-0-2374-03-167	60	551	944	184	1

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
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Houston, Texas 77042
TBPE REGISTRATION NO. F-18368

Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

SUMMARY OF ESTIMATED QUANTITIES
BRIDGE 12 - 18-057-0-2374-03-167
IH 20 EB AT PRAIRIE CREEK

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		91

TABLE OF REPAIRS (NBI # 18-057-0-2374-03-167)						
REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QUANTITY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
D1201	0438 6008	CLEANING AND SEALING JOINTS (CL 7)	LF	551	Clean and reseal armor joints at bents 2 through 7	See Bridge Joint Repair Details Sheet, Repair Type A
D1202	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	2	Repair north side span 1 deck soffit spall	See General Spall Repair Details Sheet, Intermediate Spall Detail
D1203	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	1	Repair north side span 2 deck soffit spall	See General Spall Repair Details Sheet, Intermediate Spall Detail
D1204	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	1	Repair north side span 3 deck soffit spall	See General Spall Repair Details Sheet, Intermediate Spall Detail
D1205	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	6	Repair deck soffit and edge spall at bent 3 on South side	See General Spall Repair Details Sheet, Intermediate Spall Detail
D1206	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	3	Repair deck soffit and edge spall at abutment 8 on North side	See General Spall Repair Details Sheet, Intermediate Spall Detail
D1207	0785 6004	BRIDGE JOINT REPAIR (ARMOR)	LF	184	Repair East and West Approach Slab Cracking	See Approach Slab Joint Repair Details Sheet
R1201	0451 6024	RETROFIT RAIL (TY SSTR)	LF	944	Replace all existing rail with SSTR to meet MASH TL4	See SSTR Rail Retrofit Guide Detail Sheet
SP1201	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	32	Replace Missing Grout Caps	See General Spall Repair Details Sheet, Minor Spall Detail
SP1202	4171 6001	INSTALL BRIDGE IDENTIFICATION NUMBERS	EA	1	Stencil structure number on to bridge girder	Complete work per TxDOT item Special Specification 4171
SB1201	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	1	Repair minor spall to bent 7 column 2	See General Spall Repair Details Sheet, Minor Spall Detail
SB1202	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	7	Repair major spalling to Southern corner of abutment 8 backwall	See General Spall Repair Details Sheet, Major Spall Detail
SB1203	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	7	Repair minor cracking to Northern corner of abutment 8 backwall, remove diaphragm forms which were left attached to bridge, and remove silt accumulated on backwall cap	See General Spall Repair Details Sheet, Minor Spall Detail

NO.	DATE	REVISION	APPROV.

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Houston, Texas 77042
TBPE REGISTRATION NO. F-18368

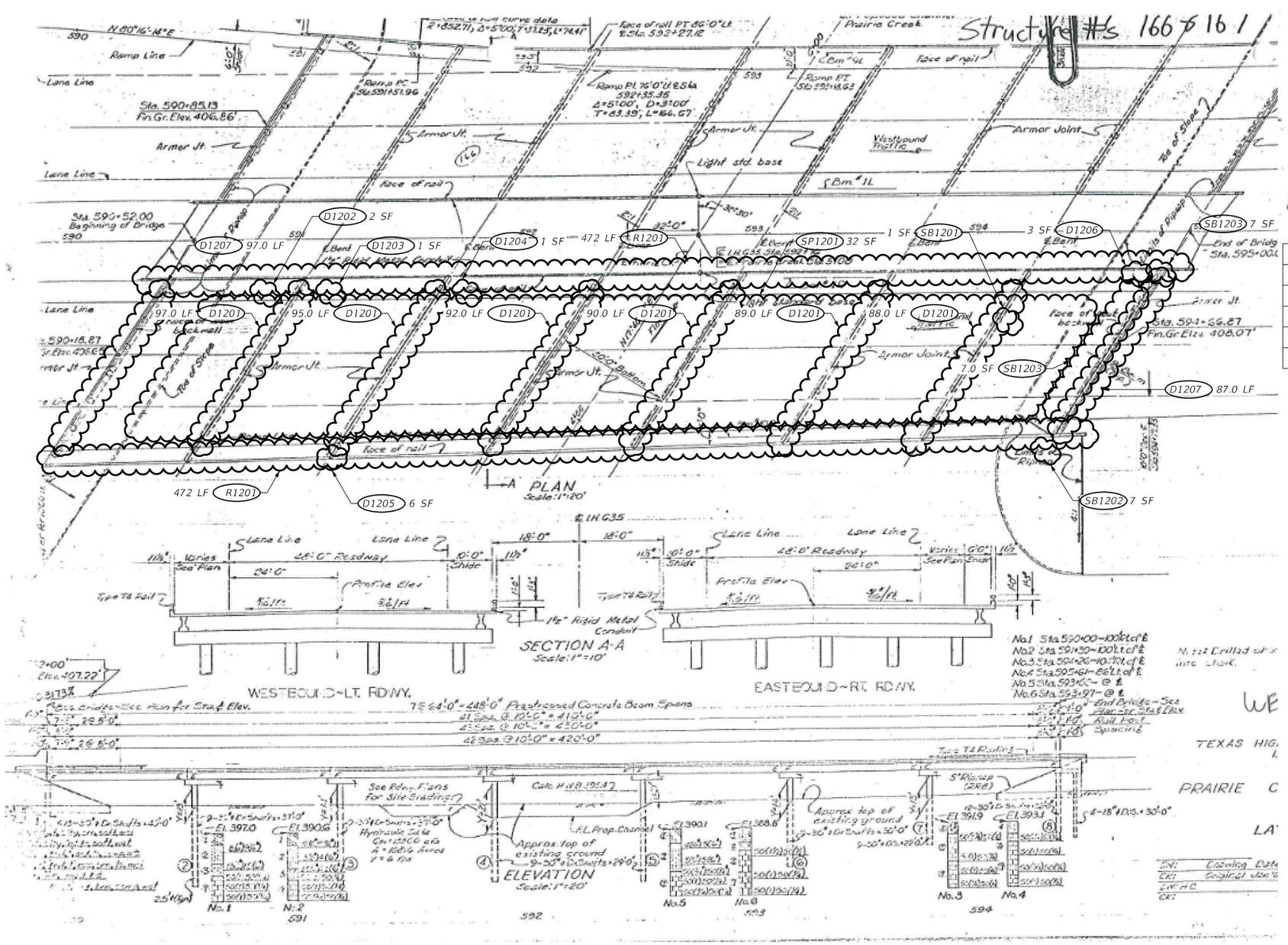
Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE
TABLE OF REPAIRS

BRIDGE 12 - 18-057-0-2374-03-167
IH 20 EB AT PRAIRIE CREEK

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		92



REPAIR CALLOUT LEGEND:

DVVXX YY ZZ

- UNIT OF MEASURE
- ESTIMATED REPAIR QUANTITY AT EACH LOCATION
- REPAIR NUMBER - SEE "TABLE OF REPAIRS"

SYMBOL	APPLICABLE REPAIR AREAS
D - #	DECK, JOINTS, OVERHANGS, APPROACH SLABS
R - #	RAILS, APPROACH MBGF
SP - #	SUPERSTRUCTURE ELEMENTS, BEARINGS
SB - #	SUBSTRUCTURE ELEMENTS
M - #	MISCELLANEOUS (RIPRAP, SHOULDER DRAINS, ETC)

GENERAL NOTES

1. LAYOUT, STATIONS, AND ELEVATIONS SHOWN ARE BASED ON AS-BUILT PLANS. COPIES OF AVAILABLE PORTIONS OF AS-BUILT PLANS MAY BE PROVIDED UPON REQUEST.
2. REPAIR LOCATIONS AND QUANTITIES ARE BASED ON CONDITION SURVEY DATED (06/2021). CURRENT CONDITIONS MAY VARY. FIELD VERIFY LOCATIONS AND EXTENT OF REPAIRS IN THE PRESENCE OF THE ENGINEER PRIOR TO ORDERING MATERIALS.
3. SEE TABLE OF REPAIRS SHEET FOR SPECIFIC DESCRIPTIONS, BID ITEMS, LOCATIONS AND REFERENCE DETAILS FOR THE REPAIRS BEING PERFORMED.

NO.	DATE	REVISION	APPROV.

IFTEKHAR AHMAD
140517
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Dallas District Bridge

BRIDGE MAINTENANCE
BRIDGE LAYOUT

BRIDGE 12 - 18-057-0-2374-03-167
IH 20 EB AT PRAIRIE CREEK

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		93

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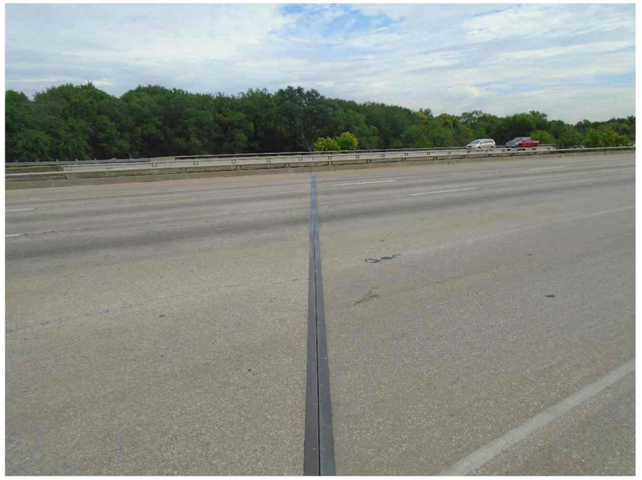
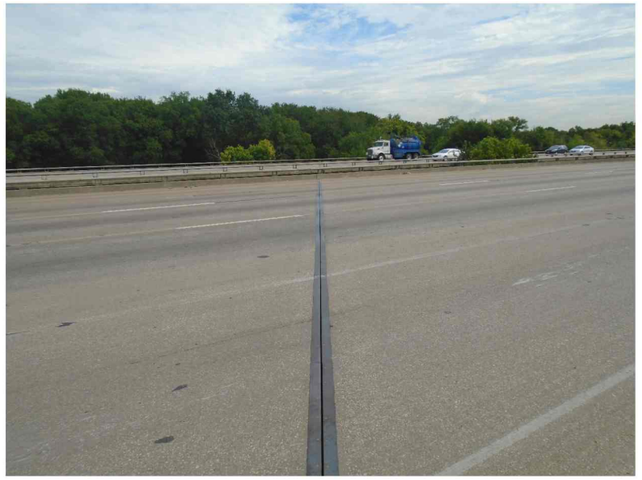
DATE: 3/28/2023



REPAIR D1201

BENT 2 EXPANSION JOINT LOOKING NORTH



REPAIR D1201

BENT 3 EXPANSION JOINT LOOKING NORTH

REPAIR D1201

BENT 4 EXPANSION JOINT LOOKING NORTH

NOTE:
PHOTOGRAPHS ARE PROVIDED FOR CONTRACTOR'S INFORMATION AND ARE INTENDED TO SHOW A GENERALIZED IDEA OF THE STRUCTURE'S CONDITIONS. EXTENT OF DAMAGE MAY VARY FROM WHAT IS SHOWN IN THE PHOTOS.

REPAIR D1201

BENT 5 EXPANSION JOINT LOOKING NORTH

REPAIR D1201

BENT 6 EXPANSION JOINT LOOKING NORTH

NO.	DATE	REVISION	APPROV.

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Dallas District Bridge

BRIDGE MAINTENANCE

PHOTO LOG: DECK

BRIDGE 12 - 18-057-0-2374-03-167
IH 20 EB AT PRAIRIE CREEK

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		94

REPAIR D1201

BENT 7 EXPANSION JOINT LOOKING NORTH

REPAIR D1202

SPAN 1 DECK SOFFIT NORTH SIDE FROM BELOW

REPAIR D1203

SPAN 2 DECK SOFFIT NORTH SIDE FROM BELOW (REPAIR D0104 SIMILAR)

NOTE:
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REPAIR D1205

BENT 3 SOUTH SIDE LOOKING NORTH

REPAIR D1206

ABUTMENT 8-DECK INTERFACE NORTH SIDE LOOKING SOUTH

NO.	DATE	REVISION	APPROV.

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03/28/2023

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BRIDGE MAINTENANCE

PHOTO LOG: DECK

BRIDGE 12 - 18-057-0-2374-03-167
IH 20 EB AT PRAIRIE CREEK

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		95

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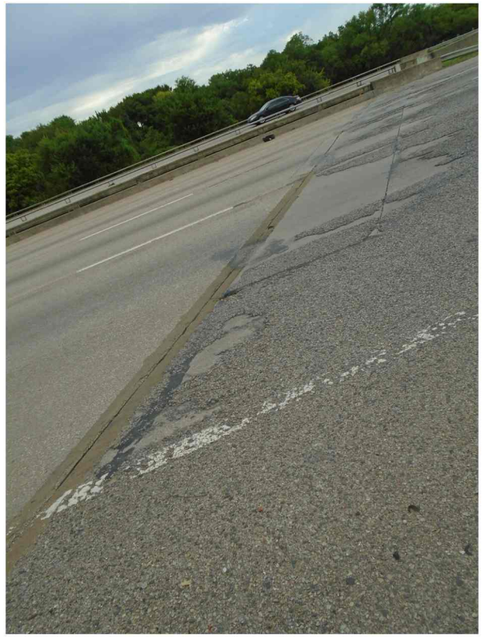
REPAIR D1207
WEST APPROACH SLAB LOOKING SOUTH



REPAIR D1207
EAST APPROACH SLAB LOOKING NORTH

REPAIR R1201
TYPICAL STRUCTURAL RAIL LOOKING SOUTH

NOTE:
PHOTOGRAPHS ARE PROVIDED FOR CONTRACTOR'S INFORMATION AND ARE INTENDED TO SHOW A GENERALIZED IDEA OF THE STRUCTURE'S CONDITIONS. EXTENT OF DAMAGE MAY VARY FROM WHAT IS SHOWN IN THE PHOTOS.

REPAIR SP1201
TYPICAL BEAM END LOOKING EAST

NO.	DATE	REVISION	APPROV.

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140517
LICENSED
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Engineers & Innovators, LLC
11111 Willcrest Green Dr. Suite #410
Houston, Texas 77042
TBPE REGISTRATION NO. F-18368

Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE
PHOTO LOG: DECK, RAIL & SUPERSTRUCTURE
BRIDGE 12 - 18-057-0-2374-03-167
IH 20 EB AT PRAIRIE CREEK

SHEET 3 OF 4

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
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REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		96

REPAIR SB1201

BENT 7 COLUMN 2 LOOKING WEST

REPAIR SB1202

SOUTH END OF ABUT 8 BACKWALL LOOKING EAST

REPAIR SB1203

NORTH END OF ABUT 8 BACKWALL LOOKING EAST

NOTE:
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REPAIR SB1203

ABUTMENT 8 BACKWALL LOOKING EAST
(SUBSIDIARY TO ABUTMENT BACKWALL REPAIR)

REPAIR SB1203

ABUTMENT 8 BACKWALL LOOKING EAST
(SUBSIDIARY TO ABUTMENT BACKWALL REPAIR)

NO.	DATE	REVISION	APPROV.

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IFTEKHAR AHMAD
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LICENSED
PROFESSIONAL ENGINEER

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infraTECH
Engineers & Innovators, LLC
11111 Willcrest Green Dr. Suite #410
Houston, Texas 77042
TBPE REGISTRATION NO. F-18368

Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE
PHOTO LOG: SUBSTRUCTURE

BRIDGE 12 - 18-057-0-2374-03-167
IH 20 EB AT PRAIRIE CREEK

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL

REVISIONS

CONT	SECT	JOB	HIGHWAY
2374	03	098	IH 20

DIST	COUNTY	SHEET NO.
DAL	DALLAS	97

ESTIMATED QUANTITIES

ITEM NO.	104	401	429	432	438	451	785	4171
DESCRIPTION CODE	6009	6001	6007	6008	6008	6024	6004	6001
ITEM DESCRIPTION	REMOVING CONC (RIPRAP)	FLOWABLE BACKFILL	CONC STR REPAIR (VERTICAL & OVERHEAD)	RIPRAP (CONC) (CLB)(RR8&RR9)	CLEANING AND SEALING JOINTS (CL 7)	RETROFIT RAIL (TY SSTR)	BRIDGE JOINT REPAIR (ARMOR)	INSTALL BRIDGE IDENTIFICATION NUMBERS
BRIDGE NO. - NBI NO.	SY	CY	SF	CY	LF	LF	LF	EA
BRIDGE 13 - 18-057-0-2374-03-166	6	2	78	2	482	944	170	1

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
IFTEKHAR AHMAD
140517
LICENSED
PROFESSIONAL ENGINEER

03/28/2023

infraTECH
Engineers & Innovators, LLC
11111 Willcrest Green Dr. Suite #410
Houston, Texas 77042
TBPE REGISTRATION NO. F-18368

Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

SUMMARY OF ESTIMATED QUANTITIES

BRIDGE 13 - 18-057-0-2374-03-166
IH 20 WB AT PRAIRIE CREEK

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		99

TABLE OF REPAIRS (NBI # 18-057-0-2374-03-166)						
REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QUANTITY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
D1301	0438 6008	CLEANING AND SEALING JOINTS (CL 7)	LF	482	Clean and reseal armor joints at bents 2 through 7.	See Bridge Joint Repair Details Sheet, Repair Type A
D1302	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	4	Repair moderate to severe cracking and spalling at the begin end (Southwest corner) of span 1 deck	See General Spall Repair Details Sheet, Major Spall Detail
D1303	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	4	Repair moderate to severe soffit spalling at South side of the span 1 deck	See General Spall Repair Details Sheet, Major Spall Detail
D1304	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	4	Repair moderate to severe cracking and spalling at the bent 3 end (Southwest corner) of span 3 deck	See General Spall Repair Details Sheet, Major Spall Detail
D1305	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	4	Repair moderate to severe cracking and spalling at the bent 7 end (Southwest corner) of span 7 deck	See General Spall Repair Details Sheet, Major Spall Detail
D1306	0785 6004	BRIDGE JOINT REPAIR (ARMOR)	LF	170	Repair cracking at abutment 1 and abutment 8 approach slabs	See Approach Slab Joint Repair Details Sheet
R1301	0451 6024	RETROFIT RAIL (TY SSTR)	LF	944	Replace all existing rail with SSTR to meet MASH TL4	See SSTR Rail Retrofit Guide Detail Sheet
SP1301	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	21	Repair damaged prestressed concrete girder grout caps	See General Spall Repair Details Sheet, Minor Spall Detail
SP1302	4171 6001	INSTALL BRIDGE IDENTIFICATION NUMBERS	EA	1	Stencil structure number on to bridge girder.	Complete work per TxDOT Item Special Specification 4171
SB1301	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	7	Repair the spalling on the abutment 1 North end.	See Abutment Backwall Repair Detail
SB1302	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	7	Repair the spalling on the abutment 8 North end.	See Abutment Backwall Repair Detail
SB1303	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	7	Repair the spalling on the abutment 8 South end.	See General Spall Repair Details Sheet, Intermediate Spall Detail
SB1304	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	9	Repair Bent 3 Bay 4 diaphragm spall.	See General Spall Repair Details Sheet, Intermediate Spall Detail
SB1305	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	10.5	Repair Bent 3 Bay 5 diaphragm spall.	See General Spall Repair Details Sheet, Intermediate Spall Detail
M1301	0104 6009	REMOVING CONC (RIPRAP)	SY	6	Repair damage to abutment 8 south corner riprap. Remove damaged portion of existing riprap (RR8) (5" VIF).	See Bridge 13 Layout Sheet for approximate locations, dimensions, and details.
M1302	0432 6008	RIPRAP (CONC)(CLB)(RR8&RR9)	CY	1	Repair damage to abutment 8 south corner riprap. Repair damaged riprap with class B concrete per CRR standard.	See Abutment Riprap Patch Repair Details
M1303	0401 6001	FLOWABLE BACKFILL	CY	1	Repair damage to abutment 8 south corner riprap. Fill in settled area below riprap.	Install per Item 401 and Abutment Riprap Patch Repair Details

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
IFTEKHAR AHMAD
140517
LICENSED
PROFESSIONAL ENGINEER

04/05/2023

infraTECH
Engineers & Innovators, LLC
11111 Willcrest Green Dr. Suite #410
Houston, Texas 77042
TBPE REGISTRATION NO. F-18368

Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

TABLE OF REPAIRS

BRIDGE 13 - 18-057-0-2374-03-166
IH 20 WB AT PRAIRIE CREEK

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		100

USER: USER

FILE: C:\PW-AF\PW-AF-PROD\DYLAN KENNEDY\D0266511\IH20_BRG_WB_166_BL_01.DGN

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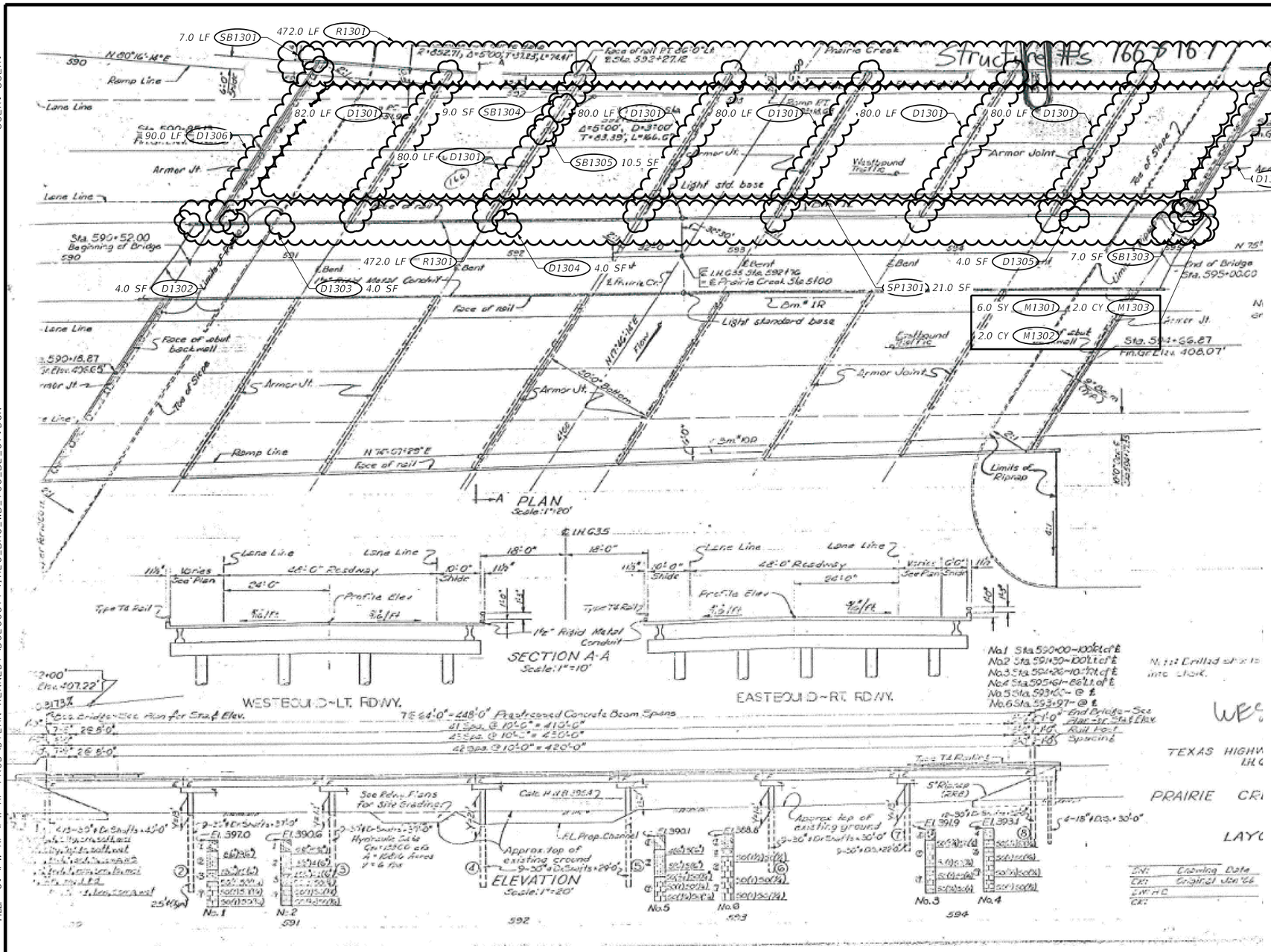

REPAIR CALLOUT LEGEND:

DVVXX YY ZZ

- UNIT OF MEASURE
- ESTIMATED REPAIR QUANTITY AT EACH LOCATION
- REPAIR NUMBER - SEE "TABLE OF REPAIRS"

SYMBOL	APPLICABLE REPAIR AREAS
D - #	DECK, JOINTS, OVERHANGS, APPROACH SLABS
R - #	RAILS, APPROACH MBGF
SP - #	SUPERSTRUCTURE ELEMENTS, BEARINGS
SB - #	SUBSTRUCTURE ELEMENTS
M - #	MISCELLANEOUS (RIPRAP, SHOULDER DRAINS, ETC)

GENERAL NOTES

1. LAYOUT, STATIONS, AND ELEVATIONS SHOWN ARE BASED ON AS-BUILT PLANS. COPIES OF AVAILABLE PORTIONS OF AS-BUILT PLANS MAY BE PROVIDED UPON REQUEST.
2. REPAIR LOCATIONS AND QUANTITIES ARE BASED ON CONDITION SURVEY DATED (06/2021). CURRENT CONDITIONS MAY VARY. FIELD VERIFY LOCATIONS AND EXTENT OF REPAIRS IN THE PRESENCE OF THE ENGINEER PRIOR TO ORDERING MATERIALS.
3. SEE TABLE OF REPAIRS SHEET FOR SPECIFIC DESCRIPTIONS, BID ITEMS, LOCATIONS AND REFERENCE DETAILS FOR THE REPAIRS BEING PERFORMED.

NO.	DATE	REVISION	APPROV.

IFTEKHAR AHMAD
140517

Iahmd
03/28/2023

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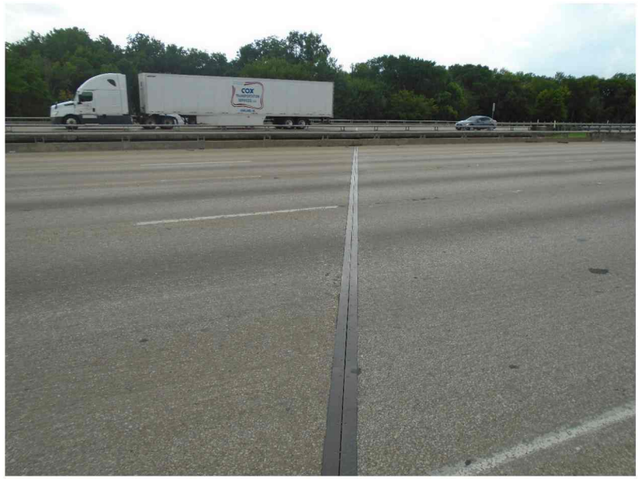
Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE
BRIDGE LAYOUT

BRIDGE 13 - 18-057-0-2374-03-166
IH 20 WB AT PRAIRIE CREEK

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL	
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY	
REVISIONS	2374	03	098	IH 20	
	DIST	COUNTY		SHEET NO.	
	DAL	DALLAS		101	

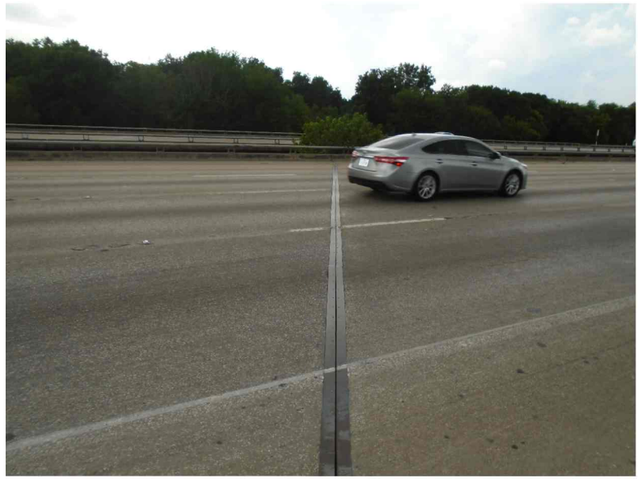


REPAIR D1301

BENT 2 EXPANSION JOINT LOOKING SOUTH

REPAIR D1301

BENT 3 EXPANSION JOINT LOOKING SOUTH



REPAIR D1301

BENT 4 EXPANSION JOINT LOOKING SOUTH

NOTE:
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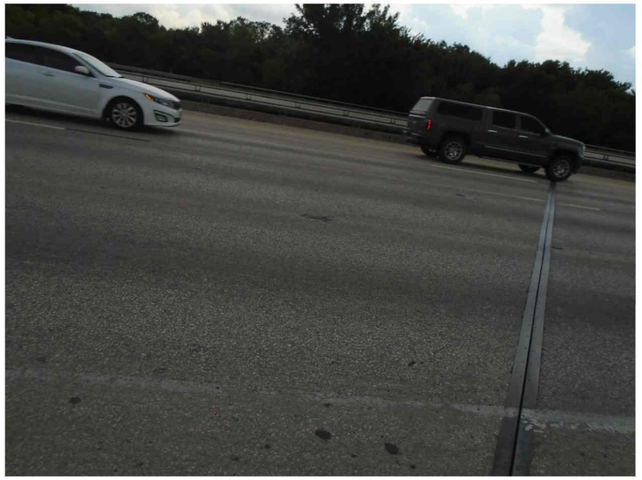
REPAIR D1301

BENT 5 EXPANSION JOINT LOOKING SOUTH



REPAIR D1301

BENT 6 EXPANSION JOINT LOOKING SOUTH

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
IFTEKHAR AHMAD
140517
LICENSED
PROFESSIONAL ENGINEER

03/28/2023

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Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

PHOTO LOG: DECK

BRIDGE 13 - 18-057-0-2374-03-166
IH 20 WB AT PRAIRIE CREEK

SHEET 1 OF 5

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		102

REPAIR D1301
BENT 7 EXPANSION JOINT LOOKING SOUTH

REPAIR D1302
ABUT 1 - DECK SPAN 1 INTERFACE LOOKING NORTH

REPAIR D1303
SOUTH SIDE OF SPAN 1 DECK SOFFIT

NOTE:
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REPAIR D1304
DECK INTERFACE AT BENT 3 LOOKING NORTH

REPAIR D1305
DECK INTERFACE AT BENT 7 LOOKING NORTH

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
IFTEKHAR AHMAD
140517
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PROFESSIONAL ENGINEER
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Texas Department of Transportation
Dallas District Bridge

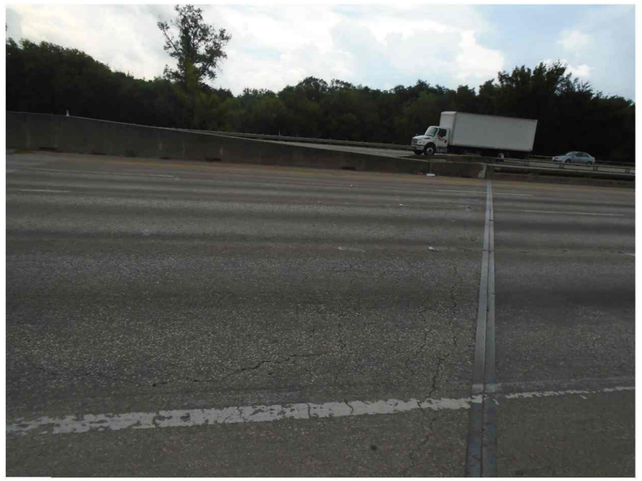
BRIDGE MAINTENANCE
PHOTO LOG: DECK

BRIDGE 13 - 18-057-0-2374-03-166
IH 20 WB AT PRAIRIE CREEK

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		103

REPAIR D1306

ABUT 1 APPROACH SLAB LOOKING SOUTH



REPAIR D1306

ABUT 8 APPROACH SLAB LOOKING SOUTH

REPAIR R1301

BRIDGE RAIL LOOKING SOUTH

NOTE:
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REPAIR SP1301

GIRDER END LOOKING EAST

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
IFTEKHAR AHMAD
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LICENSED
PROFESSIONAL ENGINEER

03/28/2023

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Engineers & Innovators, LLC
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Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

PHOTO LOG: DECK, RAIL, & SUPERSTRUCTURE
BRIDGE 13 - 18-057-0-2374-03-166
IH 20 WB AT PRAIRIE CREEK

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		104

SB1301

ABUT 1 BACKWALL NORTH END LOOKING WEST

SB1302

ABUT 1 BACKWALL NORTH END LOOKING SOUTH EAST

NOTE:
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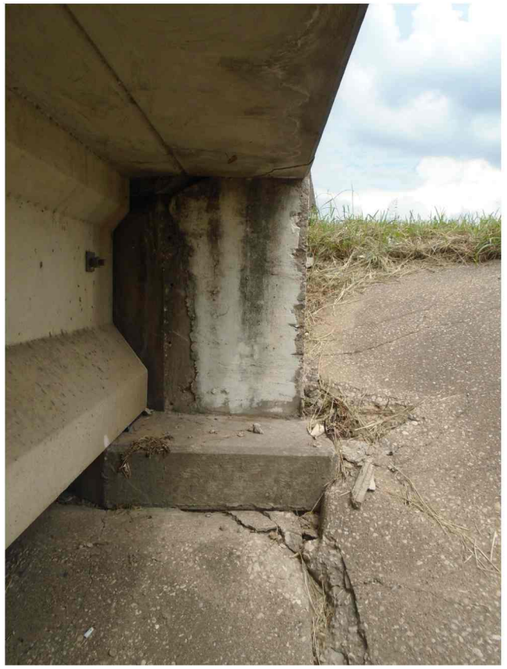
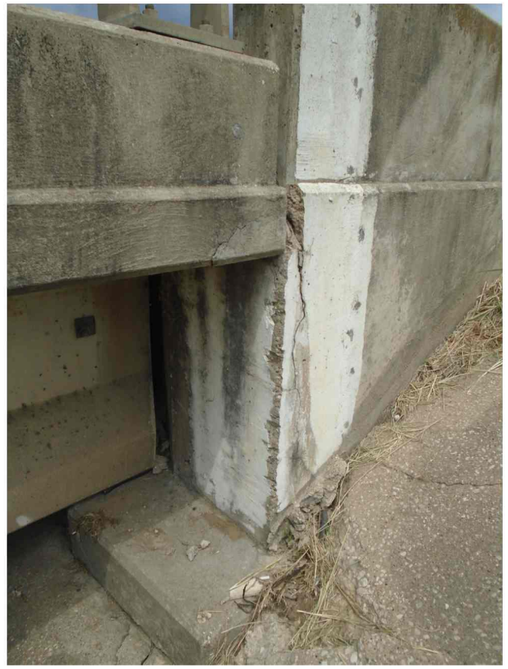


SB1303

ABUT 8 BACKWALL SOUTH END LOOKING EAST



SB1303

ABUT 8 BACKWALL SOUTH END LOOKING NORTH

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
IFTEKHAR AHMAD
140517
LICENSED
PROFESSIONAL ENGINEER

03/28/2023

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Engineers & Innovators, LLC
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Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

PHOTO LOG: SUBSTRUCTURE

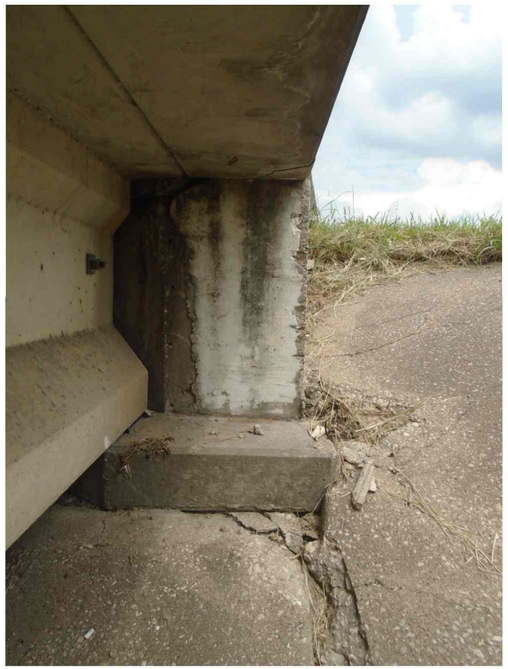
BRIDGE 13 - 18-057-0-2374-03-166
IH 20 WB AT PRAIRIE CREEK

SHEET 4 OF 5

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		105

SB1304
BENT 3 BAY 4 DIAPHRAGM LOOKING WEST

SB1305
BENT 3 BAY 5 DIAPHRAGM LOOKING WEST



M1301, M1302, & M1303
ABUT 8 RIPRAP SOUTH END LOOKING EAST

NOTE:
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NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
IFTEKHAR AHMAD
140517
LICENSED
PROFESSIONAL ENGINEER
03/28/2023

infraTECH
Engineers & Innovators, LLC
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Houston, Texas 77042
TBPE REGISTRATION NO. F-18368

Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE
PHOTO LOG: SUBSTRUCTURE & MISCELLANEOUS
BRIDGE 13 - 18-057-0-2374-03-166
IH 20 WB AT PRAIRIE CREEK

SHEET 5 OF 5

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		106

ESTIMATED QUANTITIES

ITEM NO.	104	401	429	429	432	7000
DESCRIPTION CODE	6009	6001	6007	6009	6008	6002
ITEM DESCRIPTION	REMOVING CONC (RIPRAP)	FLOWABLE BACKFILL	CONC STR REPAIR (VERTICAL & OVERHEAD)	CONC STR REPAIR (STANDARD)	RIPRAP (CONC)(CL B)(RR8&RR9)	REML & DISPL DRIFTWOOD & DEBRIS
BRIDGE NO. - NBI NO.	SY	CY	SF	SF	CY	LS
BRIDGE 14 - 18-057-0-2374-03-168	497	42	16	5	98	0.34
TOTAL	497	42	16	5	98	0.34

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
BRADLEY D. SHUEY
86490
LICENSED
PROFESSIONAL ENGINEER

03/29/2023

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE
SUMMARY OF ESTIMATED REPAIRS

BRIDGE 14 - 18-057-0-2374-03-168
IH 20 OVER DRAW

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		108

TABLE OF REPAIRS BRIDGE 14 (NBI # 18-057-0-2374-03-168) ~ IH 20 over DRAW

REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QUANTITY	REPAIR DESCRIPTION/LOCATOR	DETAILS/NOTES
SB1401	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	16	CULVERT SOUTH END ~ REPAIR SPALLS IN TOP SLAB (WEST BOX)	REFERENCE GENERAL SPALL REPAIR DETAILS
SB1402	0429 6009	CONC STR REPAIR (STANDARD)	SF	5	CULVERT SOUTH END ~ REPAIR SPALLS AT CURB WALL	REFERENCE GENERAL SPALL REPAIR DETAILS
M1401	0104 6009	REMOVING CONC (RIPRAP)	SY	375	CULVERT SOUTH END ~ RIPRAP REMOVAL	SEE BRIDGE 14 RIPRAP LAYOUT SHEETS FOR APPROXIMATE LOCATIONS, DIMENSIONS AND DETAILS
M1402	0432 6008	RIPRAP (CONC)(CL B)(RR8&RR9)	CY	69	CULVERT SOUTH END ~ RIPRAP REPLACEMENT (TYPE RR8)	SEE CRR STANDARD AND BRIDGE 14 RIPRAP LAYOUT SHEETS FOR APPROXIMATE LOCATIONS, DIMENSIONS AND DETAILS
M1403	0401 6001	FLOWABLE BACKFILL	CY	21	CULVERT SOUTH END ~ PLACE FLOWABLE FILL AT VOIDS AND TO RE-ESTABLISH RIPRAP GRADES/SLOPES	INSTALL PER ITEM 401 AND BRIDGE 14 RIPRAP LAYOUT SHEETS
M1404	0104 6009	REMOVING CONC (RIPRAP)	SY	122	CULVERT NORTH END ~ RIPRAP REMOVAL	SEE BRIDGE 14 RIPRAP LAYOUT SHEETS FOR APPROXIMATE LOCATIONS, DIMENSIONS AND DETAILS
M1405	0432 6008	RIPRAP (CONC)(CL B)(RR8&RR9)	CY	29	CULVERT NORTH END ~ RIPRAP REPLACEMENT (TYPE RR8)	SEE CRR STANDARD AND BRIDGE 14 RIPRAP LAYOUT SHEETS FOR APPROXIMATE LOCATIONS, DIMENSIONS AND DETAILS
M1406	0401 6001	FLOWABLE BACKFILL	CY	21	CULVERT NORTH END ~ PLACE FLOWABLE FILL AT SCOUR HOLES, TO FILL VOIDS AND TO RE-ESTABLISH RIPRAP GRADES/SLOPES	INSTALL PER ITEM 401 AND BRIDGE 14 RIPRAP LAYOUT SHEETS
M1407	7000 6002	REML & DISPL DRIFTWOOD & DEBRIS	LS	0.34	REMOVE DEBRIS AT BOTH ENDS OF CULVERT	

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
BRADLEY D. SHUEY
86490
LICENSED
PROFESSIONAL ENGINEER

03/29/2023

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

TABLE OF REPAIRS

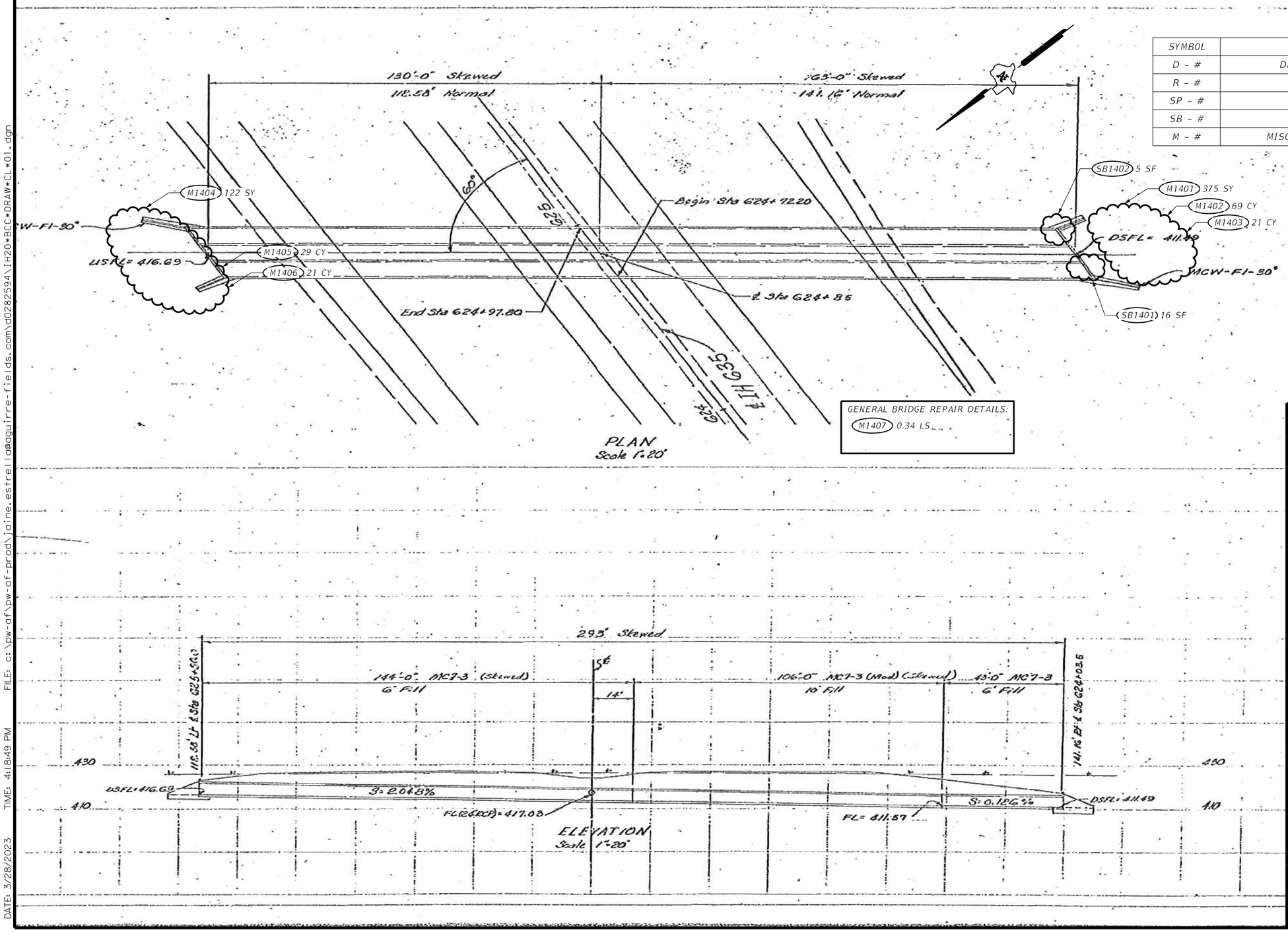
BRIDGE 14 - 18-057-0-2374-03-168
IH 20 OVER DRAW

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		109

REPAIR CALLOUT LEGEND:

DVVXX YY ZZ
- DVVXX — REPAIR NUMBER – SEE "TABLE OF REPAIRS"
- YY — ESTIMATED REPAIR QUANTITY AT EACH LOCATION
- ZZ — UNIT OF MEASURE

SYMBOL	APPLICABLE REPAIR AREAS
D – #	DECK, JOINTS, OVERHANGS, APPROACH SLABS
R – #	RAILS, APPROACH MBGF
SP – #	SUPERSTRUCTURE ELEMENTS, BEARINGS
SB – #	SUBSTRUCTURE ELEMENTS
M – #	MISCELLANEOUS (RIPRAP, SHOULDER DRAINS, ETC)



GENERAL BRIDGE REPAIR DETAILS:

M1407 0.34 LS

GENERAL NOTES

1. LAYOUT, STATIONS, AND ELEVATIONS SHOWN ARE BASED ON AS-BUILT PLANS. COPIES OF AVAILABLE PORTIONS OF AS-BUILT PLANS MAY BE PROVIDED UPON REQUEST.
2. REPAIR LOCATIONS AND QUANTITIES ARE BASED ON CONDITION SURVEY DATED (06/2021). CURRENT CONDITIONS MAY VARY. FIELD VERIFY LOCATIONS AND EXTENT OF REPAIRS IN THE PRESENCE OF THE ENGINEER PRIOR TO ORDERING MATERIALS.
3. SEE TABLE OF REPAIRS SHEET FOR SPECIFIC DESCRIPTIONS, BID ITEMS, LOCATIONS AND REFERENCE DETAILS FOR THE REPAIRS BEING PERFORMED.

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
BRADLEY D. SHUEY
LICENSED
86490
PROFESSIONAL ENGINEER
03/29/2023

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

CULVERT LAYOUT

BRIDGE 14 - 18-057-0-2374-03-168
IH 20 OVER DRAW

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		110

REPAIR M1401/M1402

SOUTH END RIPRAP REMOVAL AND REPLACEMENT

REPAIR M1403

SOUTH END RIPRAP SCOUR, UNDERMINING, AND SETTLEMENT

NOTE:
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REPAIR M1404/M1405

NORTH END RIPRAP REMOVAL AND REPLACEMENT

REPAIR M1406

NORTH END RIPRAP SCOUR, UNDERMINING, AND SETTLEMENT

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
BRADLEY D. SHUEY
86490
LICENSED
PROFESSIONAL ENGINEER

03/16/2023

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

PHOTO LOG

BRIDGE 14 - 18-057-0-2374-03-168
IH 20 OVER DRAW

SHEET 1 OF 2

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		111

REPAIR M1407
NORTH END DEBRIS REMOVAL

REPAIR SB1401
SOUTH END TOP SLAB SPALL

NOTE:
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REPAIR SB1402
SOUTH END CURB WALL SPALL

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
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86490
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03/16/2023

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Texas Department of Transportation
Dallas District Bridge

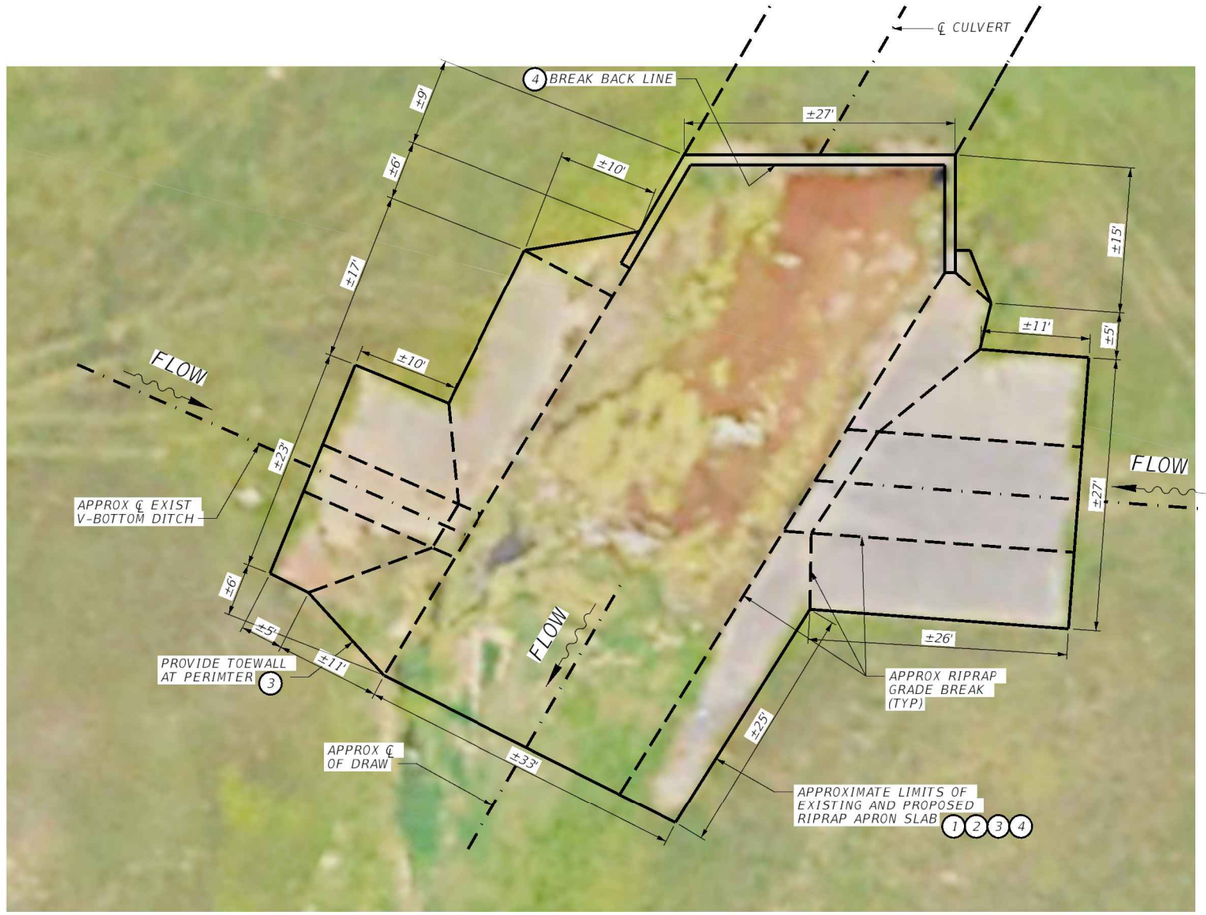
BRIDGE MAINTENANCE

PHOTO LOG

BRIDGE 14 - 18-057-0-2374-03-168
IH 20 OVER DRAW

SHEET 2 OF 2

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		112



PLAN - CULVERT SOUTH END RIPRAP 5

GENERAL NOTES

1. CONTRACTOR TO FIELD VERIFY AND ADJUST EXTENTS OF ALL REPAIRS PRIOR TO CONSTRUCTION. CONFIRM CHANGES TO SCOPE OF REPAIRS WITH FIELD ENGINEER.
2. SEE TABLE OF REPAIRS SHEET FOR SPECIFIC DESCRIPTIONS, BID ITEMS, LOCATIONS, AND REFERENCE DETAILS FOR THE REPAIRS BEING PERFORMED.

(1) CONTRACTOR SHALL RECONSTRUCT THE EXISTING RIPRAP SUCH THAT THE PROPOSED RIPRAP MATCHES THE SURROUNDING GRADE AND PROVIDES POSITIVE DRAINAGE TO THE SOUTH (DOWNSTREAM) DRAW. INSTALL RIPRAP PER CRR STANDARD.

(2) PLACE FLOWABLE FILL (PER ITEM 401) TO FILL VOIDS AND RE-ESTABLISH GRADE UNDER PROPOSED RIPRAP OR AS DIRECTED BY THE ENGINEER.

(3) UNLESS OTHERWISE DIRECTED BY THE ENGINEER, PROVIDE A 9" WIDE BY 3'-0" DEEP REINFORCED CONCRETE TOEWALL ALONG ALL EDGES OF THE RIPRAP ADJACENT TO NATURAL GROUND; REINFORCE THE TOEWALL AS INDICATED BY SEC C-C OF THE CRR STANDARD; AND EXTEND CONSTRUCTION JOINTS OR GROOVED JOINTS ORIENTED IN THE DIRECTION OF FLOW ACROSS THE FULL DISTANCE OF THE RIPRAP AT INTERVALS OF APPROXIMATELY 20'.

(4) REMOVE EXISTING APRON SLAB PORTION (PER ITEM 104) TO THE LIMITS SHOWN OR AS OTHERWISE DIRECTED BY THE ENGINEER. SAWCUT THE SLAB TO A DEPTH OF ½ IN. ALONG THE BREAK BACK LINE. DO NOT CUT OR DAMAGE THE EXISTING REINFORCING. CLEAN AND EXTEND THE EXISTING REINFORCING 1'-0" MIN. INTO NEW CONSTRUCTION.

(5) DEWATER WORK AREA. DEWATERING THE WORK AREA IS SUBSIDIARY TO ITEM 432.

CHANNEL GRADING AND TREE REMOVAL REQUIRED TO INSTALL THE RIPRAP IS SUBSIDIARY TO THE RIPRAP PAY ITEMS.

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
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86490
LICENSED
PROFESSIONAL ENGINEER

03/29/2023

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation
Dallas District Bridge

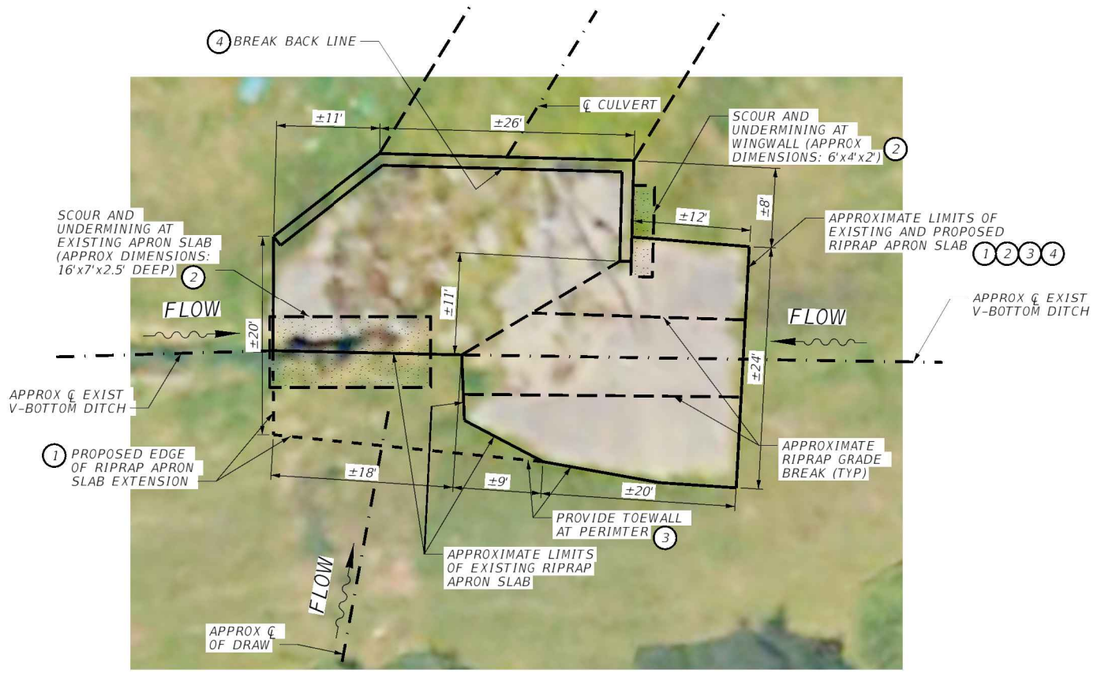
BRIDGE MAINTENANCE

RIPRAP LAYOUT

BRIDGE 14 - 18-057-0-2374-03-168
IH 20 OVER DRAW

SHEET 1 OF 2

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		113



PLAN – CULVERT NORTH END RIPRAP 5

GENERAL NOTES

1. CONTRACTOR TO FIELD VERIFY AND ADJUST EXTENTS OF ALL REPAIRS PRIOR TO CONSTRUCTION. CONFIRM CHANGES TO SCOPE OF REPAIRS WITH FIELD ENGINEER.

2. SEE TABLE OF REPAIRS SHEET FOR SPECIFIC DESCRIPTIONS, BID ITEMS, LOCATIONS, AND REFERENCE DETAILS FOR THE REPAIRS BEING PERFORMED.

(1) CONTRACTOR SHALL RECONSTRUCT THE EXISTING RIPRAP SUCH THAT THE PROPOSED RIPRAP MATCHES THE SURROUNDING GRADE AND PROVIDES POSITIVE DRAINAGE TO THE SOUTH (DOWNSTREAM) DRAW. INSTALL RIPRAP PER CRR STANDARD.

(2) PLACE FLOWABLE FILL (PER ITEM 401) TO FILL VOIDS AND RE-ESTABLISH GRADE UNDER PROPOSED RIPRAP OR AS DIRECTED BY THE ENGINEER.

(3) UNLESS OTHERWISE DIRECTED BY THE ENGINEER, PROVIDE A 9" WIDE BY 3'-0" DEEP REINFORCED CONCRETE TOEWALL ALONG ALL EDGES OF THE RIPRAP ADJACENT TO NATURAL GROUND; REINFORCE THE TOEWALL AS INDICATED BY SEC C-C OF THE CRR STANDARD; AND EXTEND CONSTRUCTION JOINTS OR GROOVED JOINTS ORIENTED IN THE DIRECTION OF FLOW ACROSS THE FULL DISTANCE OF THE RIPRAP AT INTERVALS OF APPROXIMATELY 20'.

(4) REMOVE EXISTING APRON SLAB PORTION (PER ITEM 104) TO THE LIMITS SHOWN OR AS OTHERWISE DIRECTED BY THE ENGINEER. SAWCUT THE SLAB TO A DEPTH OF ½ IN. ALONG THE BREAK BACK LINE. DO NOT CUT OR DAMAGE THE EXISTING REINFORCING. CLEAN AND EXTEND THE EXISTING REINFORCING 1'-0" MIN. INTO NEW CONSTRUCTION.

(5) DEWATER WORK AREA. DEWATERING THE WORK AREA IS SUBSIDIARY TO ITEM 432.

CHANNEL GRADING AND TREE REMOVAL REQUIRED TO INSTALL THE RIPRAP IS SUBSIDIARY TO THE RIPRAP PAY ITEMS.

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
BRADLEY D. SHUEY
86490
LICENSED
PROFESSIONAL ENGINEER
03/29/2023

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Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

RIPRAP LAYOUT

BRIDGE 14 - 18-057-0-2374-03-168
IH 20 OVER DRAW

SHEET 2 OF 2

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		114

ESTIMATED QUANTITIES

ITEM NO.	401	429	438	529
DESCRIPTION CODE	6001	6007	6008	6036
ITEM DESCRIPTION	FLOWABLE BACKFILL	CONC STR REPAIR (VERTICAL & OVERHEAD)	CLEANING AND SEALING JOINTS (CL 7)	CONCRETE CURB (SPECIAL)
BRIDGE NO. - NBI NO.	CY	SF	LF	LF
BRIDGE 19 - 18-057-0-2374-03-322	3.0	95.0	70.0	200.0
TOTAL	3.0	95.0	70.0	200.0

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
SEYED A. KHODAEAN
32870
LICENSED
PROFESSIONAL ENGINEER

4/12/2023

OMEGA ENGINEERS, INC.
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Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

ESTIMATE OF QUANTITIES

BRIDGE 19 - 18-057-0-2374-03-322
IH 20 EB AT US 175 FR U-TURN

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		115

TABLE OF REPAIRS IH 20 EB over US 175 FR U-TURN

REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QUANTITY	REPAIR DESCRIPTION/LOCATION	DETAIL/NOTES
D1901	0438 6008	CLEANING AND SEALING EXISTING JOINTS (CL 7)	LF	70	CLEANING AND RESEALING THE EXPANSION JOINT OVER BENT 5	SEE BRIDGE JOINT REPAIR DETAILS - REPAIR TYPE A
SP1901	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	5	NW EXTERIOR GIRDER BOTTOM FLANGE HAS MINOR SPALL AREA	SEE GENERAL SPALL REPAIR DETAILS
SP1902	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	10	BOTTOM OF DECK HAS AN INTERMEDIATE SPALL AT NW OVERHANG OVER BENT 5	SEE GENERAL SPALL REPAIR DETAILS
SB1901	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	10	BENT 2 CONCRETE HAS MINOR TO INTERMEDIATE SPALL AND EXPOSED REBAR ON THE SIDE AND BOTTOM OF BENT CAP	SEE GENERAL SPALL REPAIR DETAILS
SB1902	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	60	BENT 3 CONCRETE HAS MINOR TO INTERMEDIATE SPALL, DELAMINATION AND EXPOSED REBAR UNDERSIDE OF BENT	SEE GENERAL SPALL REPAIR DETAILS
SB1903	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	10	BENT 5 CONCRETE HAS MINOR TO INTERMEDIATE SPALL, DELAMINATION AND EXPOSED REBAR UNDERSIDE OF BENT	SEE GENERAL SPALL REPAIR DETAILS
M1901	0401 6001	FLOWABLE BACKFILL	CY	3	FLOWABLE CONCRETE FOR THE SW RIPRAP UNDERMINING	SEE RIPRAP UNDERMINING REPAIR DETAILS
M1902	0529 6036	CONCRETE CURB (SPECIAL)	LF	200	ABUTMENT RIPRAP: REPLACE DAMAGED SHOULDER CURB PORTIONS (REPLACE FULL LENGTH OR AS DIRECTED BY ENGINEERS) - ABUT 6 RIPRAP BOTH NORTH AND SOUTH EDGES (2 LO) - APPROX 100 LF PER LOCATION	SEE NON-STRUCTURAL CURB REPLACEMENT REPAIR DETAILS

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STATE OF TEXAS
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4/12/2023

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Texas Department of Transportation

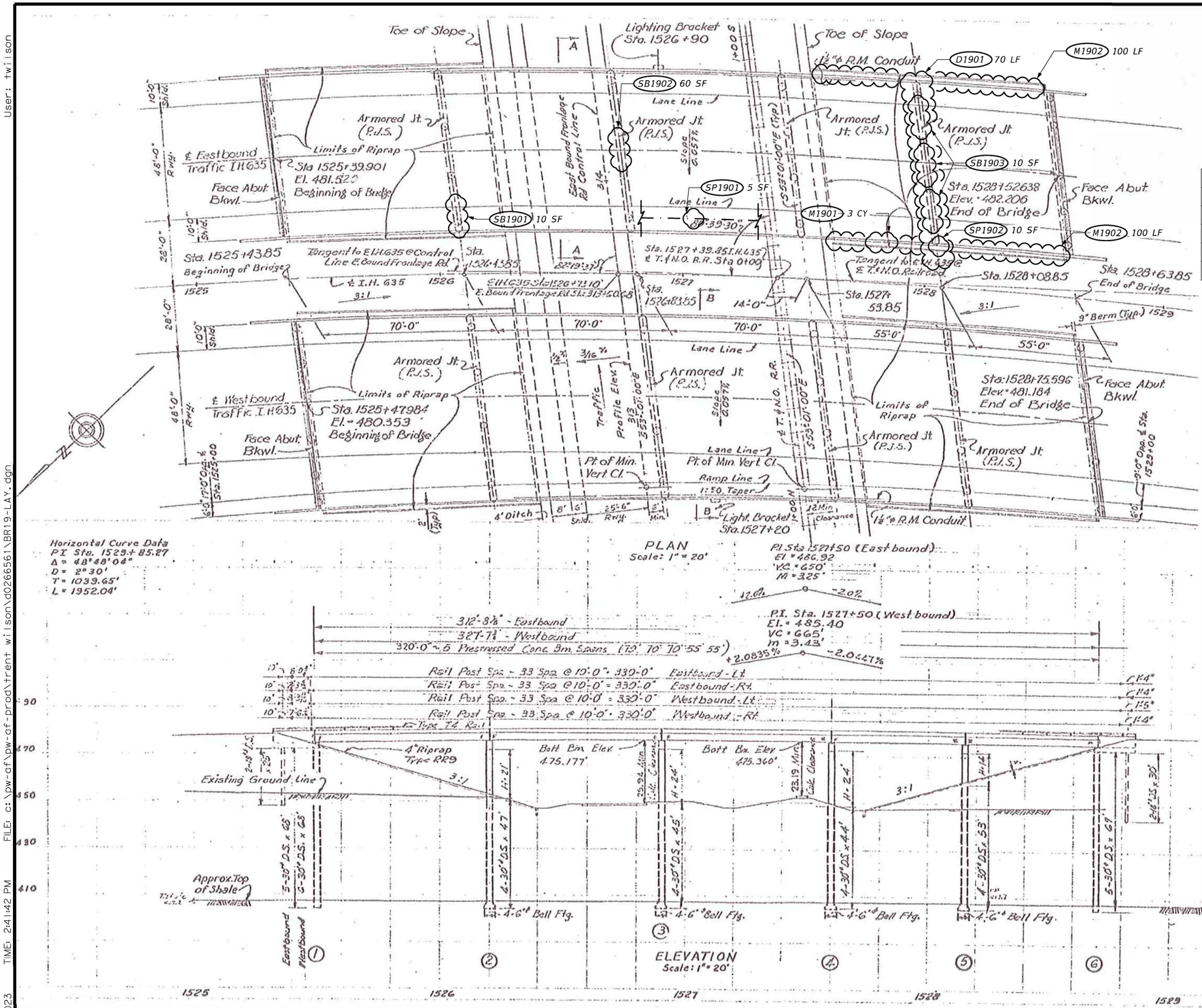
Dallas District Bridge

BRIDGE MAINTENANCE

TABLE OF REPAIRS

BRIDGE 19 - 18-057-0-2374-03-322
IH 20 EB AT US 175 FR U-TURN

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		116



Horizontal Curve Data
PI Sta. 1529+85.27
Δ = 48°48'04"
D = 2°30'
T = 1039.65'
L = 1952.04'

REPAIR CALLOUT LEGEND:

DVVXX YY ZZ
- DVVXX – REPAIR NUMBER – SEE "TABLE OF REPAIRS"
- YY – ESTIMATED REPAIR QUANTITY AT EACH LOCATION
- ZZ – UNIT OF MEASURE

SYMBOL	APPLICABLE REPAIR AREAS
D – #	DECK, JOINTS, OVERHANGS, APPROACH SLABS
R – #	RAILS, APPROACH MBGF
SP – #	SUPERSTRUCTURE ELEMENTS, BEARINGS
SB – #	SUBSTRUCTURE ELEMENTS
M – #	MISCELLANEOUS (RIPRAP, SHOULDER DRAINS, ETC)

GENERAL NOTES

1. LAYOUT, STATIONS, AND ELEVATIONS SHOWN ARE BASED ON AS-BUILT PLANS. COPIES OF AVAILABLE PORTIONS OF AS-BUILT PLANS MAY BE PROVIDED UPON REQUEST.
2. REPAIR LOCATIONS AND QUANTITIES ARE BASED ON CONDITION SURVERY DATED (06/2021). CURRENT CONDITIONS MAY VARY. FIELD VERIFY LOCATIONS AND EXTENT OF REPAIRS IN THE PRESENCE OF THE ENGINEER PRIOR TO ORDERING MATERIALS.
3. SEE TABLE OF REPAIRS SHEET FOR SPECIFIC DESCRIPTIONS, BID ITEMS, LOCATIONS, AND REFERENCE DETAILS FOR THE REPAIRS BEING PERFORMED.

NO.	DATE	REVISION	APPROV.

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Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

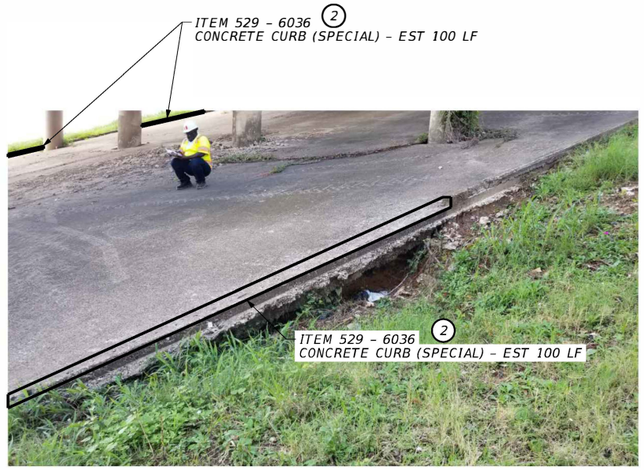
BRIDGE LAYOUT

BRIDGE 19 - 18-057-0-2374-03-322
IH 20 EB AT US 175 FR U-TURN

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		117

REPAIR M1901

UNDERMINING OF SW RIPRAP



REPAIR M1902

MULTIPLE SW RIPRAP CURB FAILURES

(1) SEE "RIPRAP UNDERMINING REPAIR DETAILS" FOR REPAIR INFORMATION.

(2) SEE "NON-STRUCTURAL CURB REPLACEMENT REPAIR DETAILS" FOR REPAIR INFORMATION.

NOTE:
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Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

PHOTO LOG: MISCELLANEOUS

BRIDGE 19 - 18-057-0-2374-03-322
IH 20 EB AT US 175 FR U-TURN

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		118

ESTIMATED QUANTITIES

ITEM NO.	429	438	451	495	785
DESCRIPTION CODE	6007	6008	6024	6001	6010
ITEM DESCRIPTION	CONC STR REPAIR (VERTICAL & OVERHEAD)	CLEANING AND SEALING JOINTS (CL 7)	RETROFIT RAIL (TY SSTR)	RAISING EXIST STRUCT	BRIDGE JOINT REPLACEMENT (ARMOR)
BRIDGE NO. - NBI NO.	SF	LF	LF	LS	LF
BRIDGE 20 - 18-057-0-2374-03-323	105.0	198.0	330.0	1.0	12.0
TOTAL	105.0	198.0	330.0	1.0	12.0

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Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

ESTIMATE OF QUANTITIES

BRIDGE 20 - 18-057-0-2374-03-323
IH 20 WB AT US 175 FR U-TURN

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		122

TABLE OF REPAIRS IH 20 WB over US 175 FR U-TURN

REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QUANTITY	REPAIR DESCRIPTION/LOCATION	DETAIL/NOTES
D2001	0438 6008	CLEANING AND SEALING EXISTING JOINTS (CL 7)	LF	140	CLEANING AND RESEALING THE SW END JOINT OF BRIDGE	SEE BRIDGE JOINT REPAIR DETAILS - REPAIR TYPE A
					CLEANING AND RESEALING THE NE END JOINT OF BRIDGE	SEE BRIDGE JOINT REPAIR DETAILS - REPAIR TYPE A
D2002	0785 6010	BRIDGE JOINT REPLACEMENT (ARMOR)	LF	12	DECK CONCRETE SPALL AND MISSING 10FT OF ARMOR JOINT OVER BENT 3	SEE BRIDGE JOINT REPAIR DETAILS - REPAIR TYPE F AT BENT ("A" = 1') ("B" = 1') ("C" = 12'). SET JOINT WIDTH TO EXISTING OPENING
D2003	0438 6008	CLEANING AND SEALING EXISTING JOINTS (CL 7)	LF	58	CLEANING AND RESEALSING ARMOR JOINT OVER BENT 3	SEE BRIDGE JOINT REPAIR DETAILS - REPAIR TYPE A
D2004	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	21	BOTTOM OF DECK OVER ABUTMENT 6 SPALL/DELAMINATION WITH EXPOSED REBAR	SEE GENERAL SPALL REPAIR DETAILS
R2001	0451 6024	RETROFIT RAIL (TY SSTR)	LF	330	RETROFIT SSTR TO REPLACE T4	SEE SSTR RAIL RETROFIT GUIDE AND SSTR STANDARD
SB2001	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	10	SW ABUTMENT CAP CONCRETE SPALL/DELAMINATION WITH EXPOSED REBAR	SEE ABUTMENT STEP REPAIR DETAILS
	0495 6001	RAISING EXIST STRUCT	LS	1	GIRDER OVER SW ABUTMENT CAP SPALL TO BE RAISED FOR REPAIR	SEE ABUTMENT STEP REPAIR DETAILS
SB2002	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	12	BENT 2 CONCRETE SPALL, DELAMINATION AND EXPOSED REBAR UNDERSIDE OF BENT	SEE GENERAL SPALL REPAIR DETAILS
SB2003	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	18	BENT 3 CONCRETE SPALL, DELAMINATION AND EXPOSED REBAR UNDERSIDE OF BENT	SEE GENERAL SPALL REPAIR DETAILS
SB2004	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	24	BENT 4 CONCRETE SPALL, DELAMINATION AND EXPOSED REBAR UNDERSIDE OF BENT	SEE GENERAL SPALL REPAIR DETAILS
M2001	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	20	CONCRETE RIPRAP AROUND THE BENT 5 COLUMN HAS SPALLING	SEE GENERAL SPALL REPAIR DETAILS

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BRIDGE MAINTENANCE

TABLE OF REPAIRS

BRIDGE 20 - 18-057-0-2374-03-323
IH 20 WB AT US 175 FR U-TURN

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
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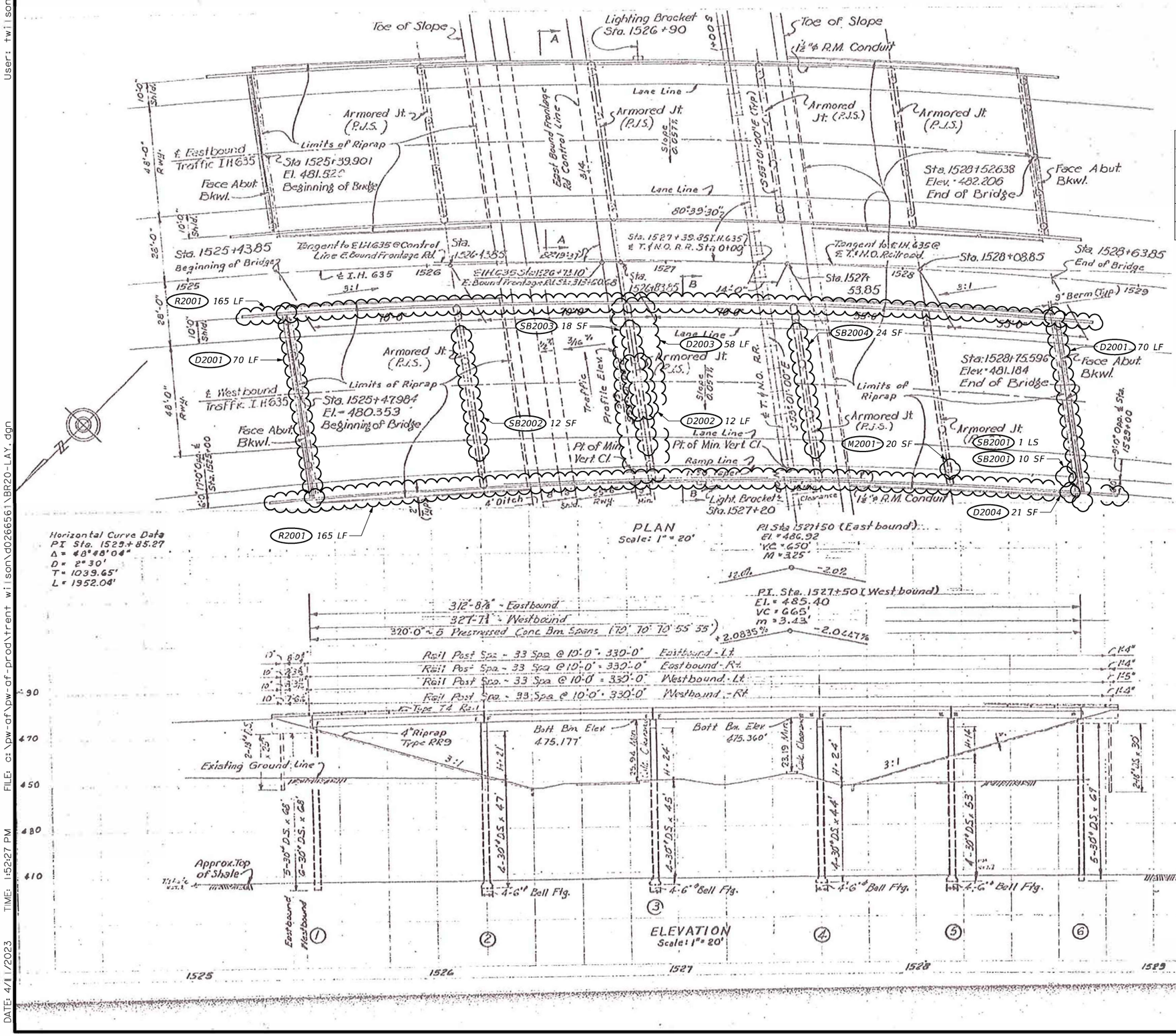
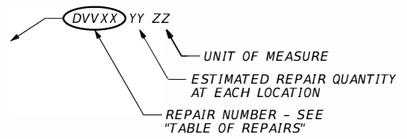


REPAIR CALLOUT LEGEND:



SYMBOL	APPLICABLE REPAIR AREAS
D – #	DECK, JOINTS, OVERHANGS, APPROACH SLABS
R – #	RAILS, APPROACH MBGF
SP – #	SUPERSTRUCTURE ELEMENTS, BEARINGS
SB – #	SUBSTRUCTURE ELEMENTS
M – #	MISCELLANEOUS (RIPRAP, SHOULDER DRAINS, ETC)

GENERAL NOTES

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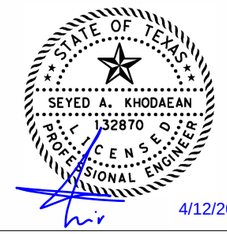

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Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

BRIDGE LAYOUT

BRIDGE 20 - 18-057-0-2374-03-323
IH 20 WB AT US 175 FR U-TURN

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		124

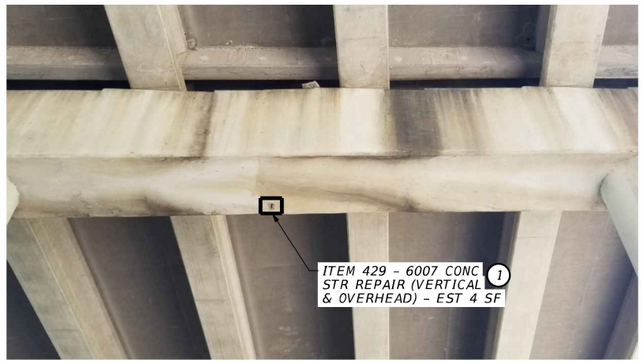
REPAIR SB2001

ABUTMENT 6 BACKWALL HAS CONCRETE SPALL WITH EXPOSED REBAR AND CONCRETE SPALL UNDER BEAM 9

REPAIR SB2002

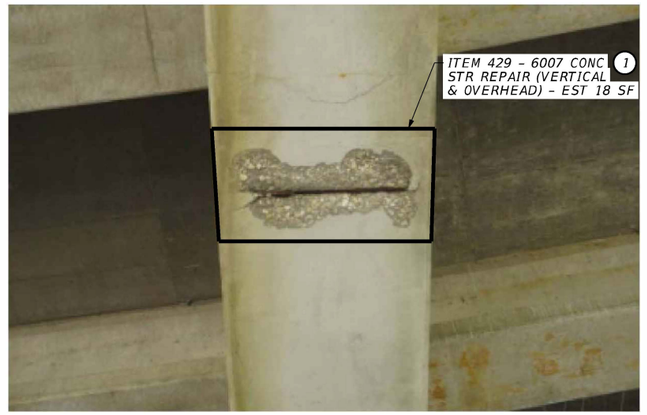
BENT 2 HAS CONCRETE SPALL AND DELAMINATION

1. SEE "GENERAL SPALLING REPAIR DETAIL" FOR ADDITIONAL INFORMATION.
2. SEE "ABUTMENT STEP REPAIR DETAIL" FOR ADDITIONAL INFORMATION.



REPAIR SB2002

BENT 2 HAS CONCRETE SPALL AND DELAMINATION



REPAIR SB2003

BENT 3 HAS CONCRETE SPALL WITH EXPOSED REBAR

REPAIR SB2004

BENT 4 HAS CONCRETE SPALL AND DELAMINATION WITH EXPOSED REBAR

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NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
SEYED A. KHODAEAN
32870
LICENSED PROFESSIONAL ENGINEER
4/12/2023

OMEGA ENGINEERS, INC.
8200 N. MOPAC EXPRESSWAY, STE #280
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Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

PHOTO LOG: SUBSTRUCTURE

BRIDGE 20 - 18-057-0-2374-03-323
IH 20 WB AT US 175 FR U-TURN

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		125

ESTIMATED QUANTITIES

ITEM NO.	429	438	785
DESCRIPTION CODE	6007	6008	6010
ITEM DESCRIPTION	CONC STR REPAIR (VERTICAL & OVERHEAD)	CLEANING AND SEALING JOINTS (CL 7)	BRIDGE JOINT REPLACEMENT (ARMOR)
BRIDGE NO. - NBI NO.	SF	LF	LF
BRIDGE 21 - 18-057-0-2374-03-315	182.0	70.0	70.0
TOTAL	182.0	70.0	70.0

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
SEYED A. KHODAEAN
132870
LICENSED
PROFESSIONAL ENGINEER
3/29/2023

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Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

ESTIMATE OF QUANTITIES

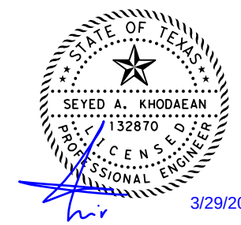
BRIDGE 21 - 18-057-0-2374-03-315
IH 20 EB AT US 175

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		128

TABLE OF REPAIRS IH 20 EB over US 175

REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QUANTITY	REPAIR DESCRIPTION/LOCATION	DETAIL/NOTES
D2101	0438 6008	CLEANING AND SEALING EXISTING JOINTS (CL 7)	LF	70	NE END JOINT PARTIALLY FAILED CLOSED AND FILLED WITH DIRT	SEE BRIDGE JOINT REPAIR DETAILS - REPAIR TYPE A
D2102	0785 6010	BRIDGE JOINT REPLACEMENT (ARMOR)	LF	70	SW END ARMOR JOINT AT ABUTMENT HAS FAILED	SEE BRIDGE JOINT REPAIR DETAILS - REPAIR TYPE F AT ABUTMENT ("A" = 1') ("B" = 1') ("C" = 70') SET JOINT OPENING = 1½"
SP2101	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	20	GIRDERS AT SW ABUTMENT HAVE LARGE AREAS OF SPALL/DELAMINATION	SEE GENERAL SPALL REPAIR DETAILS
SB2101	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	45	NE ABUTMENT CAP HAS SPALL/DELAMINATION	SEE GENERAL SPALL REPAIR DETAILS
SB2102	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	117	SW ABUTMENT CAP HAS LARGE AREAS OF SPALL/DELAMINATION AND EXPOSED REBAR WITH SIGN OF EFFLORESCENCE	SEE GENERAL SPALL REPAIR DETAILS

NO.	DATE	REVISION	APPROV.



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Texas Department of Transportation

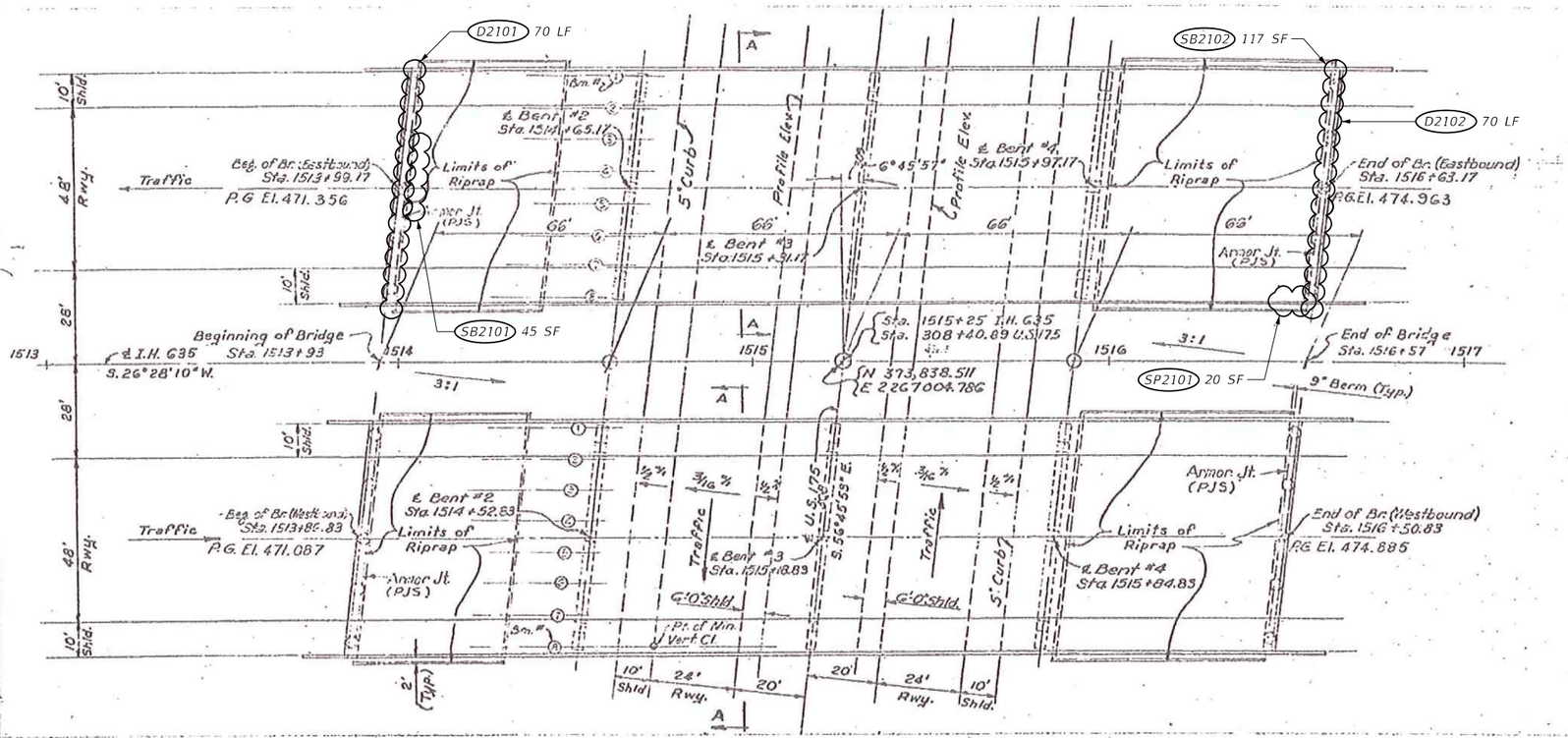
Dallas District Bridge

BRIDGE MAINTENANCE

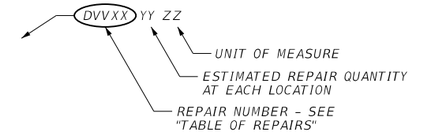
TABLE OF REPAIRS

BRIDGE 21 - 18-057-0-2374-03-315
IH 20 EB AT US 175

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		129



REPAIR CALLOUT LEGEND:



SYMBOL	APPLICABLE REPAIR AREAS
D – #	DECK, JOINTS, OVERHANGS, APPROACH SLABS
R – #	RAILS, APPROACH MBGF
SP – #	SUPERSTRUCTURE ELEMENTS, BEARINGS
SB – #	SUBSTRUCTURE ELEMENTS
M – #	MISCELLANEOUS (RIPRAP, SHOULDER DRAINS, ETC)

GENERAL NOTES

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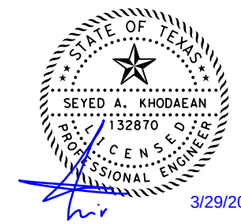
3. SEE TABLE OF REPAIRS SHEET FOR SPECIFIC DESCRIPTIONS, BID ITEMS, LOCATIONS, AND REFERENCE DETAILS FOR THE REPAIRS BEING PERFORMED.

NO.	DATE	REVISION	APPROV.



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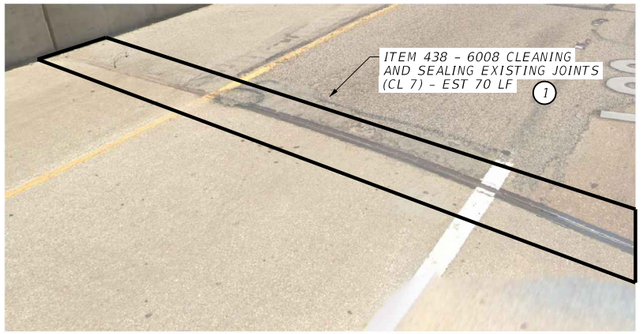
Texas Department of Transportation — Dallas District Bridge

BRIDGE MAINTENANCE

BRIDGE LAYOUT

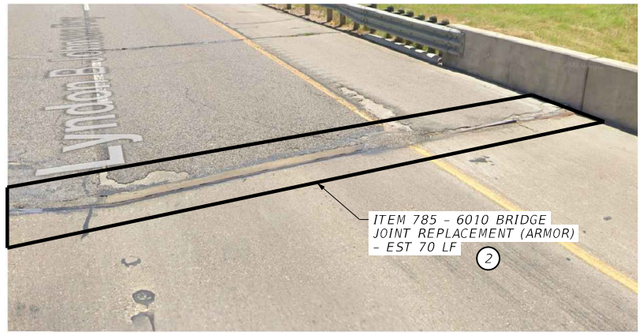
BRIDGE 21 - 18-057-0-2374-03-315
IH 20 EB AT US 175

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		130



REPAIR D2101

NE END JOINT HAS PARTIALLY FAILED AND FILLED WITH DIRT



REPAIR D2102

SW END JOINT HAS FAILED

REPAIR D2102

SW END JOINT HAS FAILED

1 SEE "BRIDGE JOINT REPAIR DETAILS - REPAIR TYPE A" FOR ADDITIONAL INFORMATION.

2 SEE "BRIDGE JOINT REPAIR DETAILS - REPAIR TYPE F" FOR ADDITIONAL INFORMATION.

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NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
SEYED A. KHODAEAN
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LICENSED
PROFESSIONAL ENGINEER
3/29/2023

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Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

PHOTO LOG: DECK

BRIDGE 21 - 18-057-0-2374-03-315
IH 20 EB AT US 175

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		131

REPAIR SP2101

GIRDER ENDS AT SW ABUTMENT CAP HAVE AREAS OF SPALL/DELAMINATION

REPAIR SP2101

GIRDER ENDS AT SW ABUTMENT CAP HAVE AREAS OF SPALL/DELAMINATION

(1) SEE "GENERAL SPALLING REPAIR DETAIL" FOR ADDITIONAL INFORMATION.

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Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

PHOTO LOG: SUPERSTRUCTURE

BRIDGE 21 - 18-057-0-2374-03-315
IH 20 EB AT US 175

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		132

REPAIR SB2101

NE ABUTMENT CAP HAS CRACKED/SPALLED DELAMINATION

REPAIR SB2102

SW ABUTMENT CAP HAS CONCRETE SPALL WITH EXPOSED REBAR

(1) SEE "GENERAL SPALL REPAIR DETAILS" FOR REPAIR INFORMATION.

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Dallas District Bridge

BRIDGE MAINTENANCE

PHOTO LOG: SUBSTRUCTURE

BRIDGE 21 - 18-057-0-2374-03-315
IH 20 EB AT US 175

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		133

ESTIMATED QUANTITIES

ITEM NO.	429	438	780
DESCRIPTION CODE	6007	6008	6004
ITEM DESCRIPTION	CONC STR REPAIR (VERTICAL & OVERHEAD)	CLEANING AND SEALING JOINTS (CL 7)	CNC CRACK REPAIR (DISCRETE) (ROUT AND SEAL)
BRIDGE NO. - NBI NO.	SF	LF	LF
BRIDGE 22 - 18-057-0-2374-03-316	52.0	140.0	35.0
TOTAL	52.0	140.0	35.0

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
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Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

ESTIMATE OF QUANTITIES

BRIDGE 22 - 18-057-0-2374-03-316
IH 20 WB AT US 175

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		134

TABLE OF REPAIRS IH 20 WB over US 175

REPAIR NO.	ITEM	BID ITEM DESCRIPTION	UNIT	QUANTITY	REPAIR DESCRIPTION/LOCATION	DETAIL/NOTES
D2201	0438 6008	CLEANING AND SEALING EXISTING JOINTS (CL 7)	LF	140	CLEANING AND RESEALING THE NE AND SW EXPANSION JOINT	SEE BRIDGE JOINT REPAIR DETAILS - REPAIR TYPE A
SP2201	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	10	SW END OF NE EXTERIOR PRESTRESSED BEAM CRACK AND SPALL OVER NE ABUTMENT	SEE GENERAL SPALL REPAIR DETAILS
SB2201	0780 6004	CONC CRACK REPAIR (DISCRETE) (ROUT AND SEAL)	LF	10	NE ABUT CAP HAS HORIZONTAL CONCRETE CRACKS	SEE ITEM 780 "CONCRETE CRACK REPAIR" AND TXDOT CONCRETE REPAIR MANUAL CHAPTER 3 - SECT. 7
SB2202	0429 6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	42	NE ABUT BACKWALL CONCRETE CRACK, SPALL AND DELAMINATED	SEE GENERAL SPALL REPAIR DETAILS
SB2203	0780 6004	CONC CRACK REPAIR (DISCRETE) (ROUT AND SEAL)	LF	25	SW ABUT CAP HAS HORIZONTAL CONCRETE CRACKS	SEE ITEM 780 "CONCRETE CRACK REPAIR" AND TXDOT CONCRETE REPAIR MANUAL CHAPTER 3 - SECT. 7

NO.	DATE	REVISION	APPROV.

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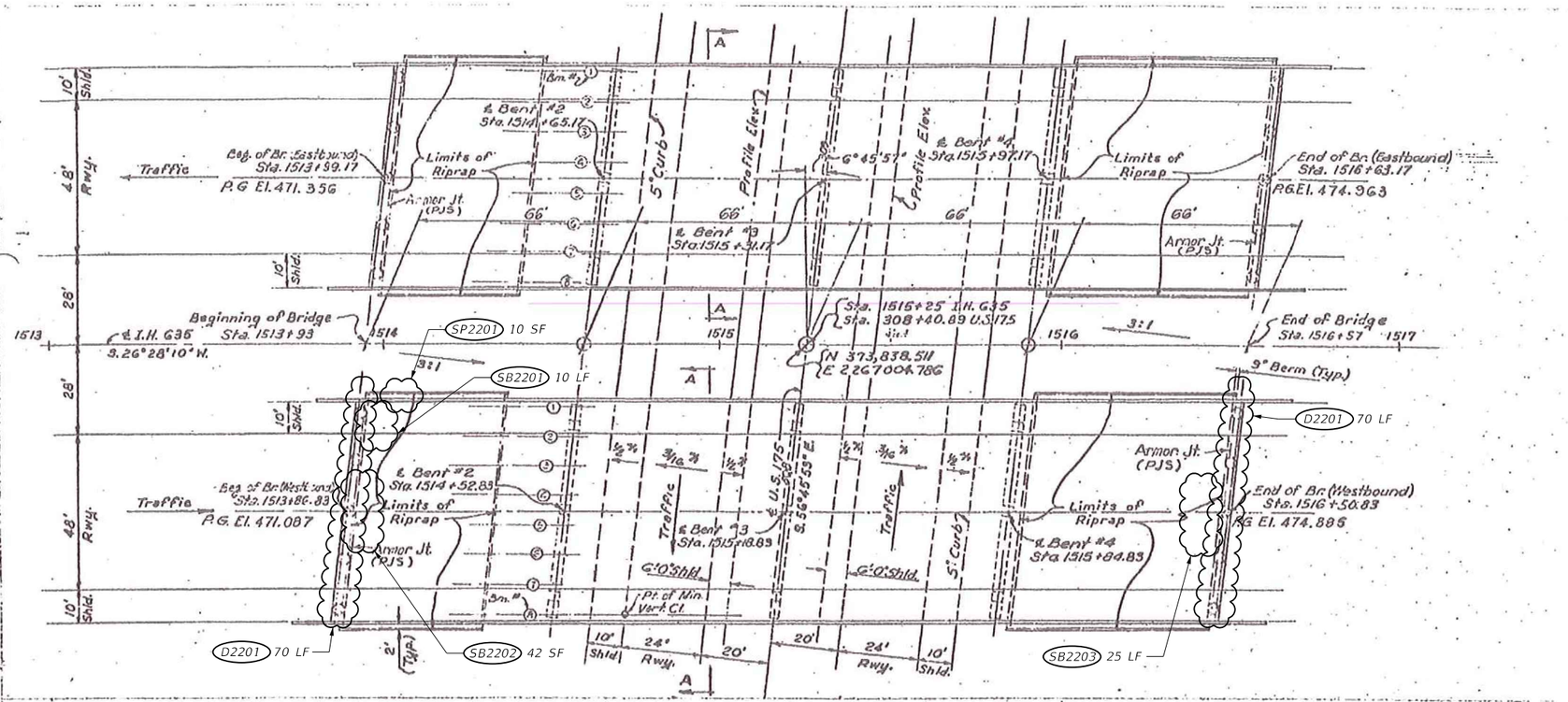
Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

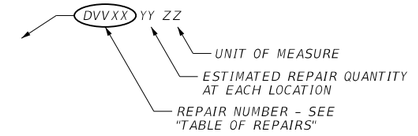
TABLE OF REPAIRS

BRIDGE 22 - 18-057-0-2374-03-316
IH 20 WB AT US 175

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		135



REPAIR CALLOUT LEGEND:



SYMBOL	APPLICABLE REPAIR AREAS
D – #	DECK, JOINTS, OVERHANGS, APPROACH SLABS
R – #	RAILS, APPROACH MBGF
SP – #	SUPERSTRUCTURE ELEMENTS, BEARINGS
SB – #	SUBSTRUCTURE ELEMENTS
M – #	MISCELLANEOUS (RIPRAP, SHOULDER DRAINS, ETC)

GENERAL NOTES

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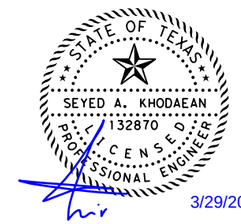

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Texas Department of Transportation — Dallas District Bridge

BRIDGE MAINTENANCE

BRIDGE LAYOUT

BRIDGE 22 - 18-057-0-2374-03-316
IH 20 WB AT US 175

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		136

REPAIR D2201

NORTHEAST EXPANSION JOINT NEEDS TO BE CLEANED

REPAIR D2201

SOUTHWEST EXPANSION JOINT NEEDS TO BE CLEANED

(1) SEE "BRIDGE JOINT REPAIR DETAILS - REPAIR TYPE A" FOR ADDITIONAL INFORMATION.

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NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
SEYED A. KHODAEAN
132870
LICENSED PROFESSIONAL ENGINEER
3/29/2023

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Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

PHOTO LOG: DECK

BRIDGE 22 - 18-057-0-2374-03-316
IH 20 WB AT US 175

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		137

REPAIR SP2201

NE END OF SPAN 1 SE EXTERIOR BEAM HAS 12" LONG SPALL/DELAMINATION AREA

1 SEE "GENERAL SPALL REPAIR DETAILS" FOR ADDITIONAL INFORMATION.

NOTE:
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NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
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Dallas District Bridge

BRIDGE MAINTENANCE

PHOTO LOG: SUPERSTRUCTURE

BRIDGE 22 - 18-057-0-2374-03-316
IH 20 WB AT US 175

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		138

REPAIR SB2201

SE END OF NE ABUTMENT CAP HAS HORIZONTAL CRACK

REPAIR SB2202

NE ABUTMENT BACKWALL CONCRETE CRACK, SPALL, AND DELAMINATION AT MULTIPLE BAYS

REPAIR SB2203

SW ABUTMENT BACKWALL CAP HAS HORIZONTAL CRACKS AT MULTIPLE BAYS

1. SEE "GENERAL SPALLING REPAIR DETAIL" FOR ADDITIONAL INFORMATION.
2. SEE TXDOT CONCRETE REPAIR MANUAL CHAPTER 3 - SECT. 7 AND ITEM 780 "CONCRETE CRACK REPAIR"

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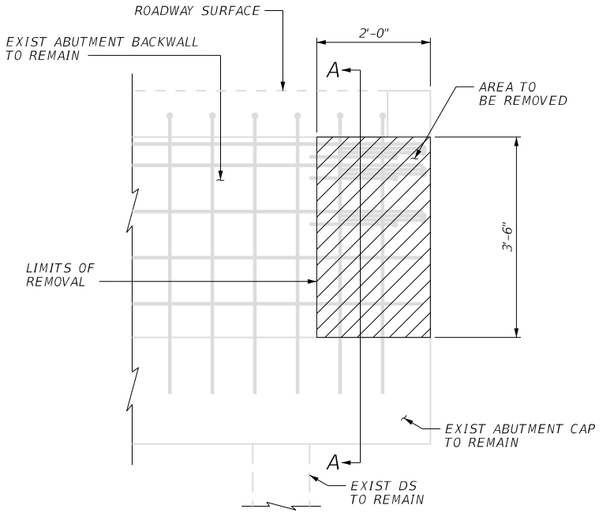
BRIDGE MAINTENANCE

PHOTO LOG: SUBSTRUCTURE

BRIDGE 22 - 18-057-0-2374-03-316
IH 20 WB AT US 175

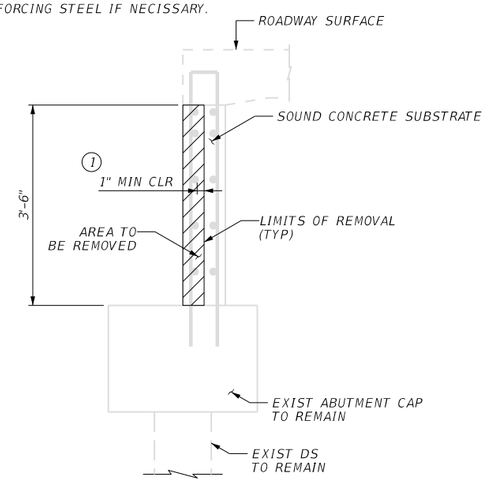
FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		139



ABUTMENT BACKWALL REMOVAL ELEVATION

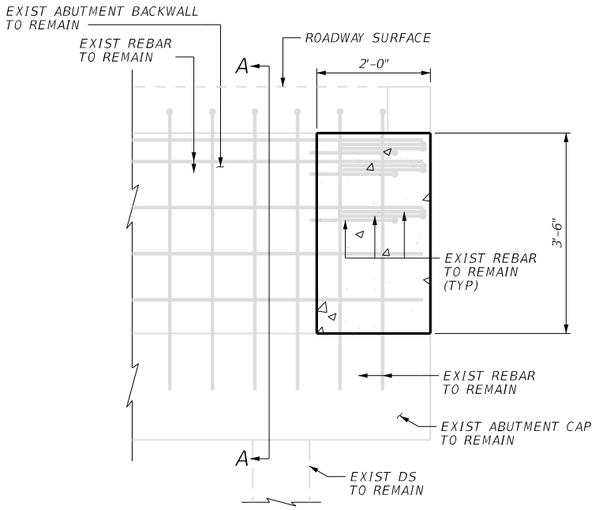
SCALE: NTS

(1) REMOVE CONCRETE TO DEPTH OF SOUND CONRETE. ONLY UNDERCUT REINFORCING STEEL IF NECISSARY.



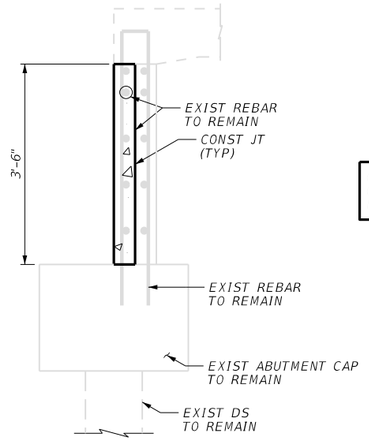
ABUTMENT BACKWALL REMOVAL SECTION A-A

SCALE: NTS



ABUTMENT BACKWALL REPAIR ELEVATION

SCALE: NTS



ABUTMENT BACKWALL REPAIR SECTION A-A

SCALE: NTS

REPAIR PROCEDURE

1. REMOVE LOOSE, DELAMINATED, OR CRACKED CONCRETE ABOVE OXIDIZED REINFORCING STEEL. ONCE INITIAL REMOVALS ARE MADE VERIFY THE SOUNDNESS OF UNDERLYING CONCRETE. IF ADDITIONAL REMOVAL IS REQUIRED, PROCEED WITH THE UNDERCUTTING OF ALL EXPOSED OXIDIZED (CORRODED) BARS. UNDERCUTTING WILL PROVIDE CLEARANCE FOR UNDER BAR CLEANING, FULL BAR CIRCUMFERENCE BONDING TO SURROUNDING CONCRETE, AND WILL SECURE THE PATCH STRUCTURALLY. PROVIDE MINIMUM 1" CLEARANCE BETWEEN EXPOSED REBARS AND SURROUNDING CONCRETE OR 1/4" LARGER THAN THE LARGEST AGGREGATE IN REPAIR MATERIAL, WHICH EVER IS GREATER.
2. REMOVE RUST, OIL, AND OTHER CONTAMINATES FROM CONCRETE AND REINFORCING STEEL. JUST PRIOR TO PATCHING BLAST THE REPAIR AREA USING A HIGH-PRESSURE AIR COMPRESSOR EQUIPPED WITH FILTERS TO REMOVE OIL.
3. OBTAIN A SATURATED SURFACE DRY (SSD) AT THE INTERFACE OF THE EXISTING CONCRETE USING A HIGH-PRESSURE WATER BLAST OR OTHER APPROVED METHOD, SURFACE MAY BE DAMP BUT MUST BE FREE OF STANDING WATER.
4. USE TXDOT PRE-APPROVED REPAIR MATERIAL SUCH AS SIKACEM 103 BY SIKA® OR APPROVED EQUAL. REFER TO TXDOT DMS-4655 AND CONCRETE REPAIR MATERIALS PRODUCER LIST FOR LIST OF PREQUALIFIED REPAIR MATERIALS. REPAIR MATERIAL SHALL BE TROWEL APPLIED. APPLY A BOND COAT CONSISTING OF A THIN LAYER OF REPAIR MATERIAL SCRUBBED INTO SUBSTRATE. DO NOT EXCEED THE MAXIMUM LIFT DEPTH PERMITTED BY THE MANUFACTURER (FOR SIKACEM IS IT 2 INCHES). PREPARE AND WET THE SURFACE JUST PRIOR TO APPLYING THE NEXT LIFT.
5. MOIST CURE THE PATCH MATERIAL FOR A MINIMUM 72 HOURS USING WET MATS, WATER SPRAY, POUNDING, OR OTHER METHOD APPROVED BY THE ENGINEER.

GENERAL NOTES

1. THE CONTRACTOR SHALL SUBMIT THE CONSTRUCTION AND REPAIR SEQUENCES, DETAIL REPAIR PROCEDURES INCLUDING PROPOSED PROPRIETARY MATERIALS, AND TEMPORARY SHORING DETAIL TO THE ENGINEER FOR REVIEW PRIOR TO COMMENCING ANY DEMOLITION AND REHABILITATION ACTIVITIES.
2. VERIFY EXTEND OF DAMAGE AND REPAIRS PRIOR TO PROCEEDING. IMMEDIATELY NOTIFY ENGINEER IF ANY DISCREPANCIES ARE NOTED BETWEEN THE PLANS AND THE ACTUAL FIELD CONDITIONS.
3. ALL DIMENSIONS SHOWN ARE BASED ON AS-BUILT DRAWINGS. CONTRACTOR IS RESPONSIBLE TO VERIFY ALL LOCATIONS DIMENSIONS, AND ELEVATIONS OF EXISTING STRUCTURE, UTILITIES, ETC.
4. PERFORM WORK IN ACCORDANCE WITH ITEM 429, "CONCRETE STRUCTURE REPAIR", AND THESE PLANS. FOR STRUCTURAL REPAIR WORK USE A PRE-APPROVED TYPE C MATERIAL PER DMS 4655, "CONCRETE REPAIR MATERIALS." ALTERNATE CLASS C CONCRETE MAY BE USED AS THE REPAIR MATERIAL IF FIELD CONDITION PERMITS.
5. UTILITIES MOUNTED TO BRIDGE ARE NOT TO BE REMOVED OR MODIFIED. THE CONTRACTOR SHALL TAKE EFFORTS TO AVOID DISRUPTING UTILITIES. IF UTILITIES ARE DAMAGED DURING THE CONSTRUCTION PROCESS, THE CONCTRACTOR SHALL NOTIFY THE DISTRICT IMMEDIATIELY.
5. PRIOR TO BEGINNING REPAIR, REMOVE ALL PREVIOUSLY APPLIED REPAIR MATERIALS. USE ONLY HAND TOOLS OR POWER-DRIVEN CHIPPING HAMMERS (15 LB MAX) TO REMOVE CONCRETE AND TO EXCAVATE AROUND THE REINFORCING BARS.
6. CONCRETE REMOVALS SHALL EXTEND ALONG THE BARS TO LOCATIONS ALONG THE BAR FREE OF BOND INHIBITING CORROSION, AND WHERE THE BAR IS WELL BONDED TO SURROUNDING CONCRETE.
7. IF UNOXIDIZED REINFORCING STEEL IS EXPOSED DURING THE UNDERCUTTING PROCESS, CARE SHALL BE TAKEN NOT TO DAMAGE THE BAR'S BOND TO SURROUNDING CONCRETE. IF BOND BETWEEN BAR AND CONCRETE IS BROKEN, AS DETERMINED BY THE ENGINEER, UNDERCUTTING OF THE BAR SHALL BE REQUIRED.
8. ANY REINFORCEMENT WHICH IS LOOSE SHALL BE SECURED IN PLACE BY TYING TO OTHER SECURED BARS OR BY OTHER APPROVED METHODS.
9. TAKE EXTRA PRECAUTION NOT TO DAMAGE REINFORCEMENT WHEN REMOVING CONCRETE.
10. BRIDGE 13, SEE REPAIR SB1301 AND SB1302 FOR ADDITIONAL INFORMATION.

MATERIAL NOTES

1. PROVIDE TYPE C REPAIR MATERIAL (f'c=4000 PSI)
2. PROVIDE GRADE 60 REINFORCING STEEL.
3. PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:

UNCOATED~	#4=1'-7" #5=2'-0"
EPOXY COATED~	#4=2'-5" #5=3'-0"

CAUTION: BEFORE STARTING REMOVAL, REVIEW EFFECT OF REMOVAL ON STRUCTURAL INTEGRITY. PROVIDE SHORING OF MEMBERS AS NECESSARY.

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
IFTEKHAR AHMAD
140517
LICENSED
PROFESSIONAL ENGINEER

03/28/2023

infraTECH
Engineers & Innovators, LLC
11111 Willcrest Green Dr. Suite #410
Houston, Texas 77042
TBPE REGISTRATION NO. F-18368

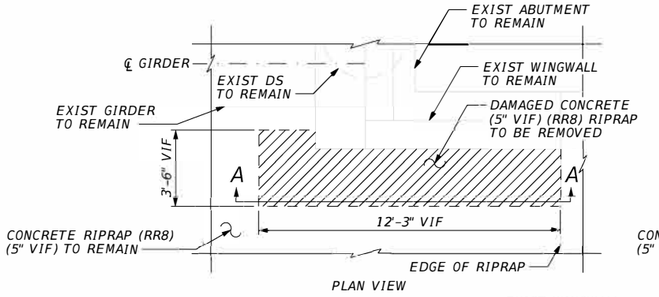
Texas Department of Transportation

Dallas District Bridge

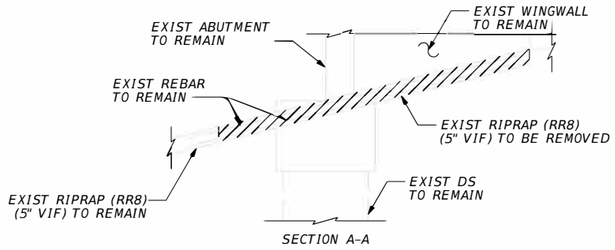
BRIDGE MAINTENANCE

ABUTMENT BACKWALL REPAIR DETAILS

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		140

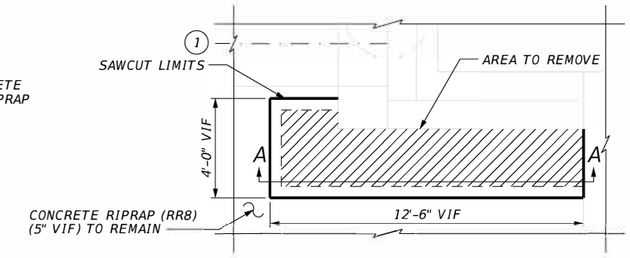


PLAN VIEW

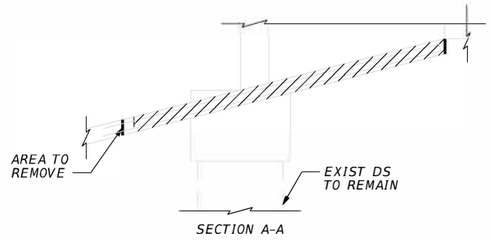


SECTION A-A

EXISTING CONDITION



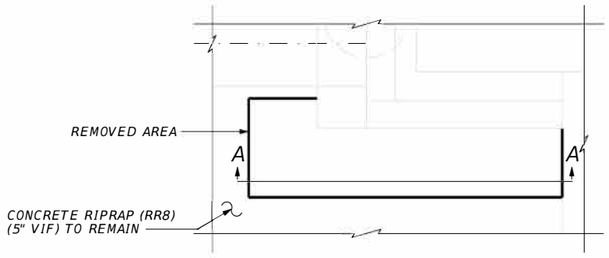
PLAN VIEW



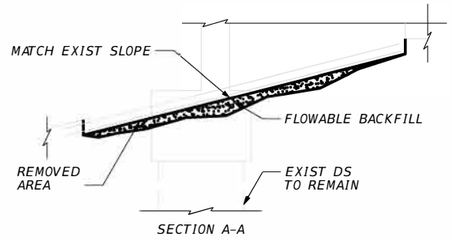
SECTION A-A

1. DEFINE LIMITS OF RIPRAP REMOVAL THAT WILL ENCOMPASS THE DAMAGED AREA AND EXTEND A MINIMUM OF 3" ON ALL SIDES WITH STRAIGHT EDGES AND 90 DEGREE CORNERS.
2. CHIP AND REMOVE DETERIORATED AND DELAMINATED RIPRAP CONCRETE. REMOVE ALL LOOSE CONCRETE, DUST, ETC. DO NOT DAMAGE EXISTING REBAR IN RIPRAP. CLEAN AND DRY THE REPAIR AREA.

STEP 1



PLAN VIEW



SECTION A-A

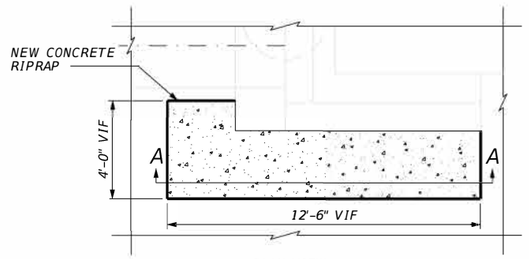
1. PLACE FLOWABLE BACKFILL AS NECESSARY TO FILL VOID UNDER EXISTING RIPRAP TO REESTABLISH EXISTING SLOPE.
2. ROUGHEN AND CLEAN SUBSTRATE TO PROMOTE BOND OF PATCHING MATERIAL.
3. APPLY TACK COAT TO SURFACE ENDS OF THE REPAIR AREA UNLESS OTHERWISE DIRECTED.

STEP 2

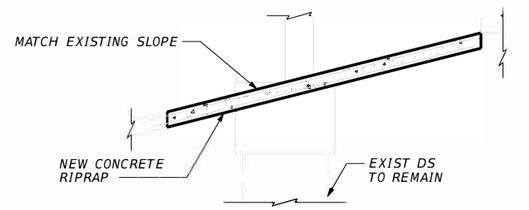
GENERAL NOTES

1. PERFORM CONCRETE RIPRAP REPAIR IN ACCORDANCE WITH TXDOT IEM 432, "RIPRAP".
2. CONTRACTOR TO SUBMIT ALL MATERIALS AND METHODS OF APPLICATION FOR APPROVAL.
3. NOTIFY EOR IF EXISTING CONDITIONS DO NOT MATCH THE PHOTOS DURING REPAIR.
4. ELEMENT LOCATIONS AND DIMENSIONS ARE APPROXIMATE AND BASED ON AS-BUILT PLANS, AERIAL PHOTOS, AND SITE VISITS. ACTUAL LOCATIONS AND DIMENSIONS SHOULD BE FIELD VERIFIED.

(1) SAWCUT 1/2" DEEP AND A MINIMUM 3" CLEAR AROUND DAMAGED RIPRAP AREA TO ESTABLISH RIPRAP AREA TO BE REPAIRED. DO NOT CUT REBAR.



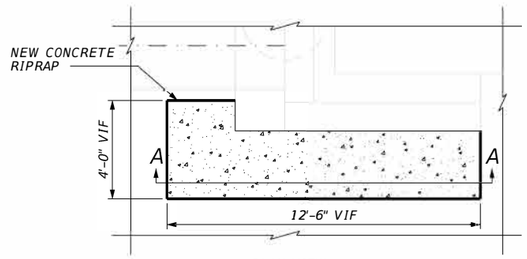
PLAN VIEW



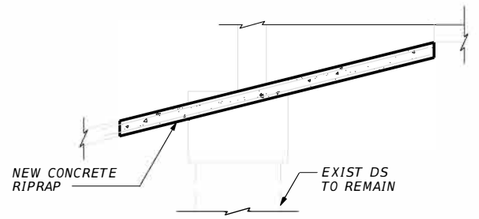
SECTION A-A

1. INSTALL CONCRETE RIPRAP PER CRR STANDARD. WHERE SHOULDER DRAINS OCCUR MATCH EXISTING SHOULDER DRAIN CROSS SECTION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
2. CONCRETE SHALL BE CLASS B PER TXDOT ITEM 421 "HYDRAULIC CEMENT CONCRETE"
3. CONTRACTOR SHALL PLACE CONCRETE RIPRAP TO RESTORE THE ORIGINAL "AS-BUILT" GRADE OR TO DIMENSIONS SHOWN ON PLANS OR STANDARDS. ADDITIONALLY, THE RIPRAP SHALL BE GRADED TO TIE INTO THE SURROUNDING GRADE AND PROMOTE POSITIVE DRAINAGE AWAY FROM THE ABUTMENT AND ROADWAY.

STEP 3



PLAN VIEW



SECTION A-A

FINAL CONDITION

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
IFTEKHAR AHMAD
140517
LICENSED
PROFESSIONAL ENGINEER

04/05/2023

infraTECH
Engineers & Innovators, LLC
11111 Willcrest Green Dr. Suite #410
Houston, Texas 77042
TBPE REGISTRATION NO. F-18368

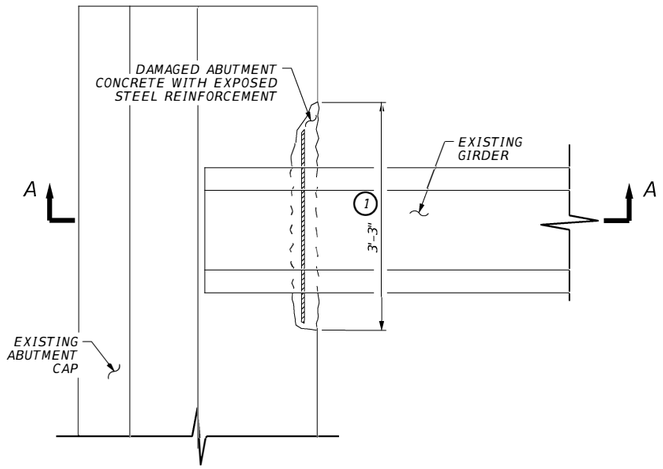
Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

ABUTMENT RIPRAP PATCH REPAIR DETAILS

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		141



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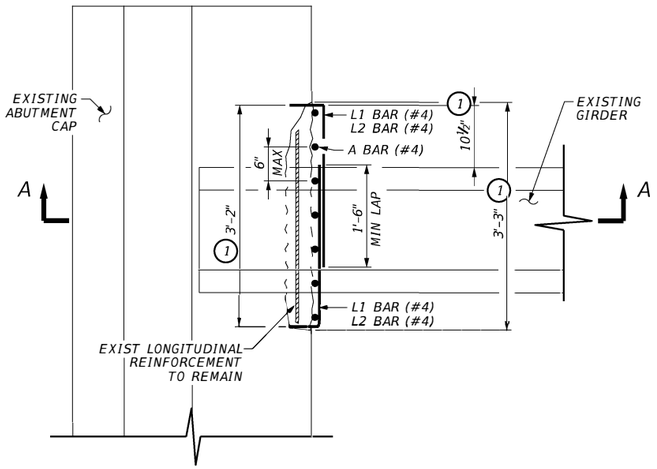

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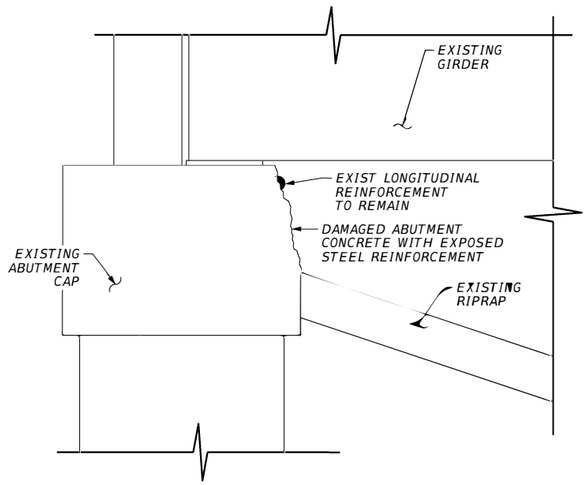
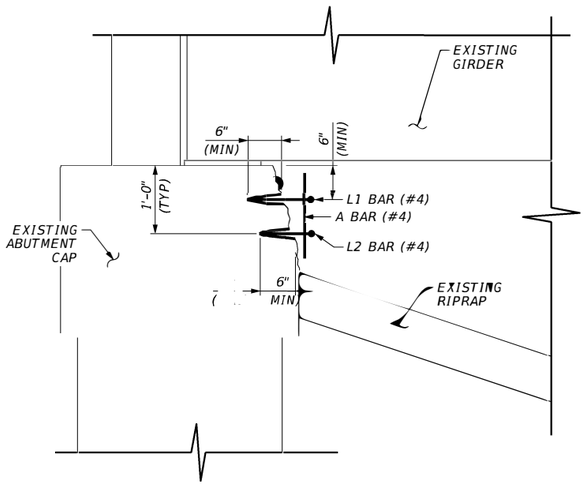


SECTION A-A



SECTION A-A

EXISTING CONDITIONS

STEP 1

1. DEFINE LIMITS OF ABUTMENT DAMAGE AND ROUGHEN SUBSTRATE TO ENSURE BOND BETWEEN PATCH MATERIAL AND ORIGINAL ABUTMENT CONCRETE (TYP)
2. PLACE BARS L (#4) BARS AND EPOXY EMBED INTO EXISTING ABUTMENT CONCRETE.
3. PLACE BARS A (#4).
3. PLACE FORMWORK FOR CONCRETE PATCH.

GENERAL NOTES

1. PERFORM REPAIR IN ACCORDANCE WITH TXDOT ITEM 429, "CONCRETE STRUCTURE REPAIR", AND THE TXDOT CONCRETE REPAIR MANUAL CHAPTER 3 SECTION 3, MARCH 2021 IN ADDITION TO DETAILS SHOWN ON THIS SHEET.
2. CONTRACTOR TO SUBMIT ALL MATERIALS AND METHODS OF APPLICATION FOR APROVAL.
3. NOTIFY EOR IF EXISTING CONDITIONS DO NOT MATCH THE PHOTOS DURING REPAIR.
4. CONTRACTOR TO TAKE CARE NOT TO UNDERMINE OR DAMAGE THE GIRDER BEARING SEAT OR GIRDER. IF THE CONCRETE BEARING SEAT IS DISTURBED OR DAMAGED, THE CONTRACTOR SHALL REPAIR THE DAMAGED BEARING SEAT AND RESET THE BEARING PAD. IN THIS CASE, SEE LIFTING NOTES BELOW. CONTRACTOR SHALL SUBMIT LIFTING PLANS AND CALCULATIONS TO THE ENGINEER FOR APPROVAL. DESIGN LIFTING DEVICE AND SUPPORTS FOR DEAD LOAD WITH APPROPRIATE LOAD FACTORS IN ACCORDANCE WITH ITEM 495, "RAISING EXISTING STRUCTURES". BEARING PAD IS INCIDENTAL TO THE COST OF JACKING THE GIRDER. UNFACTORED LOADS ARE SHOWN IN TABLE BELOW. (DEAD LOAD HAS THE FACTOR OF SAFETY OF 2 APPLIED.)
5. DURING SURFACE PREPARATION THE CONTRACTOR SHALL REMOVE ALL EXISTING MORTAR APPLIED AT PREVIOUS REPAIRS.
6. ELEMENT LOCATIONS AND DIMENSIONS ARE APPROXIMATE AND BASED ON AS-BUILT PLANS, PHOTOS, AND SITE VISITS. ACTUAL LOCATIONS AND DIMENSIONS SHOULD BE FIELD VERIFIED.

MATERIAL NOTES

1. USE REPAIR MATERIAL IN ACCORDANCE WITH THE TXDOT CONCRETE REPAIR MANUAL CHAPTER 3 SECTION 3, MARCH 2021.

LIFTING NOTES

1. SHIFT TRAFFIC ON THE BRIDGE SO NO LIVE LOADS ARE APPLIED TO THE LIFTED GIRDER(S) THROUGH THE DURATION OF THE REPAIR PROCESS.
2. CONTRACTOR SHALL SUBMIT LFITING PLANS AND CALCULATION TO THE ENGINEER FOR APPROVAL BEFORE BEGINNING WORK. DESIGN LIFTING DEVICE AND SUPPORTS FOR DEAD LOAD WITH APPROPRIATE LOAD FACTORS IN ACCORDANCE WITH ITEM 495, "RAISING EXISTING STRUCTURES". UNFACTORED LOADS ARE SHOWN IN TABLE BELOW.

NBI	SPAN #	LOCATION	BEAM LOCATION	JACKING DEAD LOAD TON/BEAM
17-057-0-237-03-323	5	SW ABUTMENT	EXTERIOR	50
	5	SW ABUTMENT	INTERIOR	55

(1) MEASUREMENT IS BASED ON SITE VISITS AND MAY VARY ± 6"

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
SEYED A. KHODAEAN
132870
LICENSED PROFESSIONAL ENGINEER
4/12/2023

OMEGA ENGINEERS, INC.
8200 N. MOPAC EXPRESSWAY, STE #280
AUSTIN, TEXAS 78759
OMEGAENGINEERS.COM
TX PE Firm Reg. No. F-2147
P:512 575 2288 F:281 647 9184

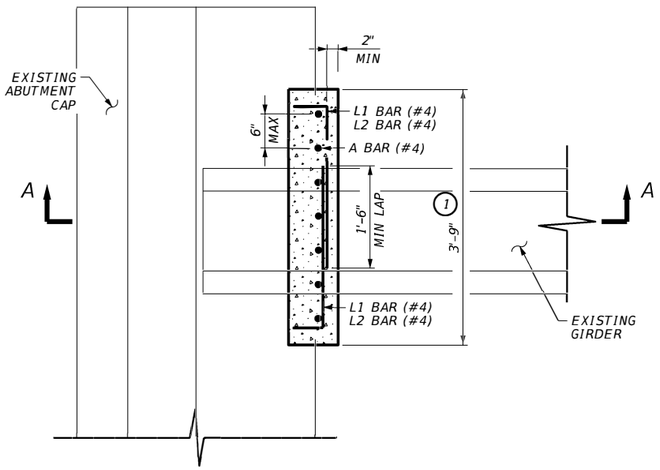
Texas Department of Transportation — Dallas District Bridge

BRIDGE MAINTENANCE

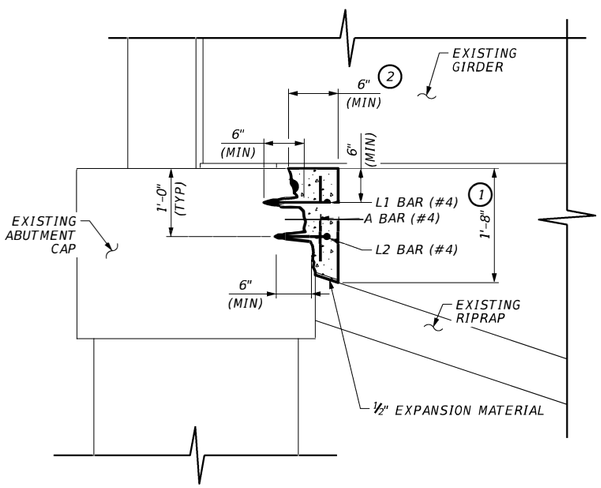
ABUTMENT STEP REPAIR DETAILS

SHEET 1 OF 2

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		142



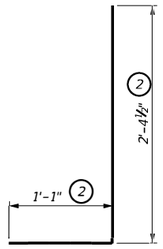
PLAN



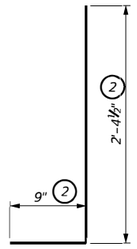
SECTION A-A

1. PLACE ½" EXPANSION MATERIAL.
2. PLACE THE CONCRETE ABUTMENT STEP. ALLOW 72 HOURS TO CURE.
3. REMOVE FORMWORK.

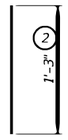
STEP 2



L1 BAR



L2 BAR



BAR A

(1) MEASUREMENT IS BASED ON SITE VISITS AND MAY VARY ± 6"
(2) MEASUREMENT IS BASED ON SITE VISITS AND MAY VARY ± 1"

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
SEYED A. KHODAEAN
32870
LICENSED PROFESSIONAL ENGINEER
4/12/2023

OMEGA ENGINEERS, INC.
8200 N. MOPAC EXPRESSWAY, STE #280
AUSTIN, TEXAS 78759
OMEGAENGINEERS.COM
TX PE Firm Reg. No. F-2147
P:512 575 2288 F:281 647 9184

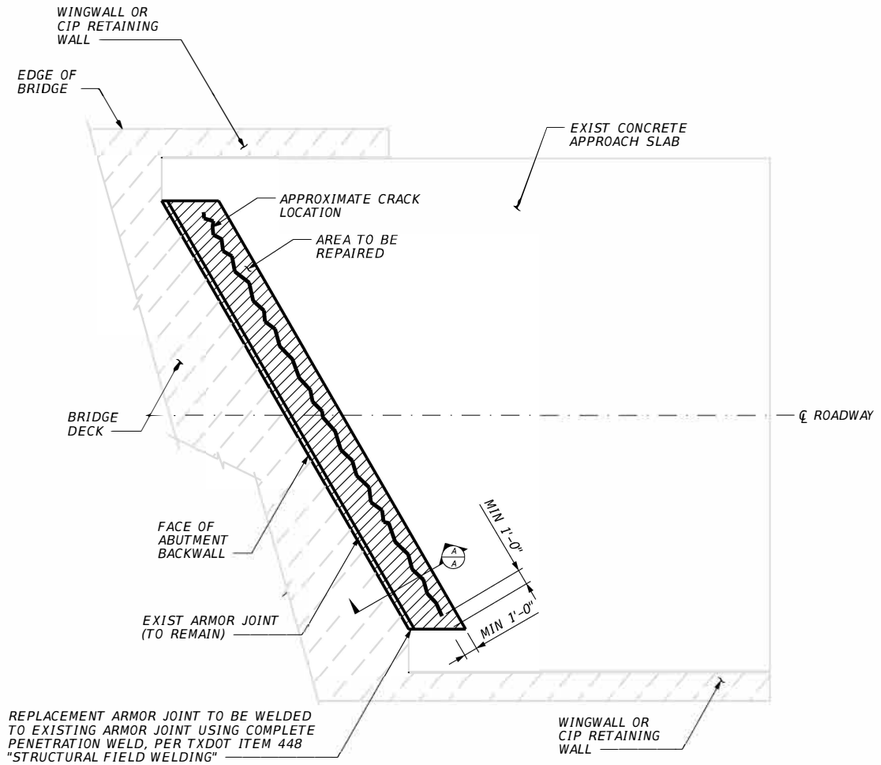
Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

ABUTMENT STEP REPAIR DETAILS

SHEET 2 OF 2

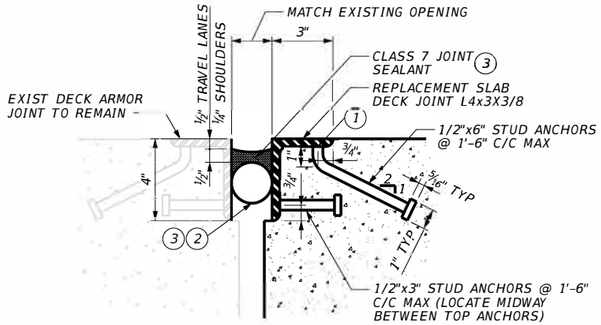
FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		143



PLAN

SCALE: NTS

1. STUD ANCHORS SHALL BE ELECTRIC ARC END-WELDED TO THE ANGLES WITH COMPLETE FUSION.
2. PROVIDE BACKER ROD 25% LARGER THAN JOINT OPENING AND COMPATIBLE WITH THE SEALANT. USE OF MULTIPLE PIECES TO CREATE A BACKER ROD CROSS SECTION IS NOT PERMITTED. TOP OF BACKER ROD MUST BE CONVEX AS SHOWN.
3. IF JOINT OPENING IS LESS THAN ⅛" OR WHERE APPROVED BY THE ENGINEER, OMIT BACKER ROD AND SEAL JOINT PER SPECIAL CONDITIONS NOTE.



DETAIL A

SCALE: NTS

PROCEDURE FOR REPLACING AND SEALING JOINTS:

1. REMOVE EXISTING SEAL, IF PRESENT. CLEAN JOINT OPENING OF ALL DIRT AND OTHER DELETERIOUS MATERIALS IN ACCORDANCE WITH ITEM 438, "CLEANING AND SEALING JOINTS". CLEAN FULL DEPTH OF JOINT.
2. ABRASIVE BLAST CLEAN EXISTING STEEL SURFACE WHERE SILICONE SEAL IS TO BE PLACED.
3. OBTAIN APPROVAL OF CLEANED JOINT PRIOR TO PROCEEDING WITH JOINT SEALING OPERATION.
4. PLACE BACKER ROD INTO JOINT OPENING 1" BELOW THE TOP OF CONCRETE IN TRAVEL LANES AND ¾" IN SHOULDERS.
5. SEAL THE JOINT OPENING WITH A CLASS 7 JOINT SEALANT. RECESS SEAL ½" BELOW TOP OF CONCRETE IN TRAVEL LANES AND ¼" BELOW TOP OF CONCRETE IN SHOULDERS.

SPECIAL CONDITIONS NOTE:

IF JOINT OPENING IS LESS THAN ⅛" OR WHERE APPROVED BY THE ENGINEER, THE USE OF THE BACKER ROD MAY BE ELIMINATED. FOR THIS CASE THE JOINT MAY BE SEALED WITH CLASS 7 SEALANT ONLY. THE CONTRACTOR SHALL PLACE THE SEALANT AND TOOL THE MATERIAL INTO THE JOINT TO ENSURE AS TIGHT A SEAL AS POSSIBLE.

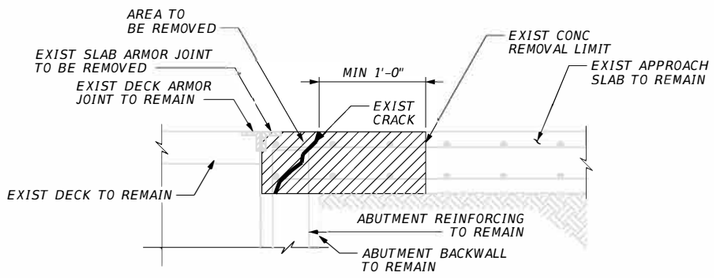
GENERAL NOTES

1. THE DETAILS ON THIS SHEET PROVIDE THE OVERALL LIMITS OF THE PROPOSED JOINT REPLACEMENT. THE CONTRACTOR SHALL DEVELOP AND SUBMIT REPLACEMENT PLANS AND PROCEDURES BASED ON THEIR PROPOSED METHODS OF CONSTRUCTION AND THE PROPOSED TRAFFIC CONTROL PLANS PROVIDED ELSEWHERE IN THESE PLANS, PRIOR TO COMMENCING ANY DEMOLITION AND REHABILITATION ACTIVITIES.
2. CONTRACTOR SHALL OBTAIN APPROVAL FOR ALL MATERIALS AND WORK METHODS BEFORE BEGINNING WORK. APPROVAL ITEMS SHALL INCLUDE, BUT NOT BE LIMITED TO, SEQUENCE OF CONSTRUCTION, JOINT REMOVAL PLAN, ARMOR JOINT SHOP DRAWINGS, PROPOSED MATERIALS, FORMING METHODS, AND CONCRETE REMOVAL & REPLACEMENT PROCEDURES
3. ALL DIMENSIONS SHOWN ARE BASED ON AS-BUILT DRAWINGS. CONTRACTOR IS RESPONSIBLE TO VERIFY ALL LOCATIONS, DIMENSIONS, AND ELEVATIONS OF EXISTING STRUCTURE, UTILITIES, ETC.
4. PERFORM WORK IN ACCORDANCE WITH ITEM 429, "CONCRETE STRUCTURE REPAIR", AND THESE PLANS. FOR STRUCTURAL REPAIR WORK USE A PRE-APPROVED TYPE B MATERIAL PER DMS 4655, "CONCRETE REPAIR MATERIALS."
5. PRIOR TO BEGINNING REPAIR ASPHALT OVERLAY SHALL BE REMOVED, IF PRESENT (VERIFY IN FIELD). ADDITIONALLY REMOVE ALL PREVIOUSLY APPLIED REPAIR MATERIALS. USE ONLY HAND TOOLS OR POWER-DRIVEN CHIPPING HAMMERS (15 LB MAX) TO REMOVE CONCRETE AND TO EXCAVATE AROUND THE REINFORCING BARS.
6. AFTER REMOVAL OF OVERLYING ASPHALT, VERIFY EXTENT OF DAMAGE AND REPAIRS PRIOR TO PROCEEDING. ESTIMATES WERE QUANTIFIED ASSUMING ALL SURFACIAL ASPHALT CRACKING CORRESPONDED TO UNDERLYING SLAB CRACKING. IMMEDIATELY NOTIFY ENGINEER IF ANY DISCREPANCIES ARE NOTED BETWEEN THE PLANS AND ACTUAL FIELD CONDITIONS.
7. EXISTING TRANSVERSE BARS MUST EXTEND INTO NEW CONCRETE FOR A MINIMUM OF 2'-0".
8. BRIDGE 12, SEE REPAIR D1207 FOR ADDITIONAL INFORMATION.
   BRIDGE 13, SEE REPAIR D1306 FOR ADDITIONAL INFORMATION.

MATERIAL NOTES:

1. PROVIDE TYPE B ULTRA-RAPID REPAIR MATERIAL, SIKACRETE®-421 CI RAPID OR EQUIVALENT, PER TxDOT DMS 4655 CONCRETE REPAIR MATERIALS". REPAIR MATERIAL SHALL REACH A MINIMUM COMPRESSIVE STRENGTH OF 3600 PSI PRIOR TO THE REPAIR BEING OPENED TO TRAFFIC.
2. PROVIDE GRADE 60 REINFORCING STEEL.
3. PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:

   UNCOATED ~ #4 = 1'-7"
   #5 = 2'-0"

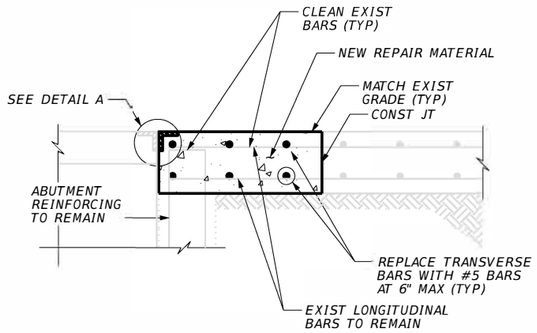


REMOVAL TYPICAL SECTION A-A

SCALE: NTS

REPAIR PROCEDURES:

1. REMOVE CONCRETE AS INDICATED IN DRAWING. TAKE ALL NECESSARY PRECAUTIONS TO PREVENT ANY DAMAGE TO REINFORCEMENT WHEN REMOVING CONCRETE.
2. REMOVE RUST, OIL, AND OTHER CONTAMINATES FROM CONCRETE AND REINFORCING STEEL SUBSTANCES. JUST PRIOR TO PATCHING BLAST THE REPAIR AREA USING A HIGH-PRESSURE AIR COMPRESSOR EQUIPPED WITH FILTERS TO REMOVE OIL.
3. OBTAIN A SATURATED SURFACE DRY (SSD) AT THE INTERFACE OF THE EXISTING CONCRETE USING A HIGH-PRESSURE WATER BLAST OR OTHER APPROVED METHOD, SURFACE MAY BE DAMP BUT MUST BE FREE OF STANDING WATER.



REPLACEMENT TYPICAL SECTION A-A

SCALE: NTS

4. PLACE REPAIR MATERIAL PER MANUFACTURER'S SPECIFICATIONS.
5. MOIST CURE THE PATCH MATERIAL FOR A MINIMUM 72 HOURS USING WET MATS, WATER SPRAY, POUNDING, OR OTHER METHOD APPROVED BY THE ENGINEER.
6. SEAL THE JOINT AS DESCRIBED IN DETAIL A.

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
IFTEKHAR AHMAD
140517
LICENSED
PROFESSIONAL ENGINEER
04/05/2023

infraTECH
Engineers & Innovators, LLC
11111 Willcrest Green Dr. Suite #410
Houston, Texas 77042
TBPE REGISTRATION NO. F-18368

Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

APPROACH SLAB JOINT REPAIR DETAILS

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
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REVISIONS	2374	03	098	IH 20
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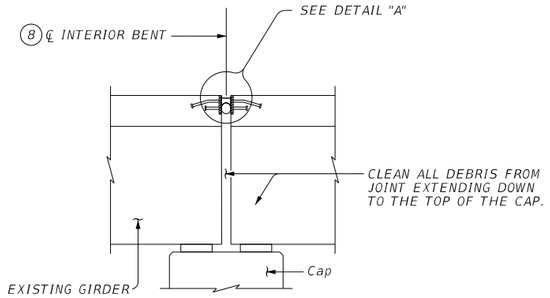
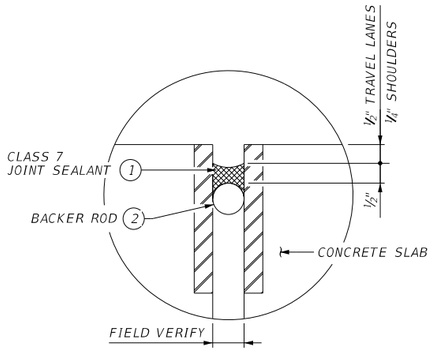
	DAL	DALLAS		144



ARMOR JOINT (8)

(SHOWN WITHOUT ACP OVERLAY. ARMOR JOINT WITH ACP OVERLAY SIMILAR.)



DETAIL "A"

(STUD ANCHORS NOT SHOWN FOR CLARITY.)

PROCEDURE FOR CLEANING AND SEALING EXISTING ARMOR JOINTS:

1) REMOVE EXISTING SEAL, IF PRESENT. CLEAN JOINT OPENING OF ALL DIRT AND OTHER DELETERIOUS MATERIALS IN ACCORDANCE WITH ITEM 438, "CLEANING AND SEALING JOINTS." CLEAN JOINT OUT FULL DEPTH OF THE JOINT.

2) ABRASIVE BLAST CLEAN EXISTING STEEL SURFACE WHERE SILICONE SEAL IS TO BE PLACED.

3) OBTAIN APPROVAL OF CLEANED JOINT PRIOR TO PROCEEDING WITH JOINT SEALING OPERATION.

4) PLACE BACKER ROD INTO JOINT OPENING 1" BELOW THE TOP OF CONCRETE.

5) SEAL THE JOINT OPENING WITH A CLASS 7 JOINT SEALANT. RECESS SEAL ½" BELOW TOP OF CONCRETE IN TRAVEL LANES AND ¼" BELOW TOP OF CONCRETE IN SHOULDERS.

SPECIAL CONDITIONS NOTE:
IF JOINT OPENING IS LESS THAN ½" OR WHERE APPROVED BY THE ENGINEER, THE USE OF THE BACKER ROD MAY BE ELIMINATED. FOR THIS CASE THE JOINT MAY BE SEALED WITH CLASS 7 SEALANT ONLY. THE CONTRACTOR SHALL PLACE THE SEALANT AND TOOL THE MATERIAL INTO THE JOINT TO ENSURE AS TIGHT A SEAL AS POSSIBLE.

REPAIR TYPE A

GENERAL NOTES:

1. CLEANING EXISTING JOINT OPENING (FULL DEPTH) OF ALL DEBRIS, PROVIDING AND PLACING BACKER ROD, SAW-CUTTING ASPHALT OVERLAY, AND SEALING JOINT IS PAID FOR BY ITEM 438, "CLEANING AND SEALING JOINTS" AND MEASURED BY THE LINEAR FOOT.
2. OBTAIN APPROVAL FOR ALL TOOLS, EQUIPMENT, MATERIALS AND TECHNIQUES PROPOSED TO CLEAN AND SEAL THE JOINT.
3. PROVIDE CLASS 7 JOINT SEALANT IN ACCORDANCE WITH DMS-6310, "JOINT SEALANTS AND FILLERS" FOR JOINTS IN CONCRETE.
4. EXTEND SEALANT UP INTO RAIL OR CURB 3 INCHES ON LOW SIDE OR SIDES OF DECK. IF THE CLASS 7 JOINT SEALANT CANNOT BE EFFECTIVELY PLACED IN THE VERTICAL POSITION, A CLASS 4 JOINT SEALANT COMPATIBLE WITH THE CLASS 7 JOINT SEALANT IS ALLOWED FOR THE EXTENSION OF THE SEAL INTO THE CURB OR RAIL. PREPARE SURFACES WHERE SEALANT IS TO BE PLACED IN ACCORDANCE WITH MANUFACTURER'S SPECIFICATIONS.
5. SEE ESTIMATED QUANTITIES SHEET FOR BRIDGE REPAIR TYPE LOCATIONS.
6. FOR ARMOR JOINT REPLACMENTS SEE ARMOR JOINT STANDARD FOR ADDTIONAL DETAILS AND DIMENSIONS NOT SHOWN.

(1) USE CLASS 7 JOINT SEALANT IN ACCORDANCE WITH DMS-6310, "JOINT SEALANTS AND FILLERS." PREPARE JOINT AND SEAL IN ACCORDANCE WITH ITEM 438 "CLEANING AND SEALING JOINTS."

(2) PROVIDE BACKER ROD 25% LARGER THAN JOINT OPENING AND COMPATIBLE WITH THE SEALANT. USE OF MULTIPLE PIECES TO CREATE A BACKER ROD CROSS SECTION IS NOT PERMITTED. TOP OF BACKER ROD MUST BE CONVEX AS SHOWN.

(8) SHOWING INTERIOR BENT CONFIGURATION, ABUTMENT CONFIGURATION SIMILAR.

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
BRADLEY D. SHUEY
86490
LICENSED
PROFESSIONAL ENGINEER
03/29/2023

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

BRIDGE JOINT REPAIR DETAILS

SHEET 1 OF 3

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
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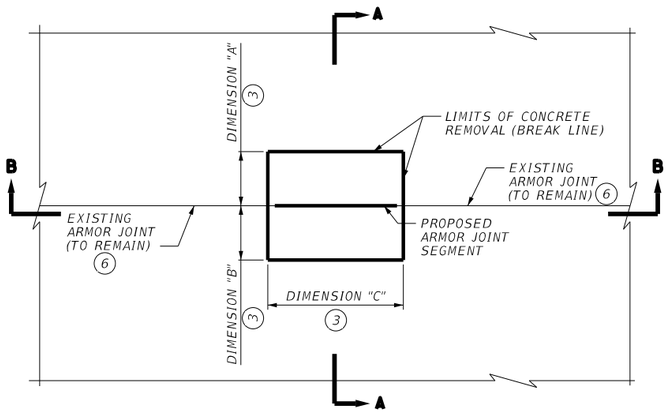
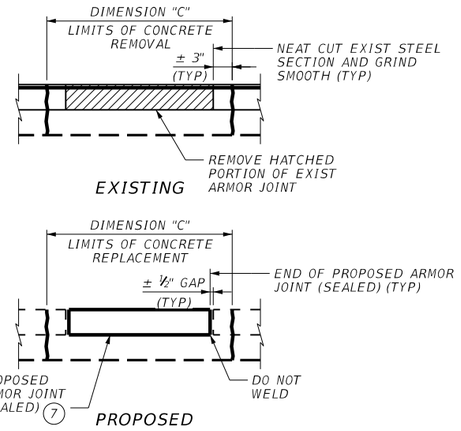
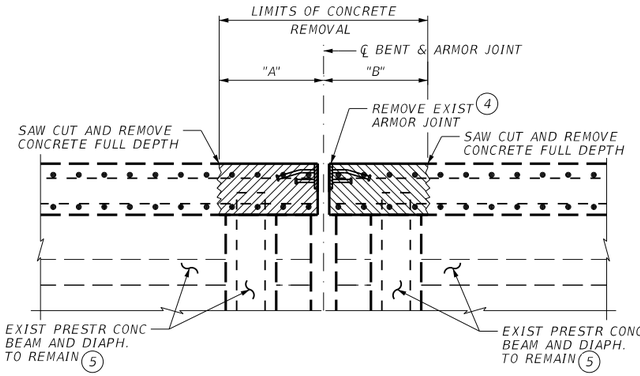


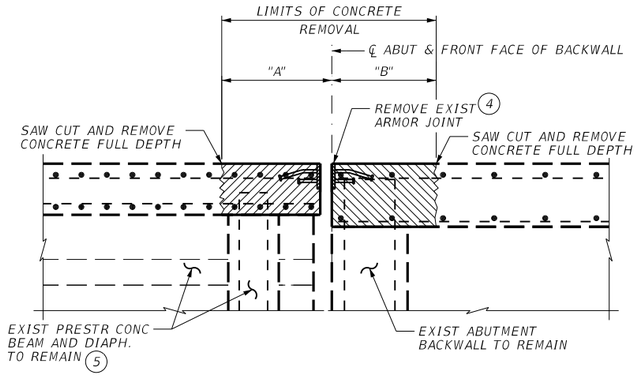
PLAN - ARMOR JOINT



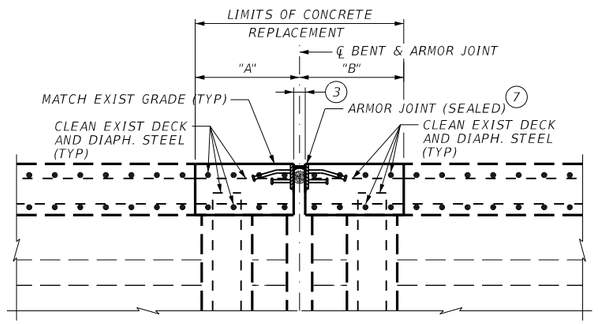
ARMOR JOINT REMOVAL LIMITS SECTION B-B



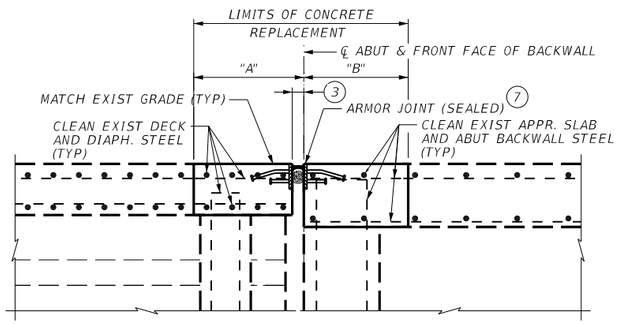
REMOVAL TYPICAL SECTION A-A



REMOVAL TYPICAL SECTION A-A



JOINT REPLACEMENT TYPICAL SECTION A-A



JOINT REPLACEMENT TYPICAL SECTION A-A

REPAIR TYPE F (AT BENT)

REPAIR TYPE F (AT ABUTMENT)

BRIDGE JOINT REPLACMENT NOTES:

THE DETAILS ON THIS SHEET PROVIDE THE OVERALL LIMITS OF THE PROPOSED JOINT REPLACEMENT. THE CONTRACTOR SHALL DEVELOP REPLACEMENT PLANS AND PROCEDURES BASED ON THEIR PROPOSED METHODS OF CONSTRUCTION AND THE PROPOSED TRAFFIC CONTROL PLANS PROVIDED ELSEWHERE IN THESE PLANS.

CONTRACTOR SHALL OBTAIN APPROVAL FOR ALL MATERIALS AND WORK METHODS BEFORE BEGINNING WORK. APPROVAL ITEMS SHALL INCLUDE, BUT NOT BE LIMITED TO, SEQUENCE OF CONSTRUCTION, JOINT REMOVAL PLAN, ARMOR JOINT SHOP DRAWINGS, PROPOSED MATERIALS, FORMING METHODS, AND CONCRETE REMOVAL & REPLACEMENT PROCEDURES.

HATCHED AREAS INDICATE PORTION OF EXISTING SLAB TO BE REMOVED. REMOVE AND REPLACE FULL DEPTH PORTION OF SLAB IN ACCORDANCE WITH ITEM 422 "CONCRETE SUPERSTRUCTURES", ITEM 429 "CONCRETE STRUCTURE REPAIR" AND THE 2021 TxDOT CONCRETE REPAIR MANUAL (CHAPTER 3, SECTION 4 BRIDGE DECK REPAIR).

PRIOR TO REMOVAL OF THE SLAB, SAW CUT THE TOP SURFACE ALONG THE "BREAK LINE" TO A DEPTH OF ½". ADJUST DEPTH AS NECESSARY TO AVOID DAMAGING THE EXISTING REINFORCEMENT.

DO NOT DAMAGE THE EXISTING REINFORCEMENT DURING REMOVAL OF THE DESIGNATED PORTION OF THE EXISTING SLAB. ABRASIVE BLAST CLEAN STEEL. INSPECT CLEANED STEEL FOR DAMAGE. REPLACE DAMAGED BARS IF CROSS SECTION IS REDUCED GREATER THAN 25%, ANY BAR CRACKING HAS OCCURRED, OR AS DIRECTED BY THE ENGINEER.

REPLACEMENT BARS SHALL MATCH EXISTING BAR SIZE. PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:

UNCOATED ~ #4 = 1'-7"
#5 = 2'-0"

IF REQUIRED BAR LAP LENGTHS CANNOT BE SATISFIED, PROVIDE A PRE APPROVED FULL TENSION MECHANICAL SPLICE COUPLER PER ITEM 440.2.8 "MECHANICAL COUPLERS".

PAYMENT FOR THE DECK JOINT REPLACEMENT WILL BE IN ACCORDANCE WITH ITEM 785 "BRIDGE JOINT REPAIR OR REPLACEMENT".

1. USE CLASS 7 JOINT SEALANT IN ACCORDANCE WITH DMS-6310, "JOINT SEALANTS AND FILLERS." PREPARE JOINT AND SEAL IN ACCORDANCE WITH ITEM 438 "CLEANING AND SEALING JOINTS."
2. PROVIDE BACKER ROD 25% LARGER THAN JOINT OPENING AND COMPATIBLE WITH THE SEALANT. USE OF MULTIPLE PIECES TO CREATE A BACKER ROD CROSS SECTION IS NOT PERMITTED. TOP OF BACKER ROD MUST BE CONVEX AS SHOWN.
3. REFER TO BRIDGE SPECIFIC REPAIR DETAIL SHEETS FOR DIMENSIONS "A", "B", "C" AND JOINT OPENING WIDTH.
4. EXISTING ARMOR JOINT TYPE AND CONFIGURATION MAY VARY. SEE BRIDGE SPECIFIC REPAIR DETAIL SHEETS FOR PHOTOGRAPHS AND ADDITIONAL INFORMATION.
5. SHOWING DECK AND BEAM CONFIGURATION WITH DIAPHRAGMS. CONDITION MAY VARY. SEE BRIDGE SPECIFIC REPAIR DETAIL SHEETS FOR PHOTOGRAPHS AND ADDTIONAL INFORMATION.
6. CLEAN AND SEAL EXISTING JOINT. SEE BRIDGE SPECIFIC REPAIR DETAIL SHEETS FOR ADDITONAL INFORMATION AND QUANTITIES.
7. ARMOR JOINT (SEALED): REFER TO ARMOR JOINT STANDARD FOR JOINT DETAILS, INSTALLATION, FABRICATION REQUIREMENTS, AND OTHER INFORMATION NOT SHOWN.

MATERIAL NOTES:

1) PROVIDE TYPE B ULTRA-RAPID REPAIR MATERIAL PER TxDOT DMS 4655 "CONCRETE REPAIR MATERIALS". REPAIR MATERIAL SHALL REACH A MINIMUM COMPRESSIVE STRENGTH OF 3600 PSI PRIOR TO THE REPAIR BEING OPENED TO TRAFFIC.
2) PROVIDE GRADE 60 REINFORCING STEEL.
3) PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:

UNCOATED ~ #4 = 1'-7"
#5 = 2'-0"

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
BRADLEY D. SHUEY
86490
LICENSED PROFESSIONAL ENGINEER
03/16/2023

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ENGINEERING INNOVATORS
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Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

BRIDGE JOINT REPAIR DETAILS

SHEET 2 OF 3

FILE:	SEE PATH	DN:	BDS	CK:	RJW	DW:	JCE	CK:	RJW
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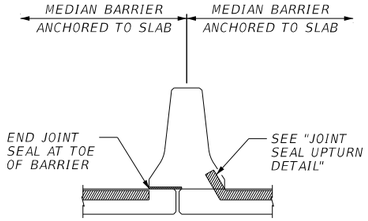
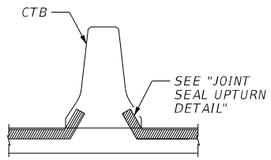
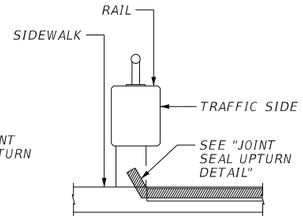


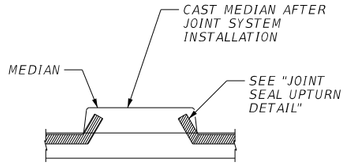
WITH OPEN DECK JOINT
BELOW MEDIAN BARRIER



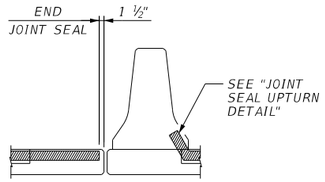
AT CONCRETE TRAFFIC BARRIER



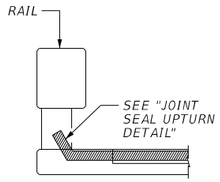
AT SIDEWALK
BEHIND BRIDGE RAIL



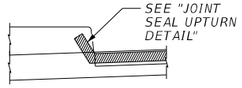
AT RAISED MEDIAN



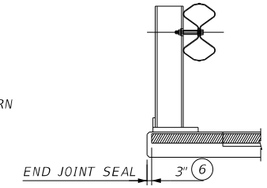
WITH OPEN DECK JOINT
ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL



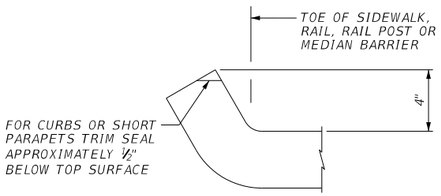
AT SIDEWALK



AT STEEL POST BRIDGE RAIL

JOINT SEALANT TERMINATION DETAILS

(6) 1 ½" for precompressed foam and silicone seal



JOINT SEAL UPTURN DETAIL

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
BRADLEY D. SHUEY
86490
LICENSED
PROFESSIONAL ENGINEER
03/16/2023

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
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Texas Department of Transportation

Dallas District Bridge

BRIDGE MAINTENANCE

BRIDGE JOINT REPAIR DETAILS

SHEET 3 OF 3

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
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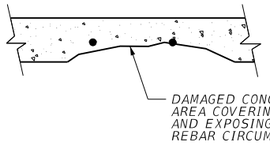
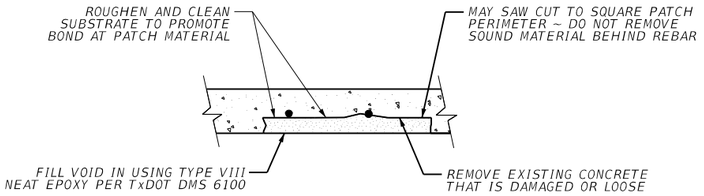
	DAL	DALLAS		147



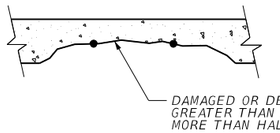
STEP 1 - DAMAGED CONDITION



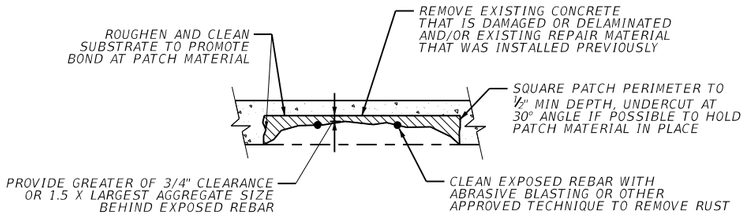
STEP 2 - EXCAVATION, PREPARATION AND PATCH

MINOR SPALL REPAIR DETAIL

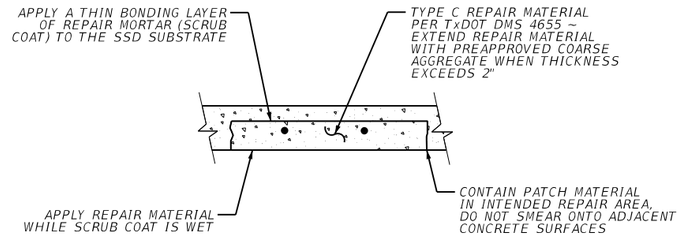
(TxDOT CONCRETE REPAIR MANUAL SECTION 3.1)



STEP 1 - DAMAGED CONDITION



STEP 2 - EXCAVATION AND PREPARATION

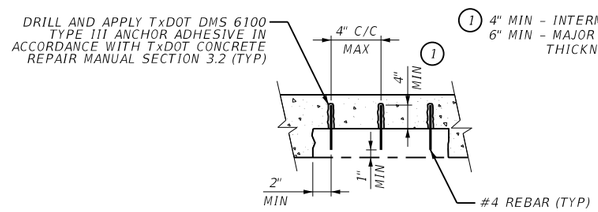


STEP 3 - PATCH DAMAGED AREA

INTERMEDIATE SPALL REPAIR DETAIL

(TxDOT CONCRETE REPAIR MANUAL SECTION 3.2)

IF BATCHED CONCRETE IS SELECTED AS THE REPAIR MATERIAL, FOLLOW THE PROVISIONS OF TxDOT CONCRETE REPAIR MANUAL SECTION 3.3



MECHANICAL TIE DETAIL

REPAIR NOTES:

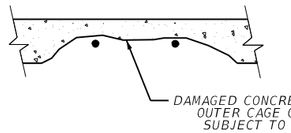
PERFORM REPAIR IN ACCORDANCE WITH TxDOT ITEM 429, "CONCRETE STRUCTURE REPAIR", AND THE TxDOT CONCRETE REPAIR MANUAL, 2021. IN ADDITION TO DETAILS SHOWN ON THIS SHEET, THE MANUAL INCLUDES CRITERIA FOR APPLICATION, SURFACE PREPARATION, FORMS, AND CURING.

CONTRACTOR TO SUBMIT ALL MATERIALS AND METHODS OF APPLICATION FOR APPROVAL.

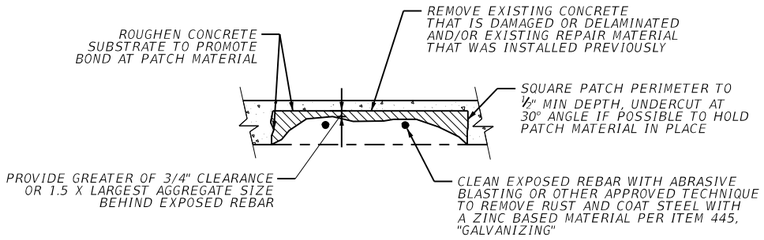
CONTRACTOR TO PROVIDE COMPRESSIVE STRENGTH TESTING OF TYPE C REPAIR MATERIAL AND CLASS "C" (HPC) CONCRETE.

APPLY MECHANICAL TIE DETAIL IN THE EVENT EXISTING REBAR IS CORRODED TO THE POINT OF NOT SUFFICIENTLY ANCHORING INTERMEDIATE AND MAJOR SPALL REPAIR MATERIAL TO THE SUBSTRATE.

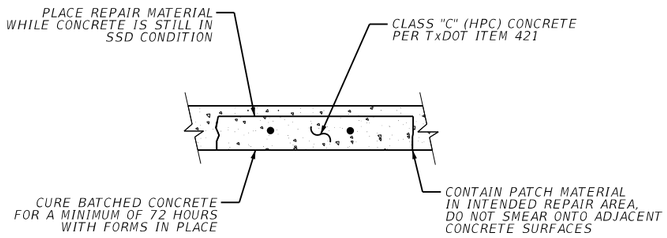
PRESTRESSED BEAM/GIRDER END REPAIRS (ONLY): IF THE DAMAGE OCCURS AT THE END OF A MEMBER AND PRESTRESSING STRAND IS EXPOSED, RECESS THE STRANDS A MINIMUM OF 3/8 INCH USING A TORCH OR OTHER APPROVED METHOD. DO NOT OVERHEAT OR DAMAGE THE SURROUNDING CONCRETE. FOR OTHER GIRDER REPAIRS SEE DETAILS PROVIDED ELSEWHERE IN THE PLANS.



STEP 1 - DAMAGED CONDITION



STEP 2 - EXCAVATION AND PREPARATION



STEP 3 - PATCH DAMAGED AREA

MAJOR SPALL REPAIR DETAIL

(TxDOT CONCRETE REPAIR MANUAL SECTION 3.3)

REMOVE AGGREGATE LARGER THAN ¾" FROM CLASS "C" (HPC) CONCRETE MIX DESIGN WHEN REPAIR THICKNESS WILL BE LESS THAN 3" OVER A SIGNIFICANT PORTION OF THE DAMAGED AREA

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
BRADLEY D. SHUEY
86490
LICENSED
PROFESSIONAL ENGINEER

03/29/2023

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation

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BRIDGE MAINTENANCE

GENERAL SPALL REPAIR DETAILS

FILE: SEE PATH	DN: BDS	CK: RJW	DW: JCE	CK: RJW
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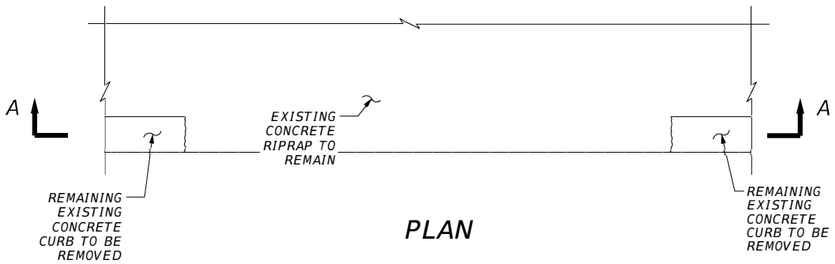
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		148



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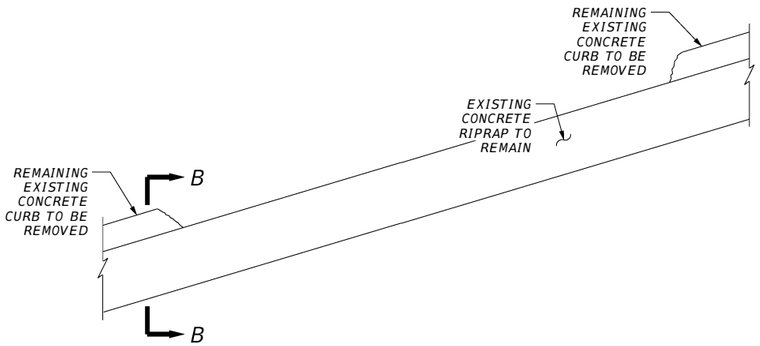
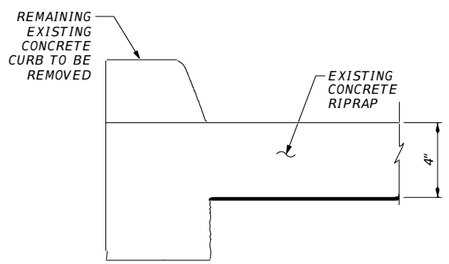
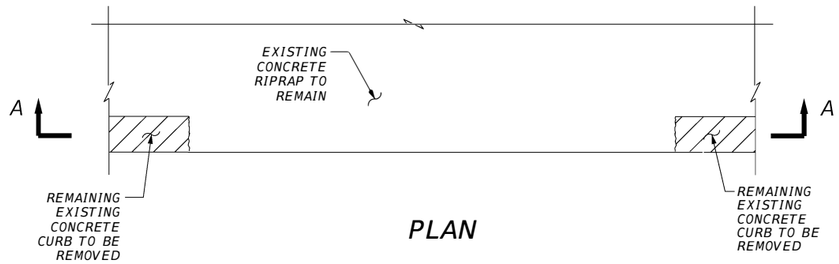


SECTION A-A



SECTION B-B

EXISTING CONDITION



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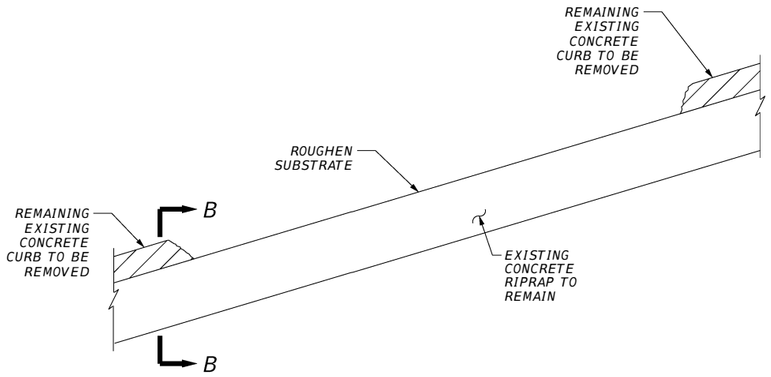
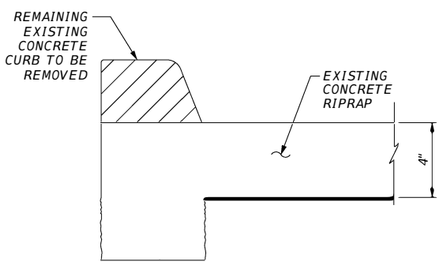


SECTION A-A



SECTION B-B

1. REMOVE EXISTING CONCRETE CURB. TAKE CARE TO NOT DAMAGE EXISTING CONCRETE RIPRAP.
2. ROUGHEN SUBSTRATE TO ENSURE BOND BETWEEN PATCH MATERIAL AND EXISTING CONCRETE RIPRAP.

STEP 1

GENERAL NOTES

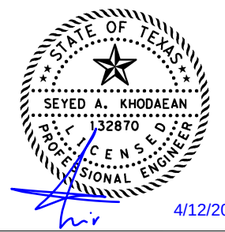
1. PERFORM REPAIR IN ACCORDANCE WITH TXDOT STANDARD CRR AND THE TXDOT CONCRETE REPAIR MANUAL, MARCH 2021 IN ADDITION TO DETAILS SHOWN ON THIS SHEET.
2. CONTRACTOR TO SUBMIT ALL MATERIALS AND METHODS OF APPLICATION FOR APROVAL.
3. HATCHED AREAS INDICATE A FULL REMOVAL OF THE EXISTING CONCRETE CURB ON THE SIDE OF RIPRAP AS DEFINED ON THE BRIDGE SPECIFIC REPAIR DETAIL SHEETS.
4. CLEAN OR REPLACE EXISTING DOWELS IF APPLICABLE. IF THE EXISTING DOWEL IS DAMAGED, DRILL AND EPOXY NEW DOWEL INTO THE EXISTING RIPRAP. IF NO EXISTING DOWEL IS PRESENT IN 2'-0" SPACING, PLACE NEW DOWEL.
5. PAYMENT FOR CURB REMOVAL WILL BE SUBSIDIARY TO TXDOT ITEM 529 "CONCRETE CURB, GUTTER, AND COMBINED CURB AND GUTTER".
6. PAYMENT FOR NEW CURB WILL BE IN ACCORDANCE WITH TXDOT ITEM 529 "CONCRETE CURB, GUTTER, AND COMBINED CURB AND GUTTER".
7. ALL REINFORCEMENT IS SUBSIDIARY TO TXDOT ITEM 529 "CONCRETE CURB, GUTTER, AND COMBINED CURB AND GUTTER".

MATERIAL NOTES

1) REFER TO TXDOT STANDARD CRR FOR ADDITIONAL MATERIAL INFORMATION.
2) PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:

   UNCOATED ~ #4 = 1'-9"
   UNCOATED ~ #5 = 2'-2"

NO.	DATE	REVISION	APPROV.



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Texas Department of Transportation
Dallas District Bridge

BRIDGE MAINTENANCE

NON-STRUCTURAL CURB REPLACEMENT

REPAIR DETAILS

SHEET 1 OF 2

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
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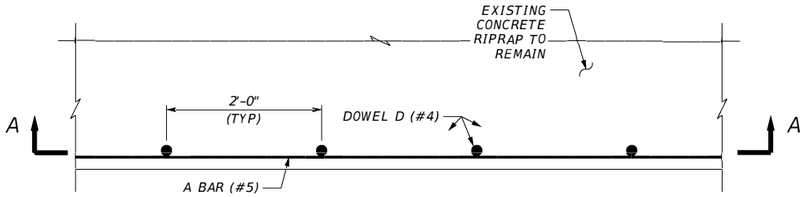
	DAL	DALLAS		149



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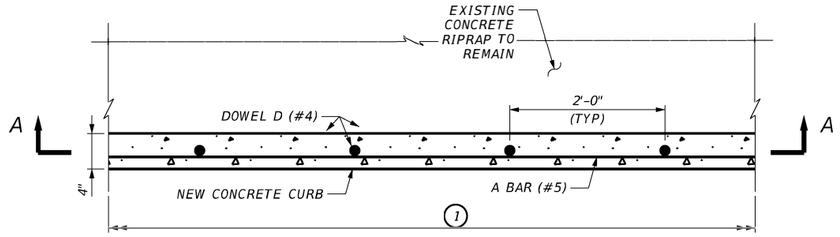
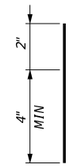
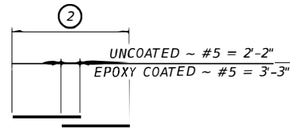


PLAN

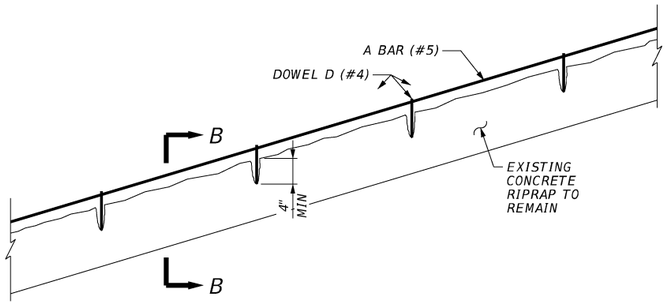
1. MATCH LENGTH OF EXISTING RIPRAP UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
2. MATCH LENGTH OF EXISTING RIPRAP WITH 2" OF COVER ON EITHER SIDE UNLESS OTHERWISE DIRECTED BY THE ENGINEER.



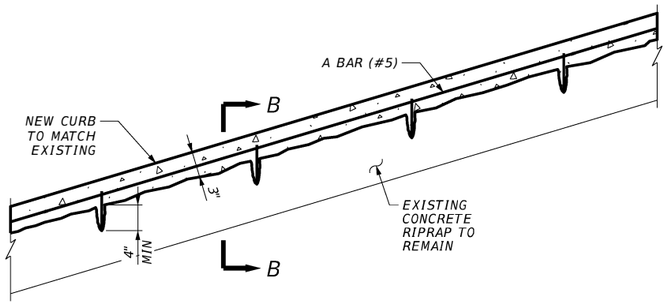
DOWEL D



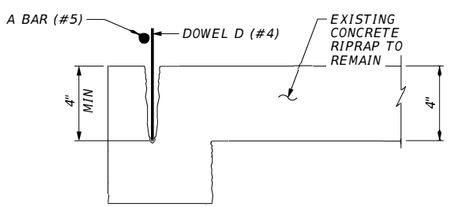
A BAR



SECTION A-A



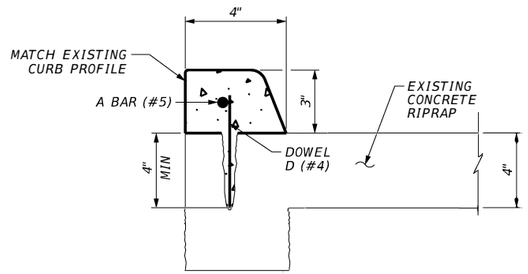
SECTION A-A



SECTION B-B

1. PLACE DOWEL D (#4) BARS AND EPOXY EMBED INTO EXISTING RIPRAP. FOLLOW MANUFACTURERS DIRECTIONS FOR INSTALLING THE EPOXIED ANCHOR BARS.
3. PLACE A BARS (#5).
4. PLACE FORMWORK FOR CONCRETE CURB.

STEP 2

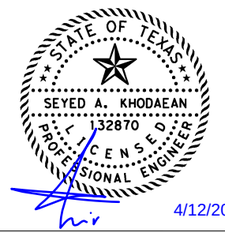


SECTION B-B

1. PLACE THE NEW CONCRETE CURB WHILE SUBSTRATE IS STILL IN SSD CONDITION. CURE CONCRETE FOR A MINIMUM OF 72 HOURS WITH FORMS IN PLACE.
2. REMOVE FORMWORK.

STEP 3

NO.	DATE	REVISION	APPROV.



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Texas Department of Transportation

Dallas District Bridge

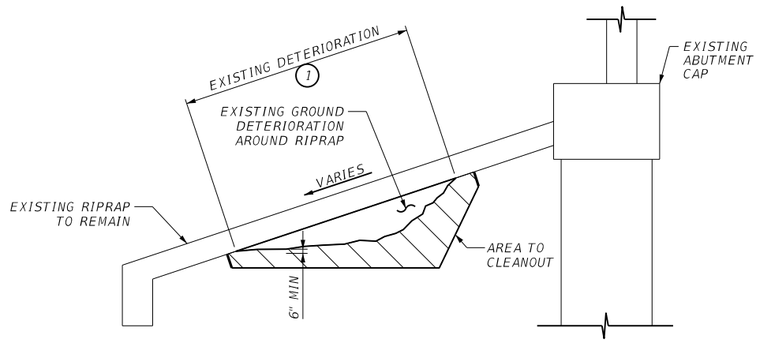
BRIDGE MAINTENANCE

NON-STRUCTURAL CURB REPLACEMENT

REPAIR DETAILS

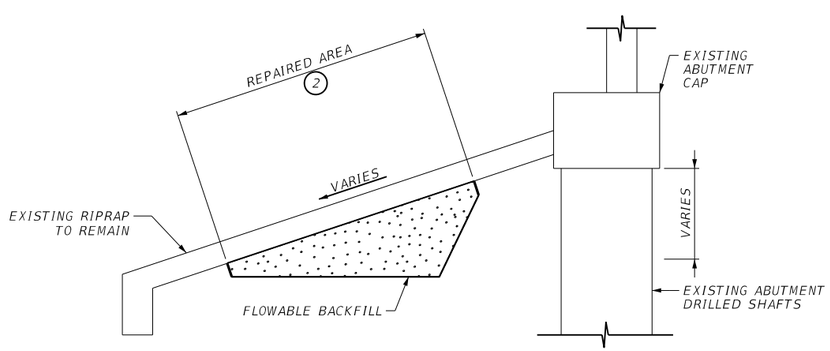
SHEET 2 OF 2

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		150



1. CLEANOUT AREA BELOW RIPRAP UNDERMINING 6" MIN FROM EXISTING GROUND.

STEP 1



1. PLACE FLOWABLE BACKFILL TO FILL VOID UNDER EXISTING RIPRAP AND TO RESTABLISH 3:1 EMBANKMENT SLOPE.

STEP 2

CONCRETE RIPRAP UNDERMINING REPAIR

GENERAL NOTES

1. PERFORM FLOWABLE CONCRETE BACKFILL REPAIR IN ACCORDANCE WITH TXDOT ITEM 401, "FLOWABLE BACKFILL".
2. CONTRACTOR TO SUBMIT ALL MATERIALS AND METHODS OF APPLICATION FOR APROVAL.
3. NOTIFY EOR IF EXISTING CONDITIONS DO NOT MATCH THE PHOTOS DURING REPAIR.
4. ELEMENT LOCATIONS AND DIMENSIONS ARE APPROXIMATE AND BASED ON AS-BUILT PLANS, PHOTOS, AND SITE VISITS. ACTUAL LOCATIONS AND DIMENSIONS SHOULD BE FIELD VERIFIED.
5. CONTRACTOR TO REGRADE THE SOIL TO MATCH TOP OF RIPRAP.
6. CLEANOUT/EXCAVATION AND GRADING OF EXISTING GROUND IS SUBSIDIARY TO ITEM 401 "FLOWABLE BACKFILL".

(1) BRIDGE 19 = 8'-0" ± 1'-0"
(2) BRIDGE 19 = 13'-0" ± 1'-0"

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS
SEYED A. KHODAEAN
132870
LICENSED
PROFESSIONAL ENGINEER
3/29/2023

OMEGA ENGINEERS, INC.
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BRIDGE MAINTENANCE

RIRRAP UNDERMINING

REPAIR DETAILS

FILE: SEE PATH	DN: AK	CK: GT	DW: TW	CK: AK
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	04	098	IH 20
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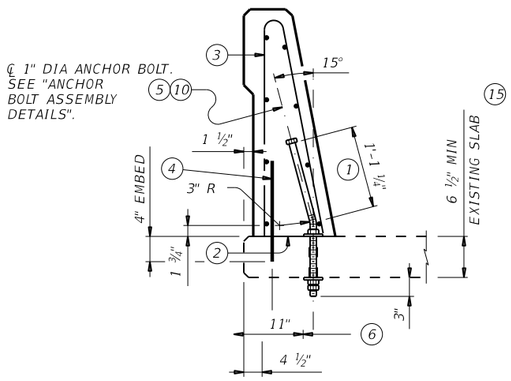
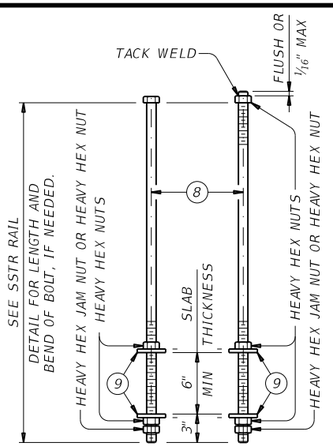
	DAL	DALLAS		151



(ANCHOR BOLT) SSTR RAIL RETROFIT SECTIONS ON SLABS (7)

SCALE: N.T.S



ANCHOR BOLT ASSEMBLY DETAILS (10)

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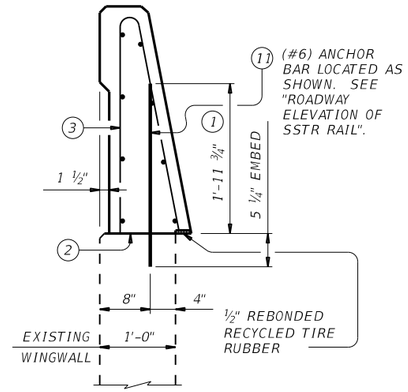


(ADHESIVE ANCHORS) SSTR RAIL RETROFIT SECTIONS ON WINGWALLS (7)

SCALE: N.T.S.

CONSTRUCTION NOTES:

FIELD VERIFY DIMENSIONS BEFORE COMMENCING WORK AND ORDERING MATERIALS.

BY ADDING ADDITIONAL ANCHORAGE, WELDING CAN BE PERFORMED AT A MINIMUM SPACING OF 3 FT BETWEEN THE CAGE AND ADDITIONAL ANCHORAGE. BY SATISFYING ADDITIONAL ANCHORAGE REQUIREMENTS SLIP FORMING IS ALLOWED. DO NOT WELD TO THE REQUIRED ANCHORAGE.

TEST ADHESIVE ANCHORS IN ACCORDANCE WITH ITEM 450.3.3, "TESTS". TEST 3 ANCHORS PER 100 ANCHORS INSTALLED. PERFORM CORRECTIVE MEASURES TO PROVIDE ADEQUATE CAPACITY IF ANY OF THE TESTS DO NOT MEET THE REQUIRED TEST LOAD. REPAIR DAMAGE FROM TESTING AS DIRECTED.

MATERIAL NOTES:

PROVIDE GRADE 60 REINFORCING STEEL.

EPOXY COAT OR GALVANIZE ALL REINFORCING STEEL IF REQUIRED ELSEWHERE.

(#6) AND (#4) ANCHOR BARS USED FOR THE ADHESIVE ANCHORAGE SYSTEM MUST NOT BE EPOXY COATED WITHIN THE REQUIRED EMBEDMENT.

GENERAL NOTES:

USE OF THIS RETROFIT DETAILS WILL RESULT IN A RAILING ACCEPTABLE FOR THE MASH TEST LEVEL INDICATED ON THE SSTR RAIL STANDARD.

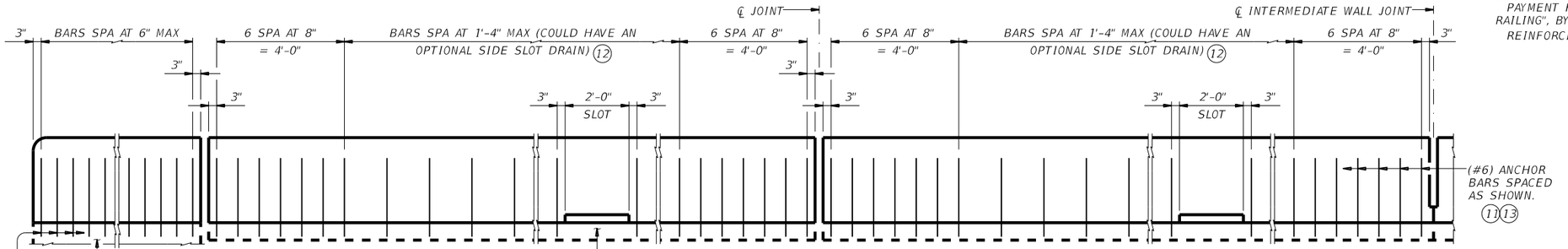
RAIL ANCHORAGE DETAILS SHOWN ON THIS PLAN SETS MAY REQUIRE MODIFICATION FOR SELECT STRUCTURE TYPES. SEE APPROPRIATE DETAILS ELSEWHERE IN PLANS FOR THESE MODIFICATIONS.

DO NOT REMOVE ANY PART OF A CURB UNTIL IT HAS BEEN EVALUATED TO NOT BE A LOAD-CARRYING STRUCTURAL COMPONENT.

REMOVAL AND REPLACEMENT OF BACKFILL, SUBGRADE, AND ASPHALT OR CONCRETE PAVEMENT NECESSARY FOR THIS INSTALLATION IS CONSIDERED SUBSIDIARY TO THE RETROFIT RAILING.

PAYMENT FOR A RAIL RETROFIT WILL BE AS PER ITEM 451, "RETROFIT RAILING", BY THE TYPE OF THE RAIL RETROFIT.

REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.



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

ROADWAY ELEVATION OF SSTR RAIL RETROFIT (14)

SCALE: N.T.S

(1) INCREASE BY AMOUNT OF EXISTING OVERLAY/SEAL COAT THICKNESS, NOT TO EXCEED 2". IF THICKNESS OF EXISTING OVERLAY/SEAL COAT IS GREATER THAN 2" AT TOE OF RAIL, TAPER OVERLAY AT A 1:10 OR FLATTER SLOPE OVER SHOULDER WIDTH TO A THICKNESS OF 2" OR LESS AT TOE OF RAIL.

(2) DO NOT CAST RAILS OR PARAPET WALLS ON TOP OF OVERLAYS/SEAL COATS.

(3) SEE "SSTR" RAIL STANDARD FOR REINFORCING STEEL. MODIFY LENGTH OF VERTICAL REINFORCING BARS AS REQUIRED TO FIT EXISTING STRUCTURE. LONGITUDINAL REINFORCING BARS MAY BE REMOVED ONLY IF THEIR POSITION PUTS THEM IN CONFLICT WITH UN-REMOVED PORTIONS OF EXISTING STRUCTURE.

(4) EMBED SECONDARY (#4) ANCHOR BARS 1'-4" IN LENGTH WITH A TYPE III CLASS C, D, E, OR F ANCHOR ADHESIVE. MINIMUM ADHESIVE ANCHOR EMBEDMENT DEPTH IS 4". ANCHOR ADHESIVE CHOSEN MUST BE ABLE TO ACHIEVE A BASIC BOND STRENGTH IN TENSION, NBA, OF 10 KIPS. SUBMIT SIGNED AND SEALED CALCULATIONS OR THE MANUFACTURER'S PUBLISHED LITERATURE SHOWING THE PROPOSED ANCHOR ADHESIVE'S ABILITY TO DEVELOP THIS LOAD TO THE ENGINEER FOR APPROVAL PRIOR TO USE. ANCHOR INSTALLATION, INCLUDING HOLE SIZE, DRILLING, AND CLEAN OUT, MUST BE IN ACCORDANCE WITH ITEM 450, "RAILING". (#4) ANCHOR BARS SPACED LONGITUDINALLY ALONG RAIL AT 4 FT MAX (SPACED 3" LONGITUDINALLY FROM OUTSIDE EDGE AND EDGE OF SIDE SLOT DRAINS).

(5) ℄ 1" DIA ANCHOR BOLT SPACED LONGITUDINALLY ALONG RAIL AT 24" MAX (SPACED 6" LONGITUDINALLY FROM OUTSIDE EDGE AND EDGE OF OPTIONAL SIDE SLOT DRAINS, IF REQUIRED).

(6) ℄ 1 1/16" TO 1 ¼" DIA HOLES. CORE DRILL HOLES THROUGH EXISTING DECK (PERCUSSION DRILLING NOT PERMITTED). CONCRETE SPALLS IN THE BOTTOM OF THE DECK EXCEEDING ½" FROM EDGE OF HOLES WILL BE PATCHED IN ACCORDANCE WITH ITEM 429, "CONCRETE STRUCTURE REPAIR" AT THE CONTRACTOR'S EXPENSE.

(7) SHOWING LOCATION OF ANCHOR BARS AND ANCHOR BOLTS OR ANCHOR BARS IN A RAIL RETROFIT CONDITION. SEE "SSTR" RAIL STANDARD FOR DETAILS AND NOTES NOT SHOWN.

(8) ℄ 1" DIA ASTM F1554 GR 55 ANCHOR BOLT OR THREADED ROD. NUTS MUST CONFORM TO ASTM A563 REQUIREMENTS.

(9) PLATE WASHER ⅜ X 3 X 3 ASTM A36 WITH 1 1/16" DIA HOLE CENTERED.

(10) GALVANIZE ANCHOR BOLTS, NUTS, AND PLATE WASHERS.

(11) EMBED (#6) ANCHOR BARS WITH A TYPE III, CLASS C, D, E, OR F ANCHOR ADHESIVE. MINIMUM ADHESIVE ANCHOR EMBEDMENT DEPTH IS 5 1#4". ANCHOR ADHESIVE CHOSEN MUST BE ABLE TO ACHIEVE A BASIC BOND STRENGTH IN TENSION, NBA, OF 20 KIPS. SUBMIT SIGNED AND SEALED CALCULATIONS OR THE MANUFACTURER'S PUBLISHED LITERATURE SHOWING THE PROPOSED ANCHOR ADHESIVE'S ABILITY TO DEVELOP THIS LOAD TO THE ENGINEER FOR APPROVAL PRIOR TO USE. ANCHOR INSTALLATION, INCLUDING HOLE SIZE, DRILLING, AND CLEAN OUT, MUST BE IN ACCORDANCE WITH ITEM 450, "RAILING".

(12) WHEN SIDE SLOT DRAINS ARE USED, PROVIDE 8'-0" MIN CLEAR SPACING BETWEEN DRAIN SLOTS.

(13) SEE "SSTR" RAIL SECTIONS IN "RAIL RETROFIT SECTION ON WINGWALLS USING ADHESIVE ANCHORS" AND/OR "RAIL RETROFIT SECTION ON CONCRETE SLABS USING ADHESIVE ANCHORS".

(14) SHOWING SPACING OF (#6) ADHESIVE ANCHOR IN A RAIL RETROFIT CONDITION. SECONDARY (#4) ADHESIVE ANCHOR IN A RAIL RETROFIT NOT SHOWN FOR CLARITY. REINFORCING STEEL AND TERMINAL CONNECTIONS NOT SHOWN FOR CLARITY. SEE "SSTR" RAIL STANDARD FOR DETAILS AND NOTES NOT SHOWN.

(15) FIELD VERIFY FOR EXISTING CONDITION.

NO.	DATE	REVISION	APPROV.

STATE OF TEXAS — IFTEKHAR AHMAD — 140517 — LICENSED PROFESSIONAL ENGINEER

03/28/2023

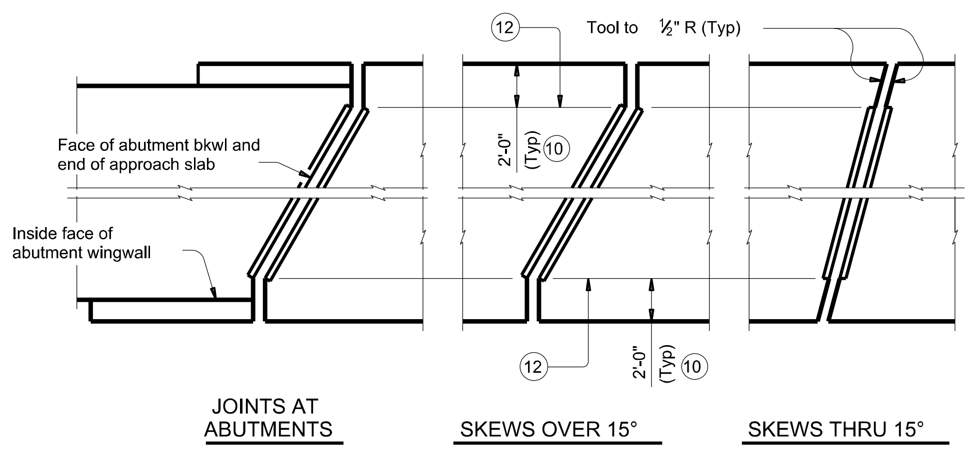
infraTECH
Engineers & Innovators, LLC
11111 Willcrest Green Dr. Suite #410
Houston, Texas 77042
TBPE REGISTRATION NO. F-18368

Texas Department of Transportation — Dallas District Bridge

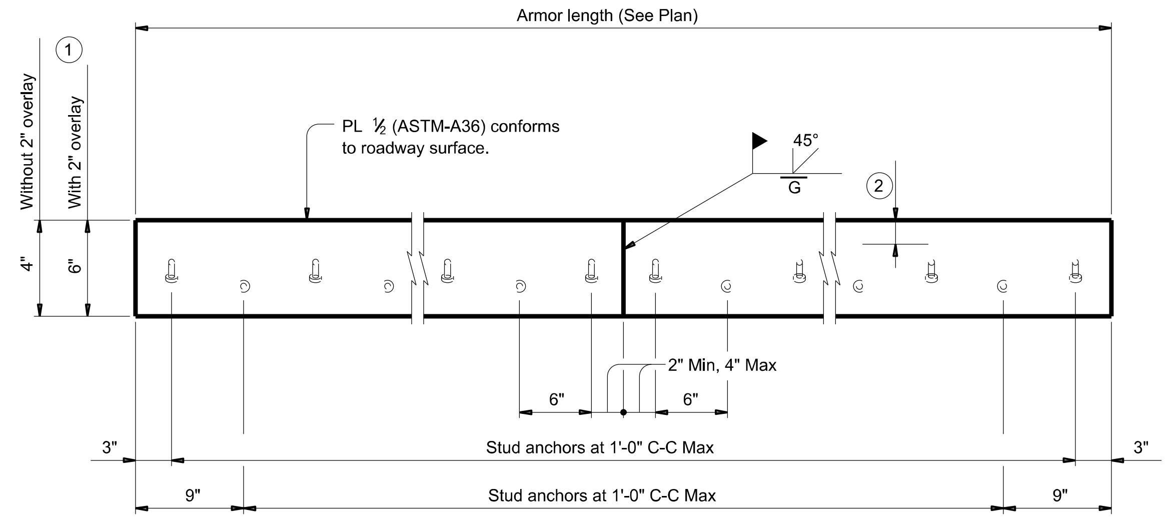
BRIDGE MAINTENANCE

SSTR RAIL RETROFIT GUIDE DETAIL

FILE: SEE PATH	DN: DK	CK: AUL	DW: DK	CK: AUL
©TxDOT 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		152

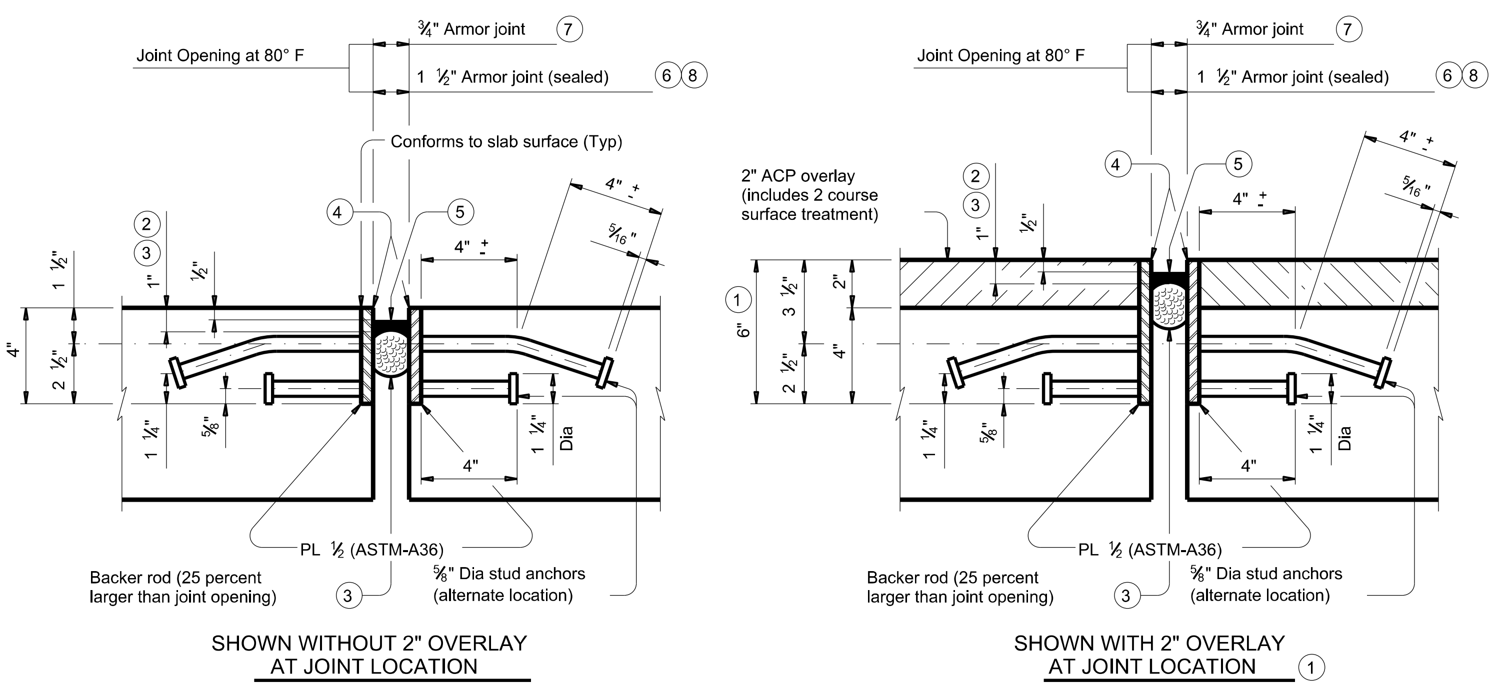


PLANS OF ARMOR PLATES



ELEVATION OF BASIC ARMOR PLATE

1. Adjust 6" plate height for overlay thicknesses other than the 2" shown. Adjust weight by 1.70 plf for each ½" variation in thickness.
2. Do not paint top 1 ½" of plate if using sealed armor joint.
3. Set top of backer rod 1" below top of armor plate. Backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.
4. Blast clean entire contact area between sealant and plate (SSPC-SP10) before installing sealant. Light brush blast and thoroughly clean all dust and debris from concrete surfaces in contact with joint sealant before application of silicone seal.
5. Use Class 7 joint sealant that conforms to DMS-6310.
6. Place sealant while ambient temperature is between 55°F and 80°F and is rising.
7. Armor joint does not include joint sealant or backer rod.
8. Armor joint (sealed) includes Class 7 joint sealant and backer rod.
9. Form vertical leg of seal as per the Manufacturer's recommendations. Use Class 4 joint sealant if Class 7 cannot be installed correctly. Install according to Manufacturer's recommendations.
10. Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.
11. See "Plans of Armor Plates".
12. At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.
13. Align shipping angle perpendicular to joint.



ARMOR JOINT SECTIONS

Showing Armor Joint (Sealed)

FABRICATION NOTES:

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

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

Weld studs in accordance with AWS D1.1.

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

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

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

CONSTRUCTION NOTES:

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

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

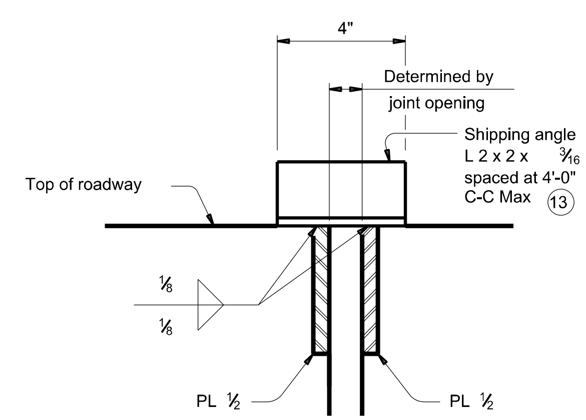
GENERAL NOTES:

Provide armor joints at locations shown on the plans. Provide the seal when "Armor Joint (Sealed)" is noted on the plans.

These joint details accommodate a joint movement range of 1 ⅜" (¾" opening movement and ⅝" closure movement).

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

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

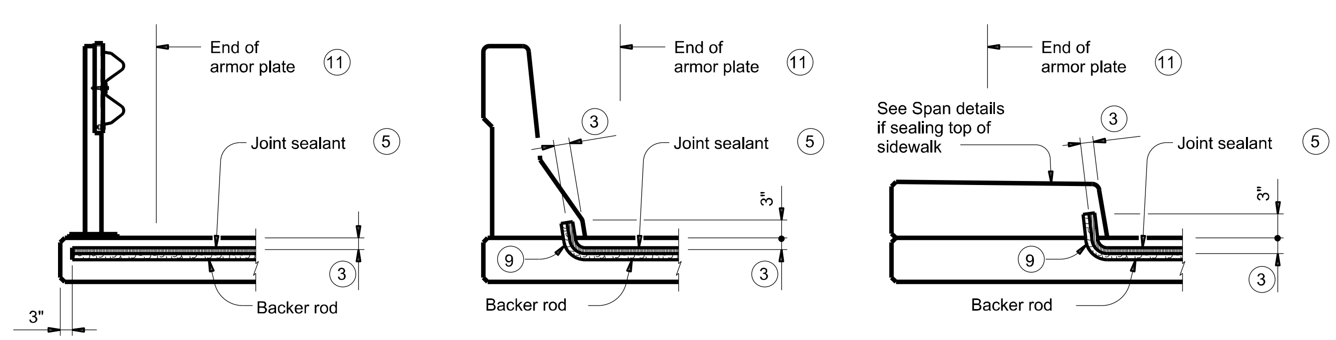


SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION

With overlay similar

SHIPPING ANGLE

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



JOINT SEALANT TERMINATION DETAILS

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

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Texas Department of Transportation — Bridge Division Standard

ARMOR JOINT DETAILS

AJ

FILE: ajstde01-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	2374	03	098	IH 20
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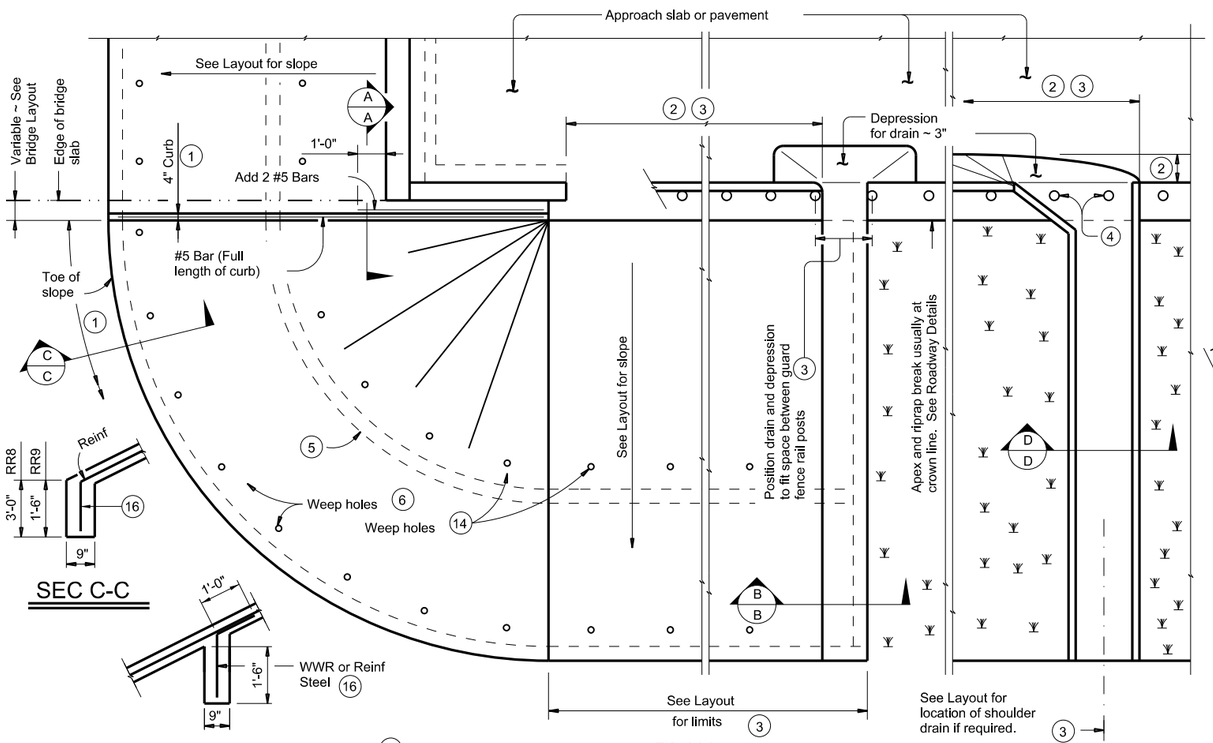
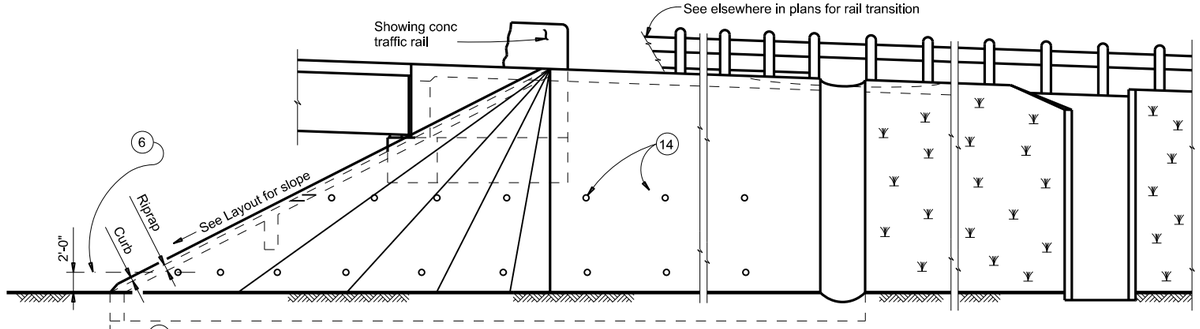


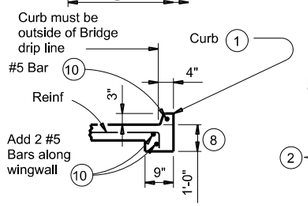
PLAN

SEC C-C

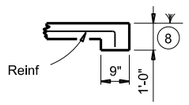
INTERMEDIATE TOEWALL (5)



ELEVATION

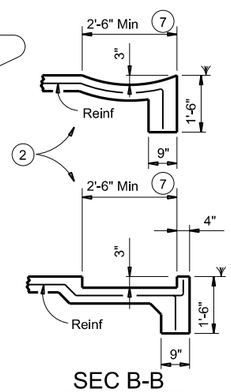


SEC A-A



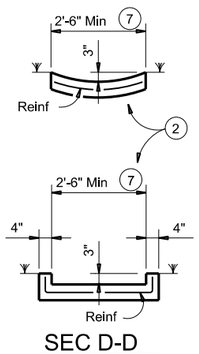
SEC B-B

(No drain)



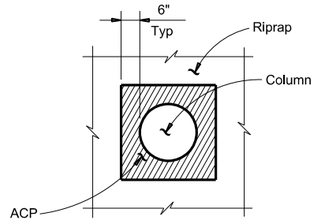
SEC B-B

(Shoulder drain integral with riprap)



SEC D-D

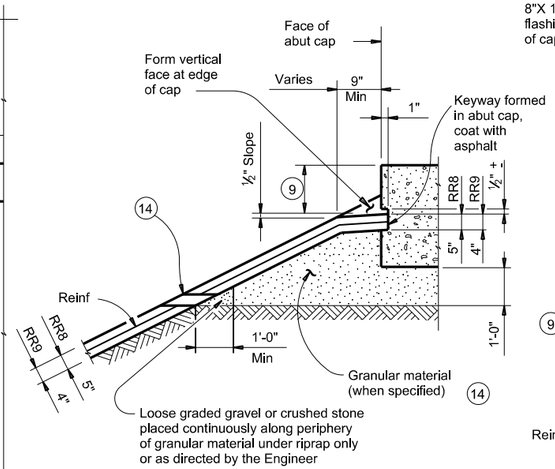
(Shoulder drain)



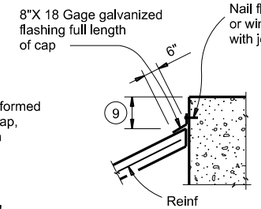
Riprap blockout to be filled with ACP. (Subsidiary to riprap)

RIPRAP DETAIL AT COLUMNS

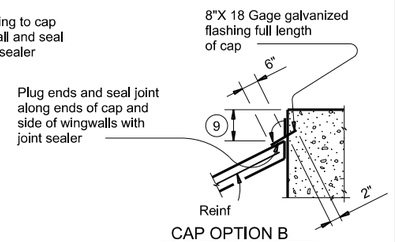
(As directed by the Engineer)



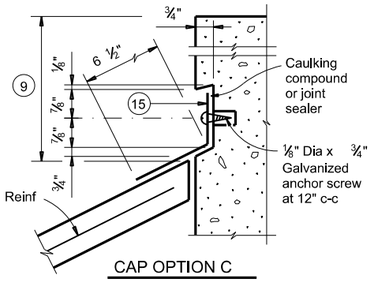
SHOWING KEYWAY OPTION



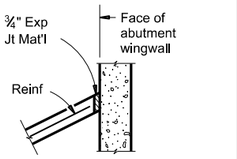
CAP OPTION A



CAP OPTION B

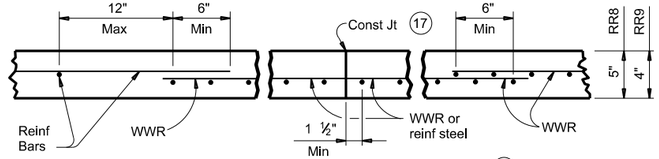


CAP OPTION C



SECT THRU RIPRAP AT WINGWALL (12)

SECTIONS THRU RIPRAP AT CAP (11)



REINFORCEMENT DETAILS (13)

See General Notes for optional synthetic fiber reinforcement.

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

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

GENERAL NOTES:

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

Provide Grade 60 reinforcing steel.

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

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

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

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

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

See Layout for limits of riprap.

RR8 is to be used on stream crossings.

RR9 is to be used on other embankments.

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Bridge Division Standard

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

CRR

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
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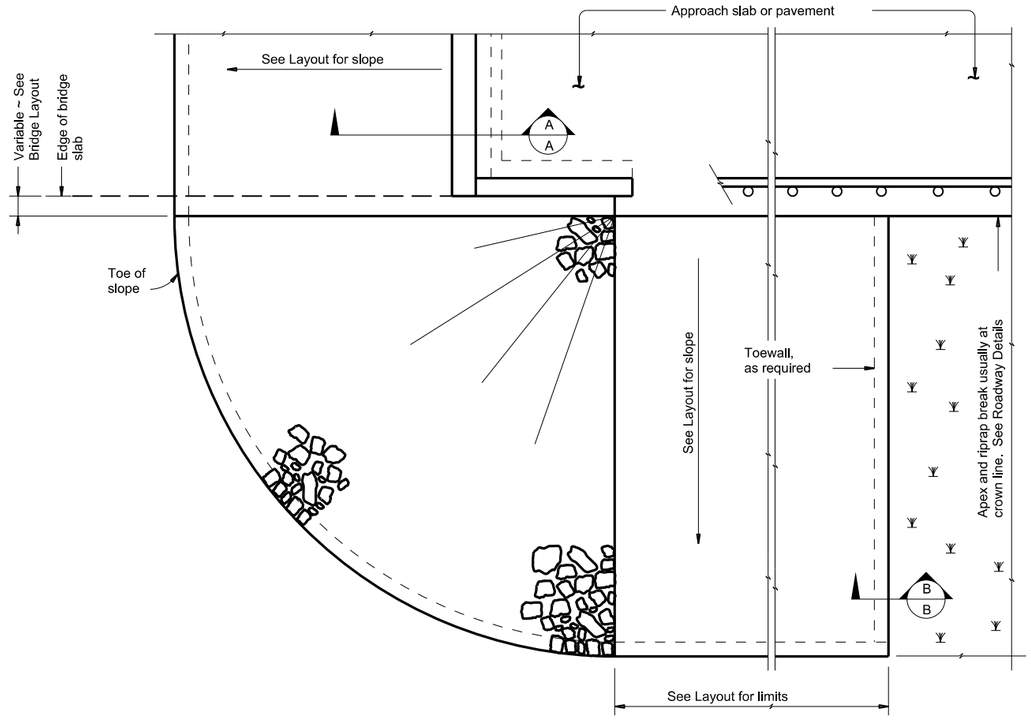
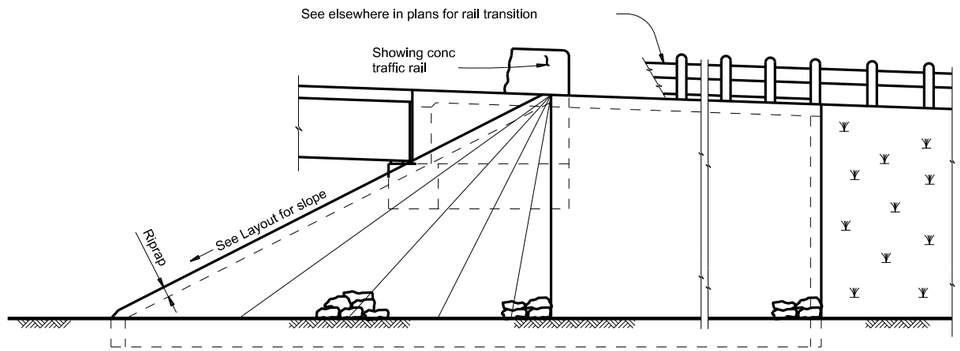


PLAN



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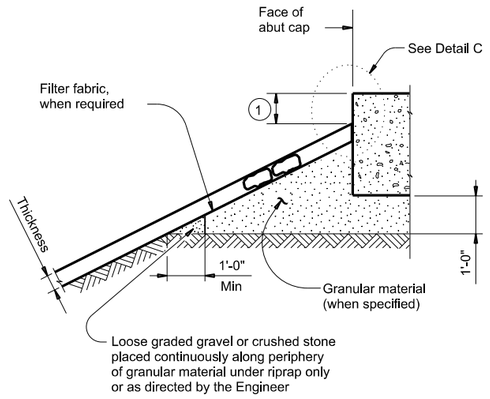
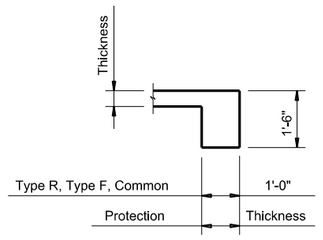
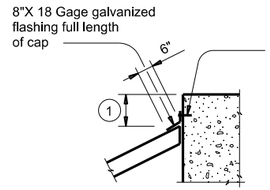


SECTION A-A AT CAP

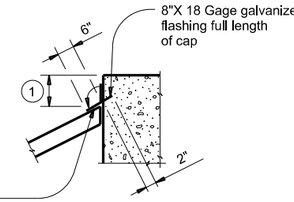


SECTION B-B

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



CAP OPTION A



CAP OPTION B

DETAIL C

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

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

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STONE RIPRAP

SRR

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
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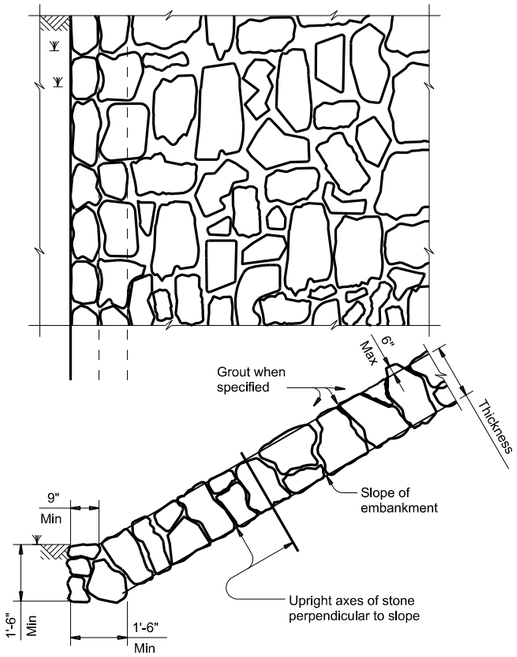


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

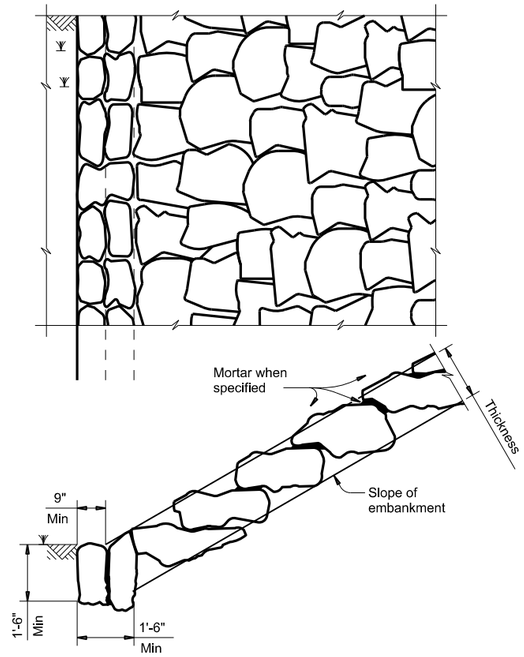


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

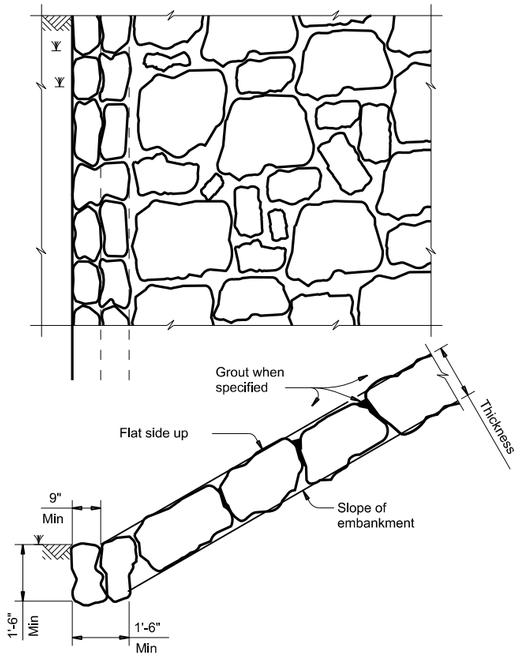


FIGURE 3 ~ TYPE F STONE RIPRAP

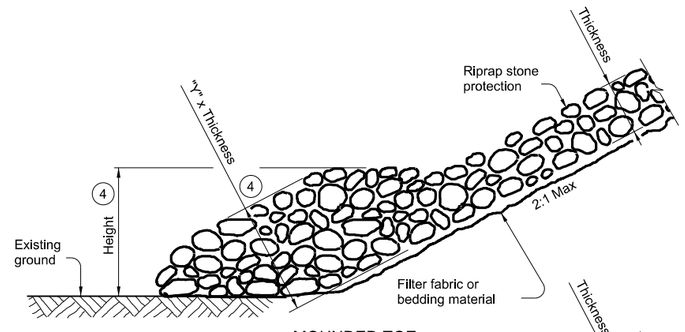
grouted

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

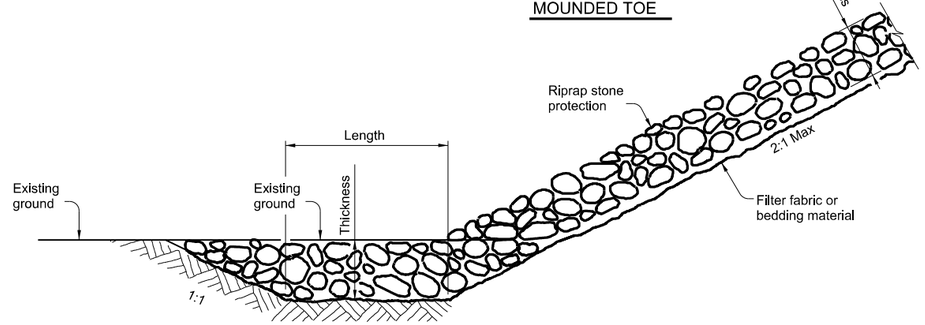
3 Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

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

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



MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)

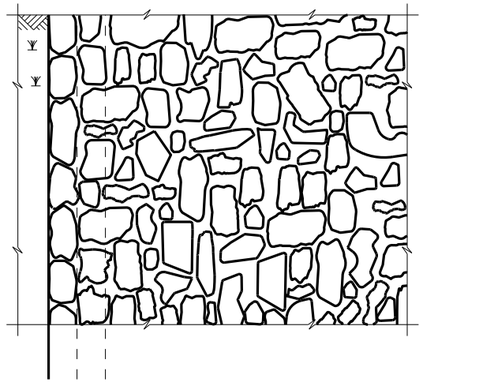


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

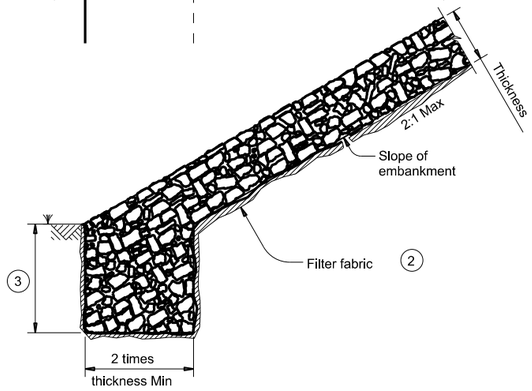


FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

SHEET 2 OF 2

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Bridge Division Standard

STONE RIPRAP

SRR

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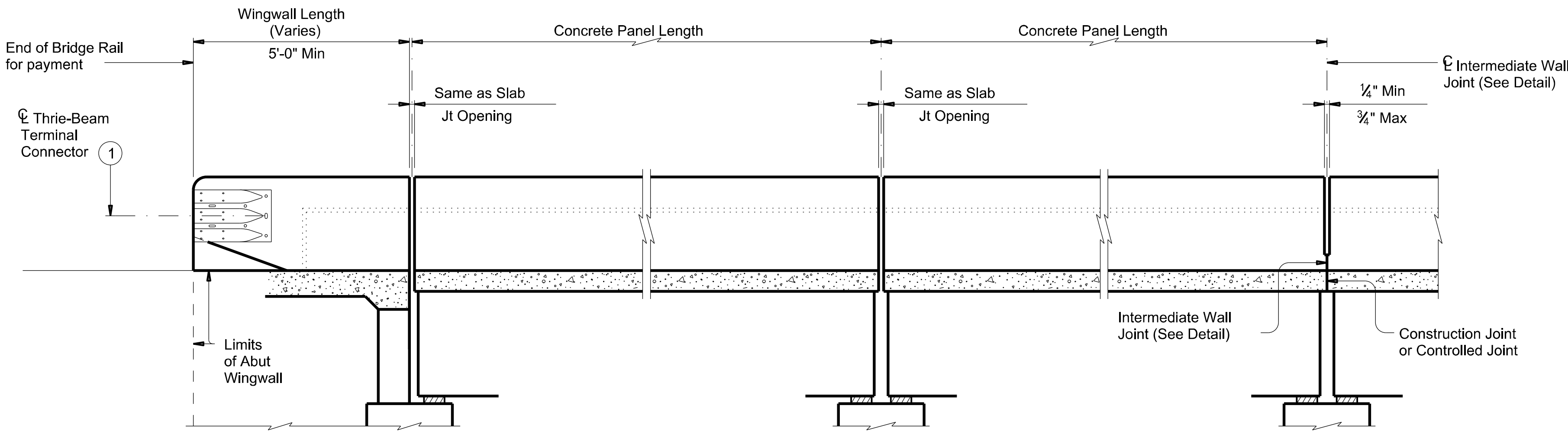
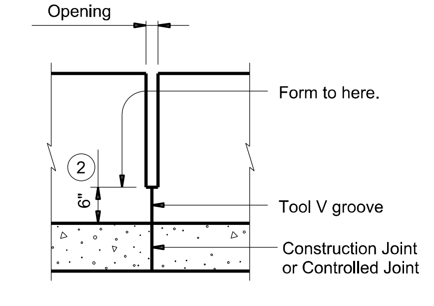
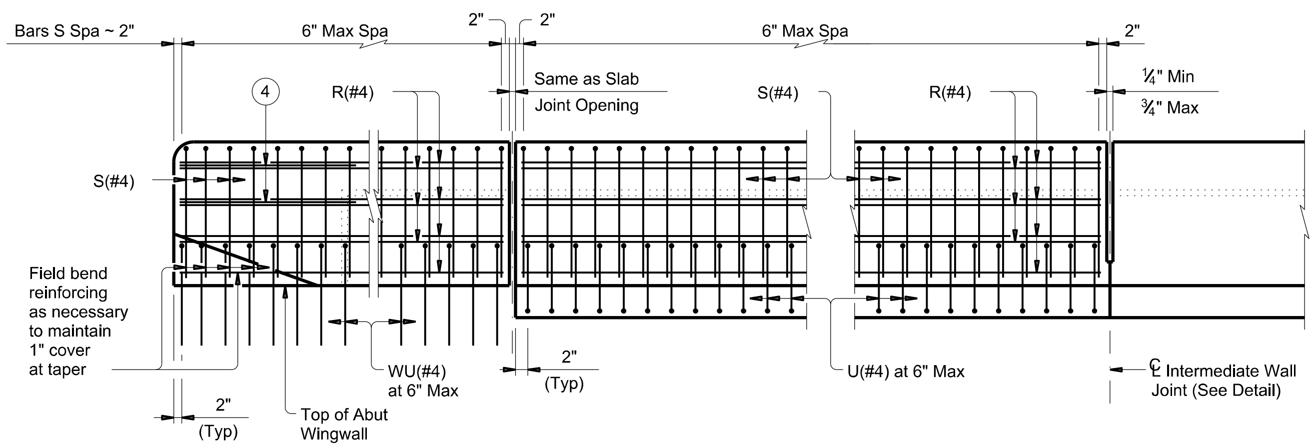


ROADWAY ELEVATION OF RAIL

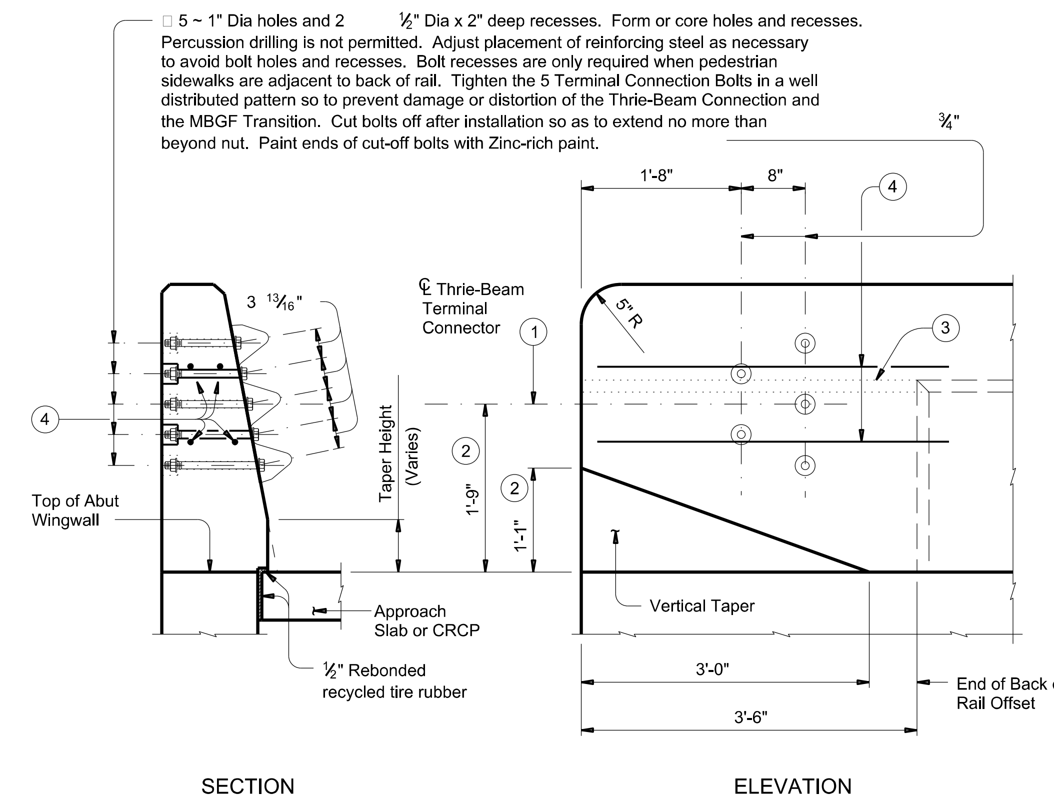


INTERMEDIATE WALL JOINT DETAIL

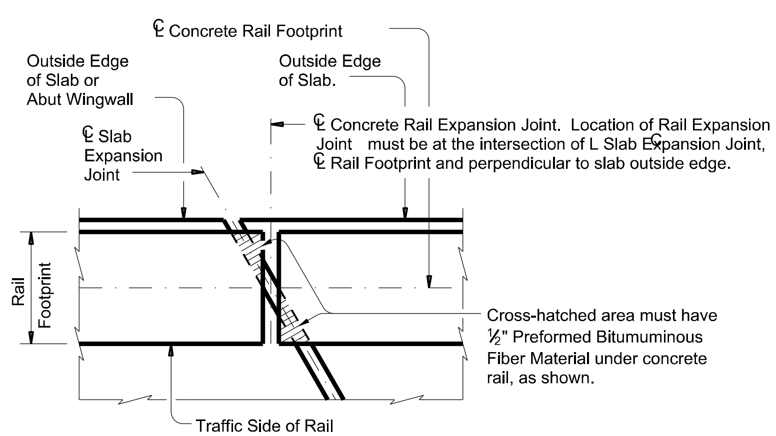
Provide at all interior bents without slab expansion joints.



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



TERMINAL CONNECTION DETAILS



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

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

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TRAFFIC RAIL SINGLE SLOPE

TYPE SSTR

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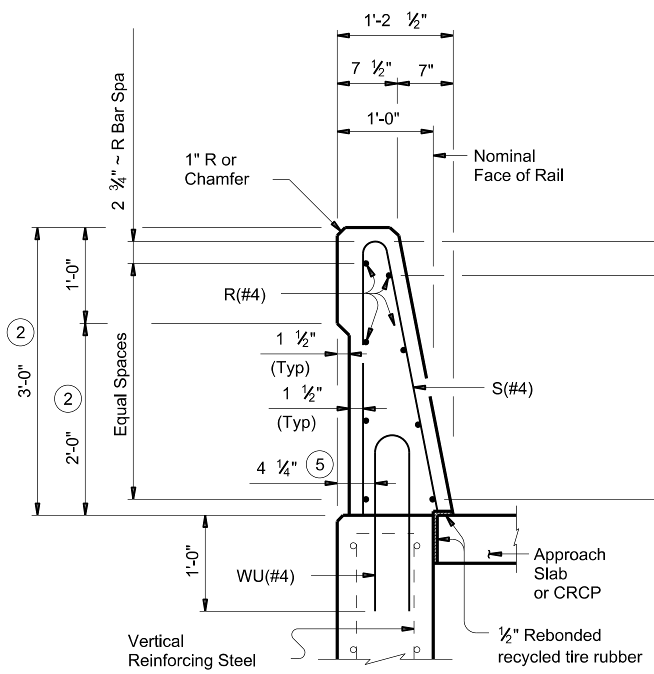
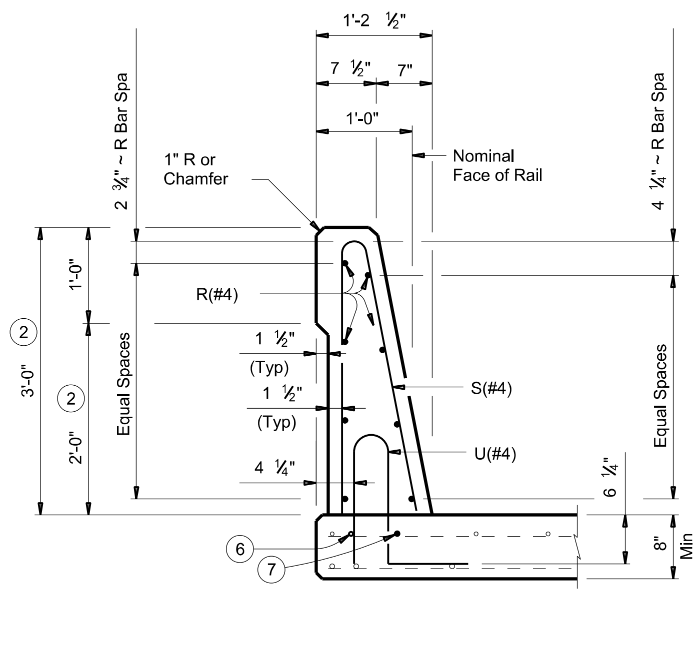


ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON BRIDGE SLAB

SECTIONS THRU RAIL

2 Increase 2" for structures with Overlay.

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

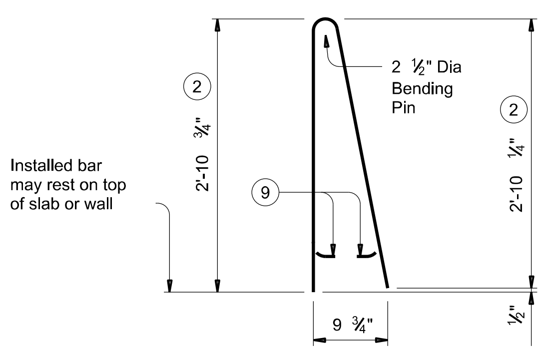
6 As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars must be furnished at the Contractor's expense.

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

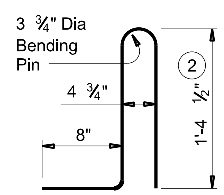
8 No longitudinal wires may be within upper bend.

9 Bend or cut as required to clear drain slots.

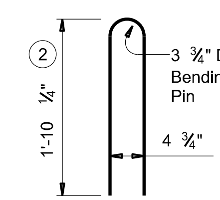
10 Space U(#4) bars at 4" Max when end region of panel length is less than 6'-0" to side slot drain. Space U(#4) bars at 6" Max when end region of panel length is 6'-0" and greator to side slot drain.



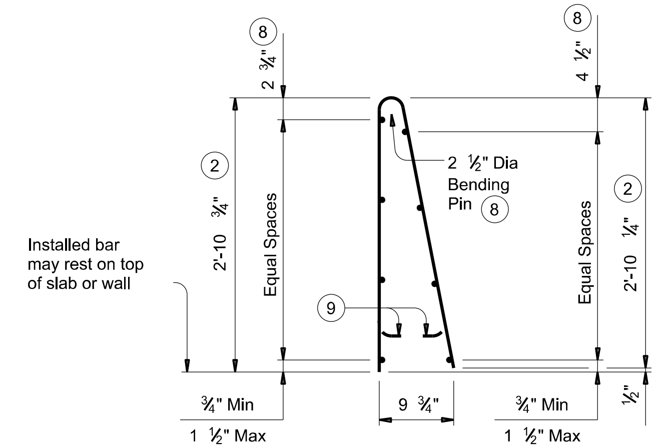
BARS S (#4)



BARS U (#4)



BARS WU (#4)



OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

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

CONSTRUCTION NOTES:

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

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

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

MATERIAL NOTES:

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

Provide Grade 60 reinforcing steel.

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

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

Provide bar laps, where required, as follows:

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

Epoxy coated ~ #4 = 2'-5"

GENERAL NOTES:

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

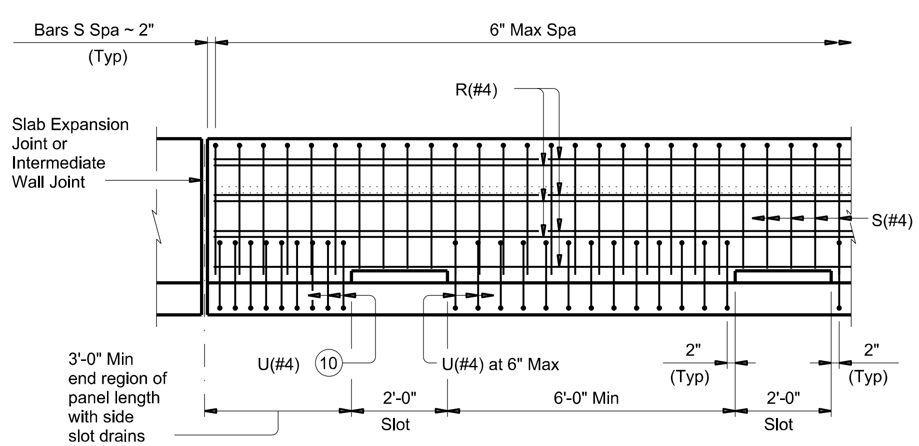
Do not use this railing on bridges with expansion joints providing more than 5" movement.

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

Shop drawings will not be required for this rail.

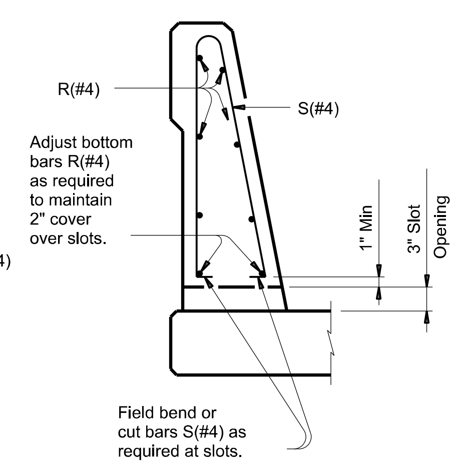
Average weight of railing with no overlay is 376 plf.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



OPTIONAL SIDE SLOT DRAIN DETAIL

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



SECTION THRU OPTIONAL SIDE SLOT DRAIN

SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

TRAFFIC RAIL SINGLE SLOPE

TYPE SSTR

FILE: rfstd014-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
	DIST		COUNTY	SHEET NO.
	DAL		DALLAS	158

DATE: 3/17/2023 3:56:49 PM
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DATE: 3/17/2023 3:06:33 PM
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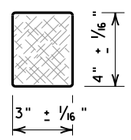
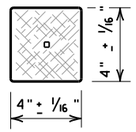
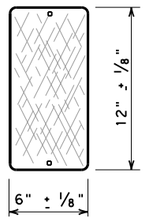
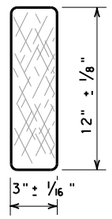
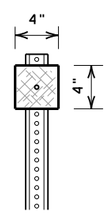
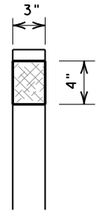
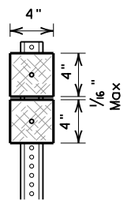
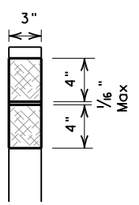
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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

DELINEATORS

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

D & OM DESCRIPTIVE CODES

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

NUMBER OF REFLECTORS
S = Single
D = Double

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

REFLECTOR UNIT SIZE
1 or 2

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

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

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

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

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

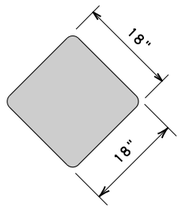
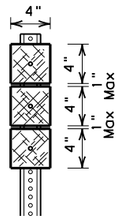
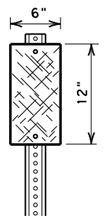
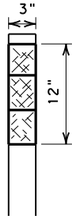
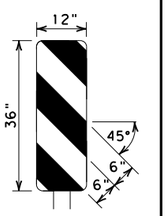
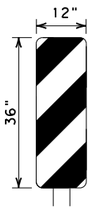
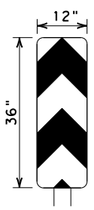
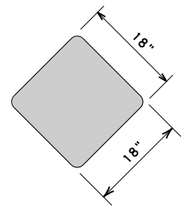
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

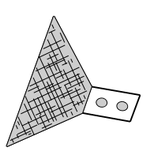
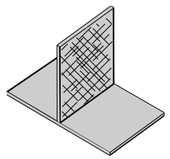
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

BARRIER REFLECTORS (BRF)

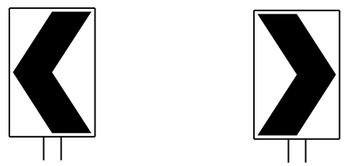
	GF1	GF2	CTB
DEVICE			

1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

SHEETING: Yellow, White, Red

NOTE: 1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.

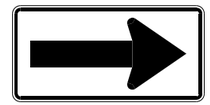
CHEVRONS

DEVICE:  W1-8

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

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

ONE DIRECTION LARGE ARROW

DEVICE:  W1-6

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

NOTE:

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

DEPARTMENTAL MATERIAL SPECIFICATIONS

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

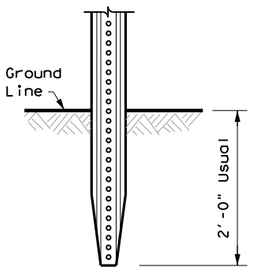
FILE: daml-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	DAL	DALLAS		159

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

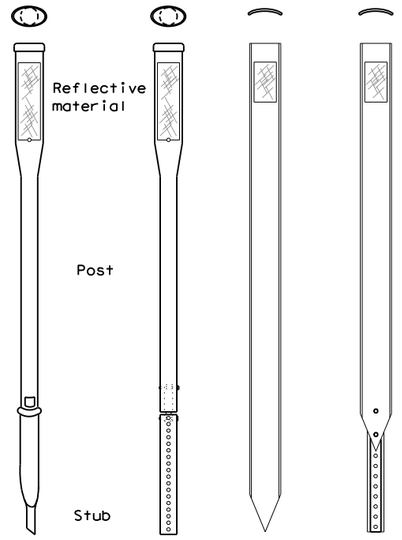


NOTES

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

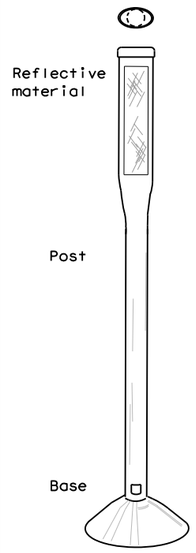
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



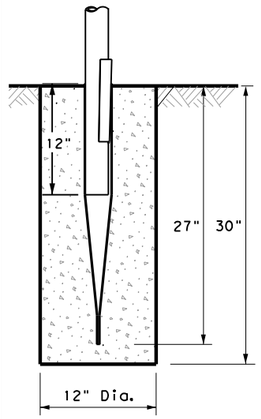
SURFACE MOUNT

NOTES

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

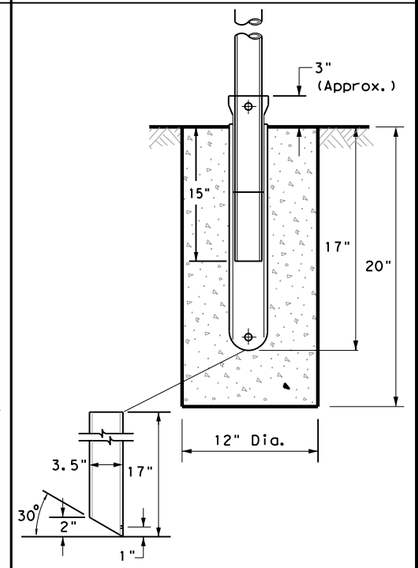
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

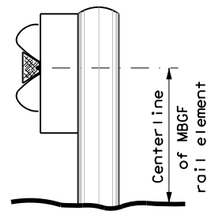
NOTE

1. Install per manufacturer's recommendations.

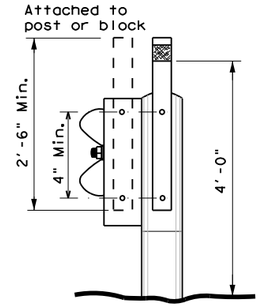
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

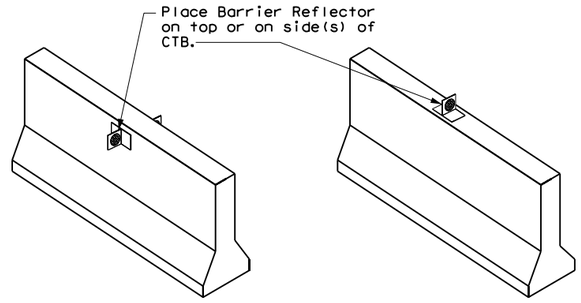
GF1



GF2



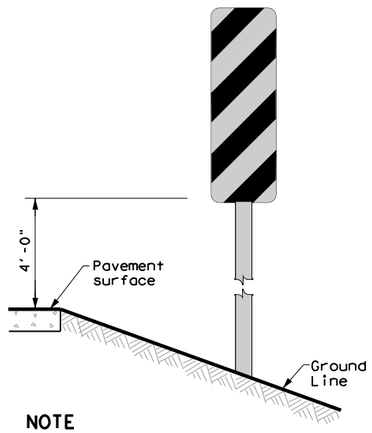
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

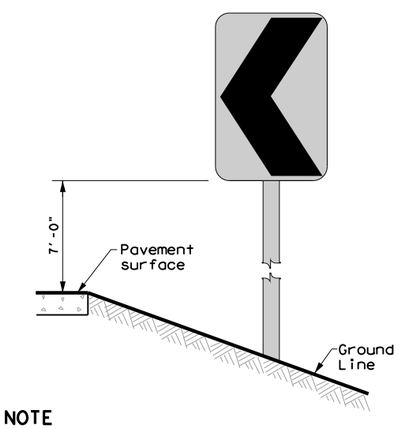
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

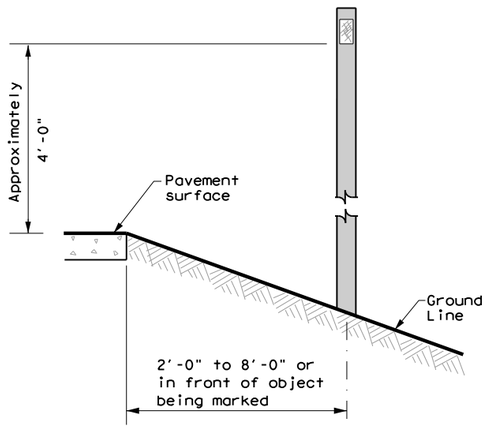
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	DAL	DALLAS		160

20B

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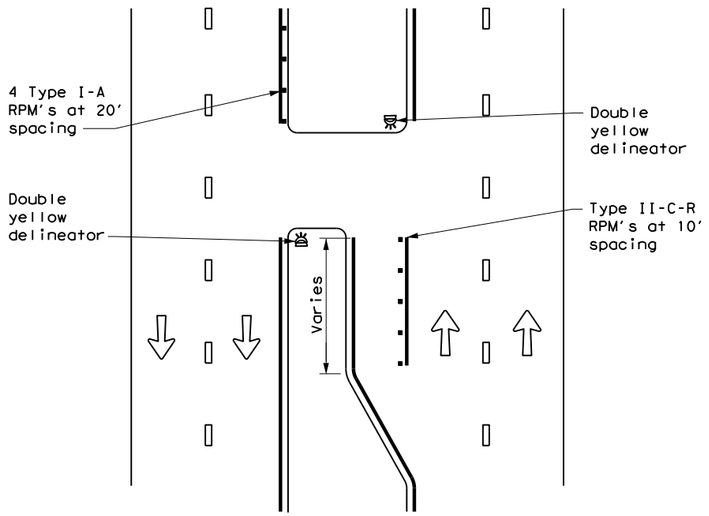
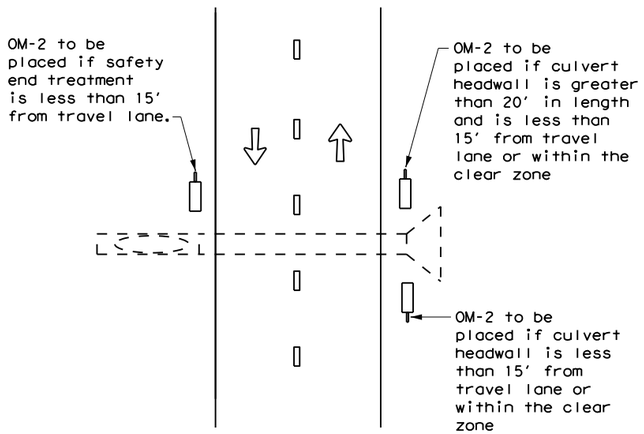
CROSSOVERS



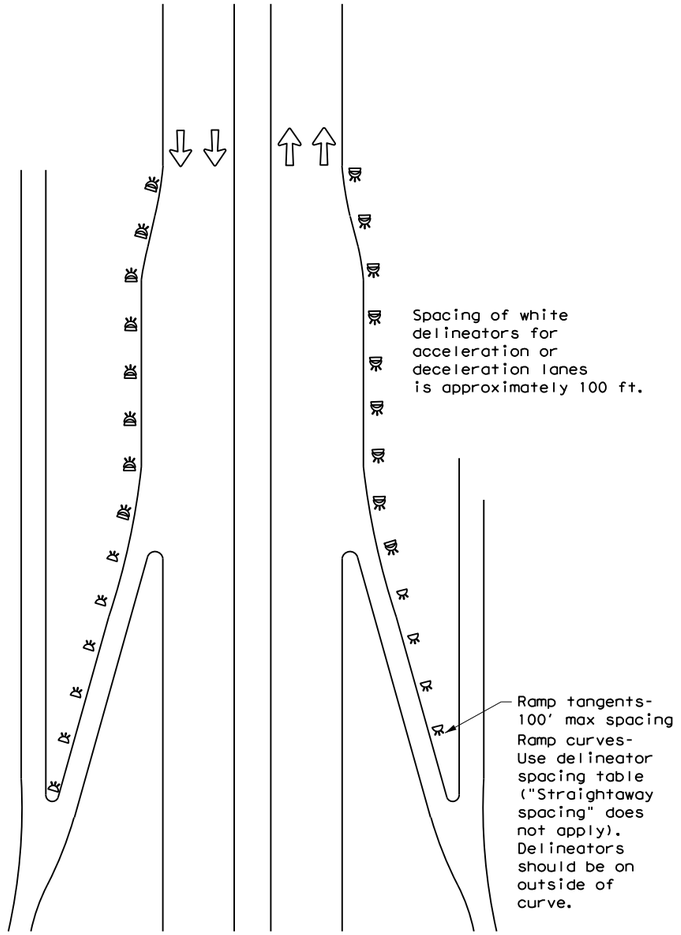
DETAIL 1

FOR CULVERTS WITHOUT MBGF



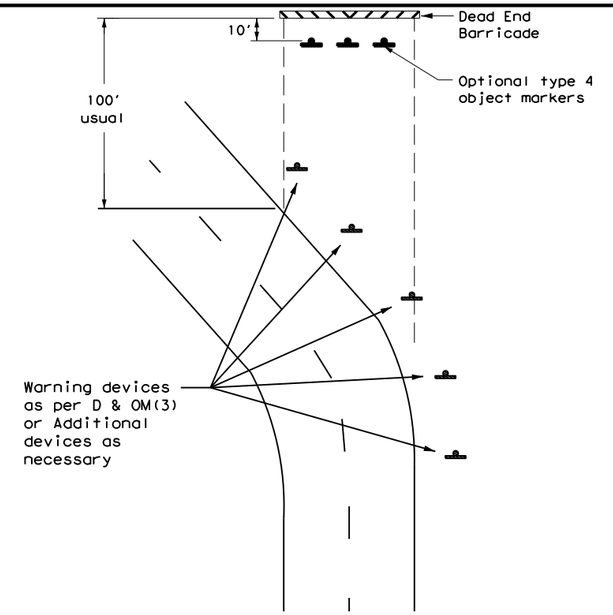
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



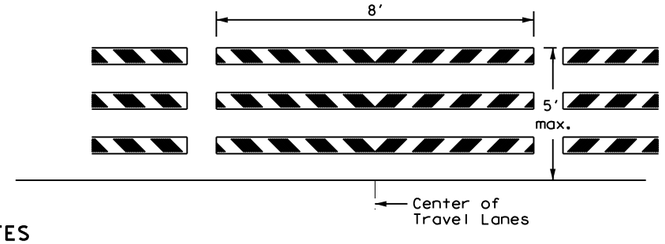
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
3-15 7-20	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		161

20D

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DATE: 3/17/2023 3:06:37 PM
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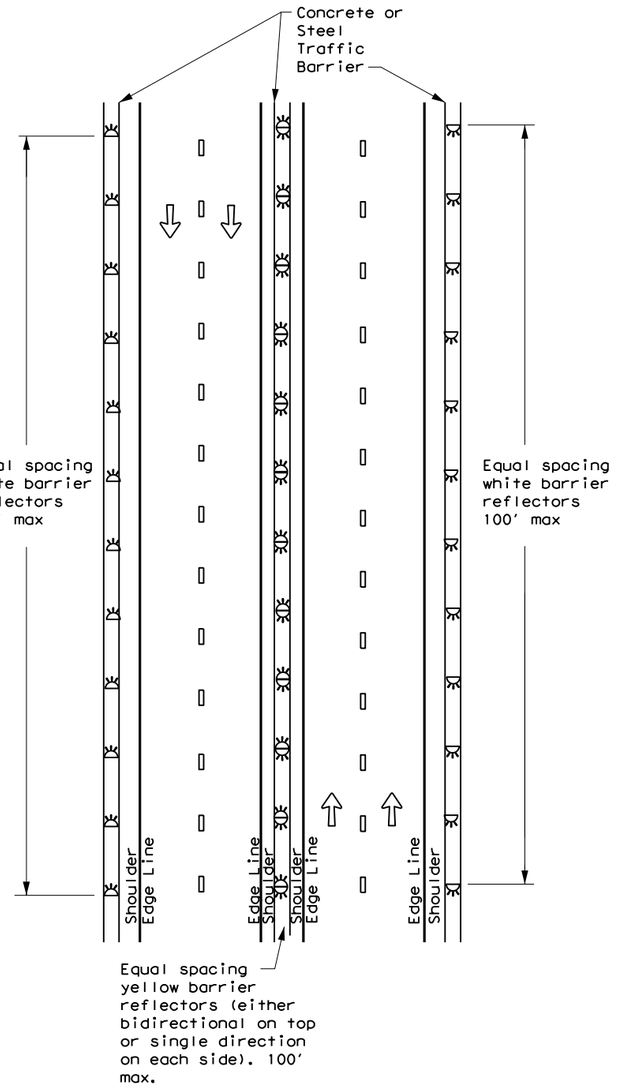
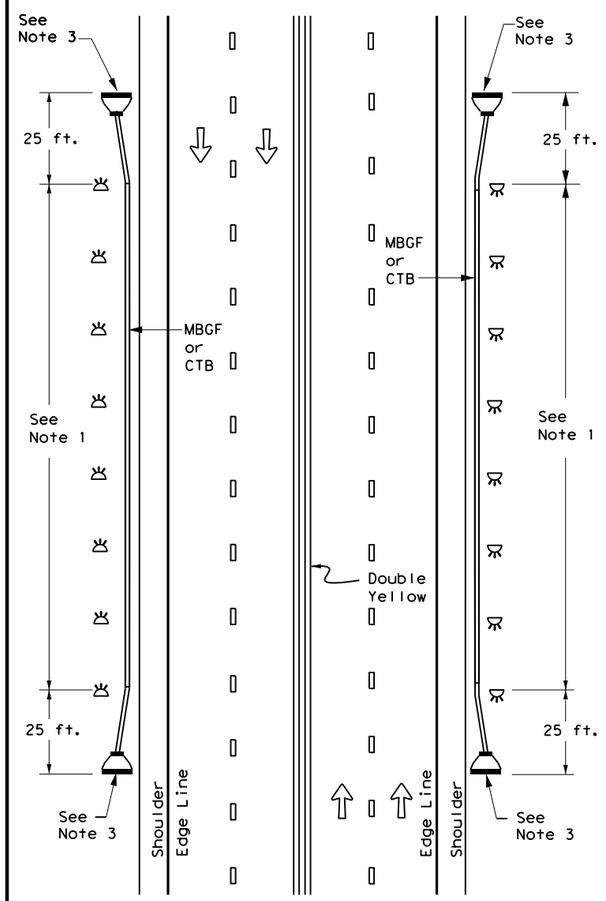
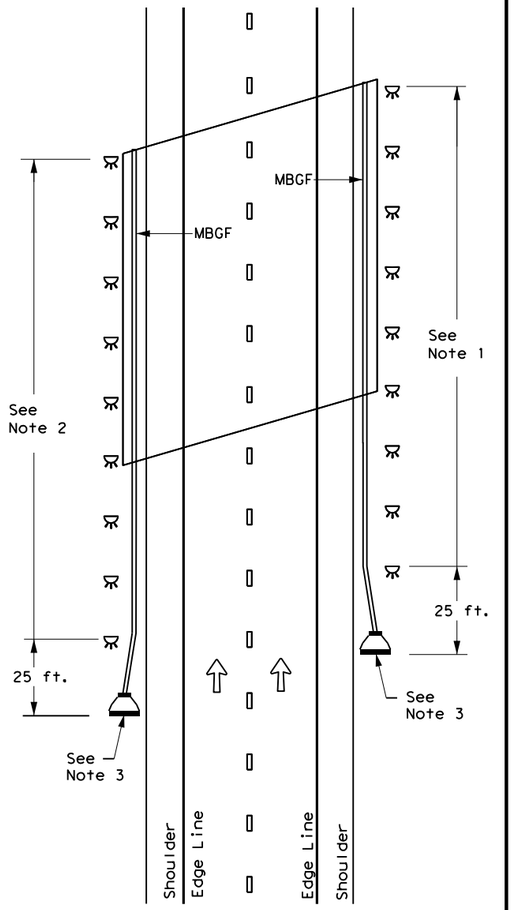
CONTINUOUS CONCRETE OR STEEL BARRIER



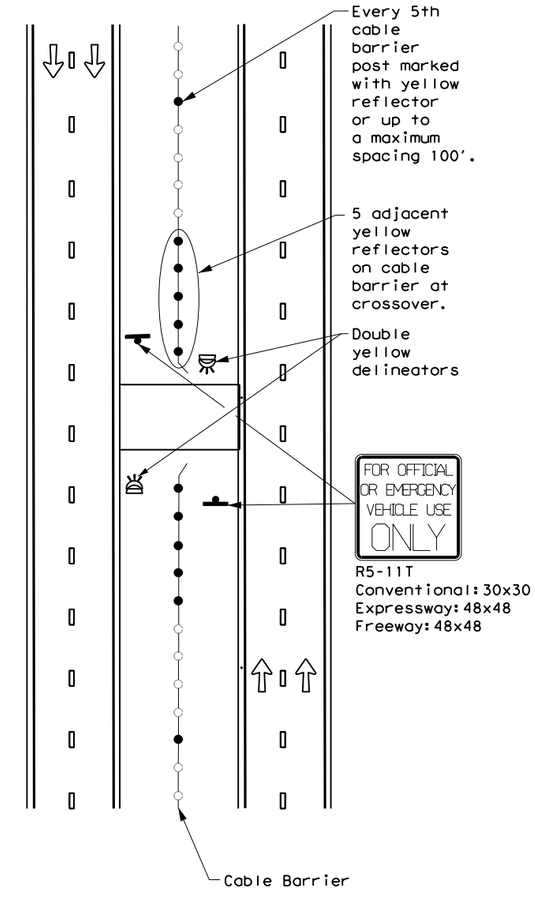
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100' max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100' max.)
2. Equal spacing (100' max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3)in front of the terminal end.

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
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7-20	DIST	COUNTY		SHEET NO.
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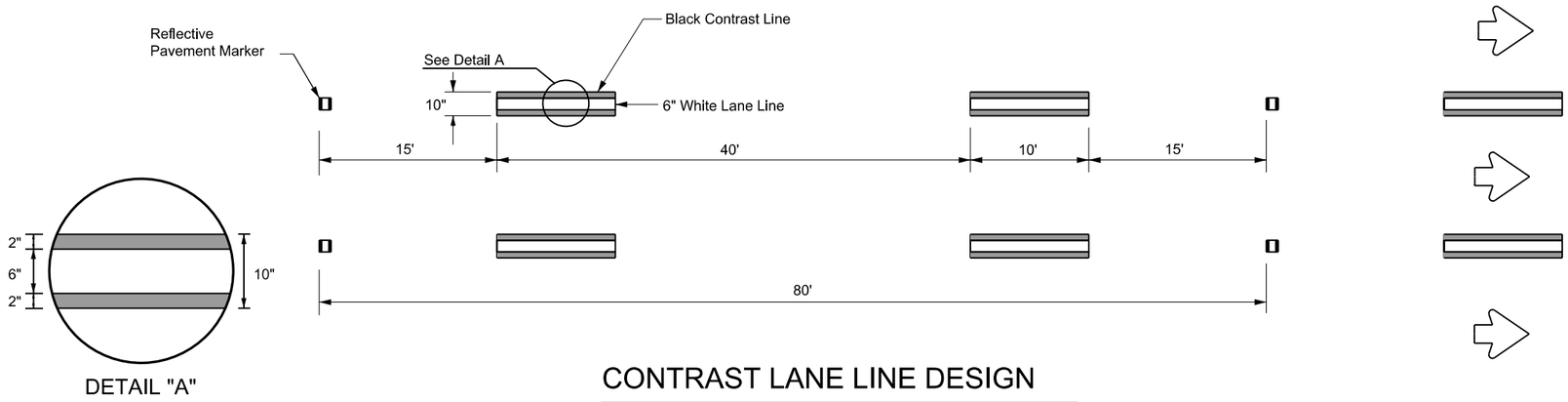
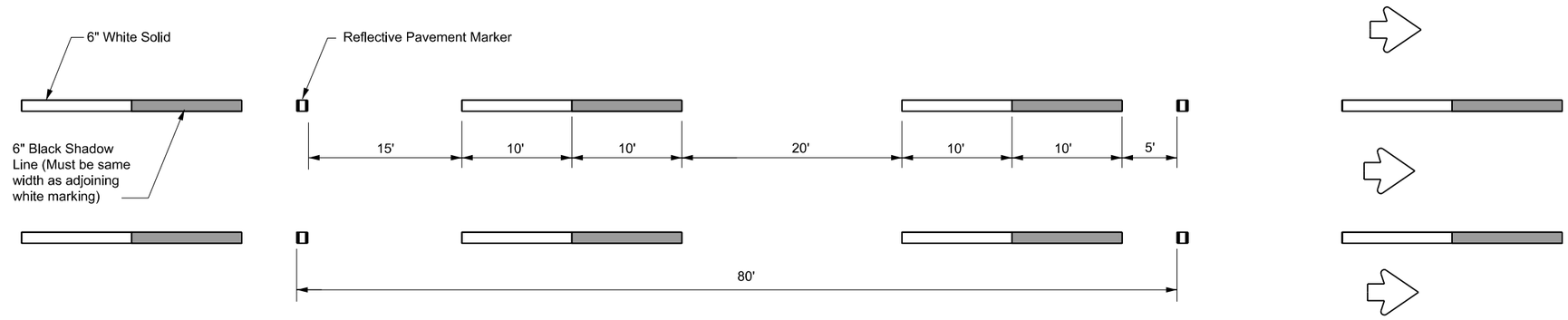
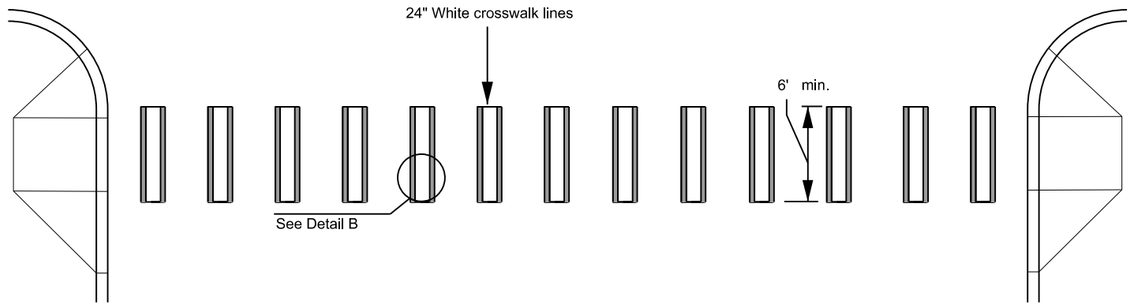


DETAIL "A"

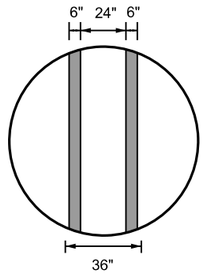
CONTRAST LANE LINE DESIGN



SHADOW LANE LINE DESIGN



CONTRAST CROSSWALK DESIGN



DETAIL "B"

(See PM(4) for crosswalk line placement details)

GENERAL NOTES

1. Contrast and Shadow markings may only be used on concrete pavements.
2. Contrast and Shadow markings shall not be used on edge lines.
3. Contrast lane lines shall be permanent prefabricated pavement markings meeting DMS 8240.
4. Shadow lane line designs shall be a liquid markings system approved by TxDOT.
5. All raised reflective pavement markers placed in broken lines shall be placed in line with and midway between the white stripes.
6. See PM(2) for raised reflective pavement markings installation details.

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 Safety Division Standard

CONTRAST AND SHADOW PAVEMENT MARKINGS

CPM(1)-23

FILE: CPM(1)-23.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
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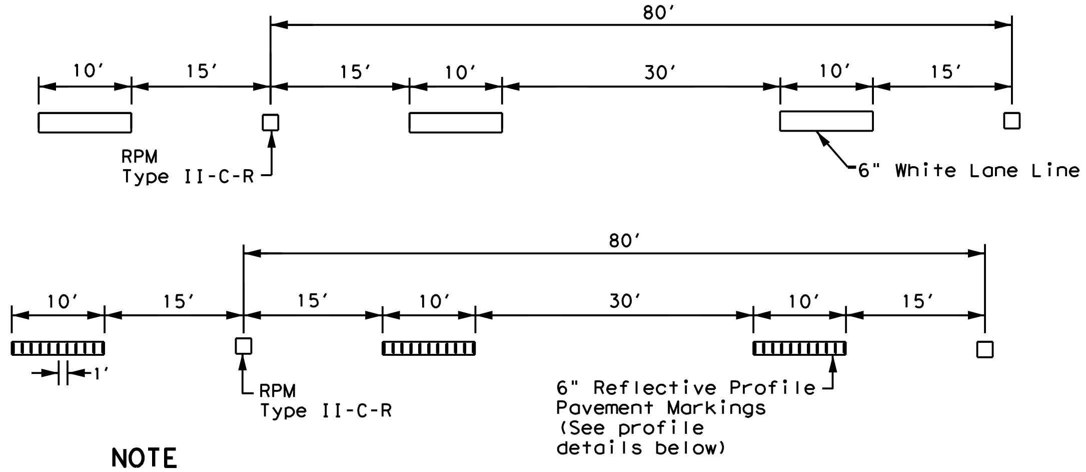
5-14 2-23	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		163

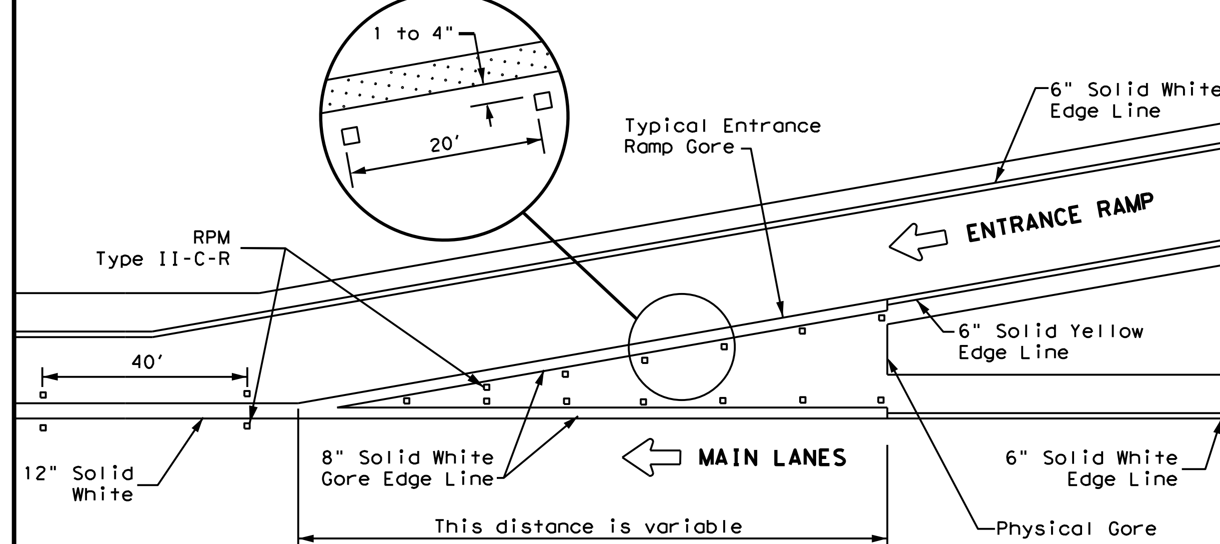
22N



NOTE

Reflectorized raised pavement markers 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. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.

TRAFFIC LANE LINES PAVEMENT MARKING

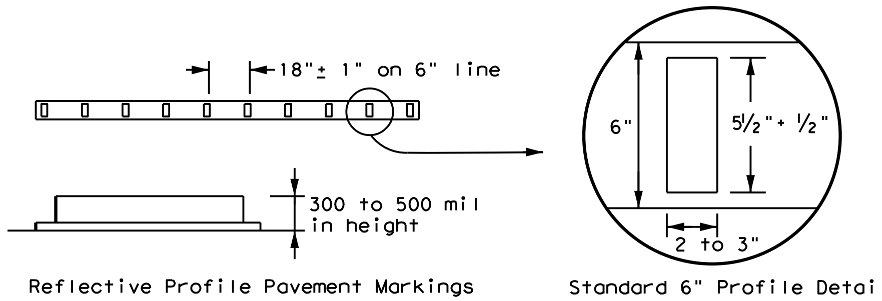


TYPICAL ENTRANCE RAMP GORE MARKING

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.

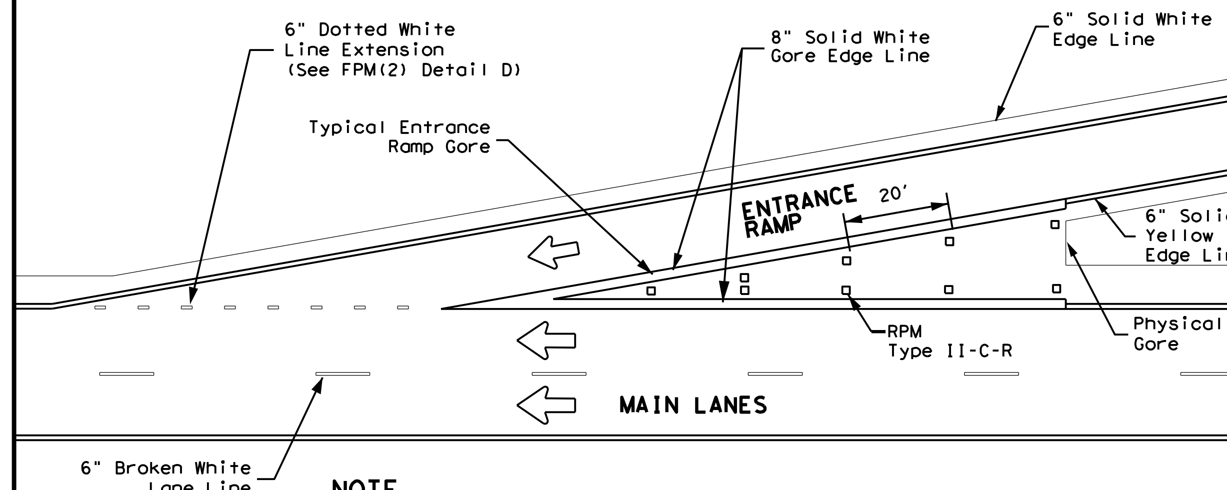
LEGEND	
⇦	Traffic flow
↱	Pavement marking arrows (white)
▫	Reflectorized Raised Markers (RPM) Type II-C-R



NOTE

Edge lines should typically be 6" wide and the materials shall be as specified in the plans. See details above if reflective profile pavement markings are to be used.

EDGE LINE PAVEMENT MARKINGS



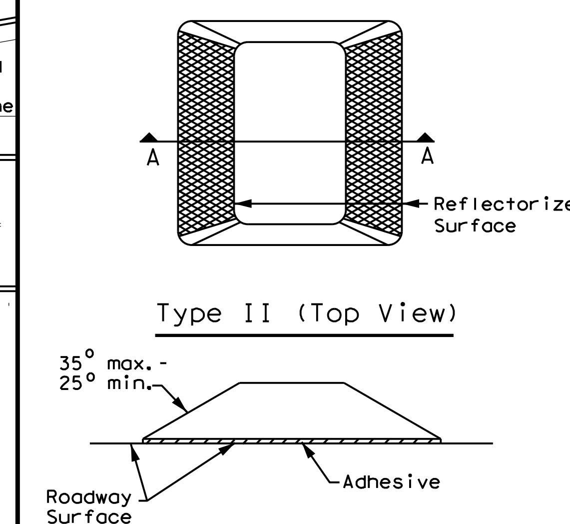
NOTE

See the Roadway Design Manual Chapter 3 to determine if a tapered acceleration lane may be used.

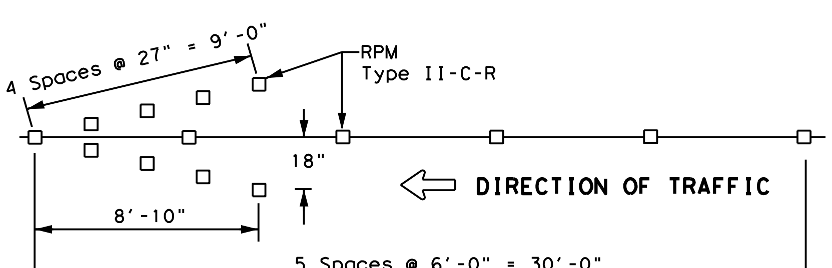
TAPERED ACCELERATION LANE

GENERAL NOTE

On concrete pavements the raised pavement markers shall be placed to one side of the longitudinal joints.



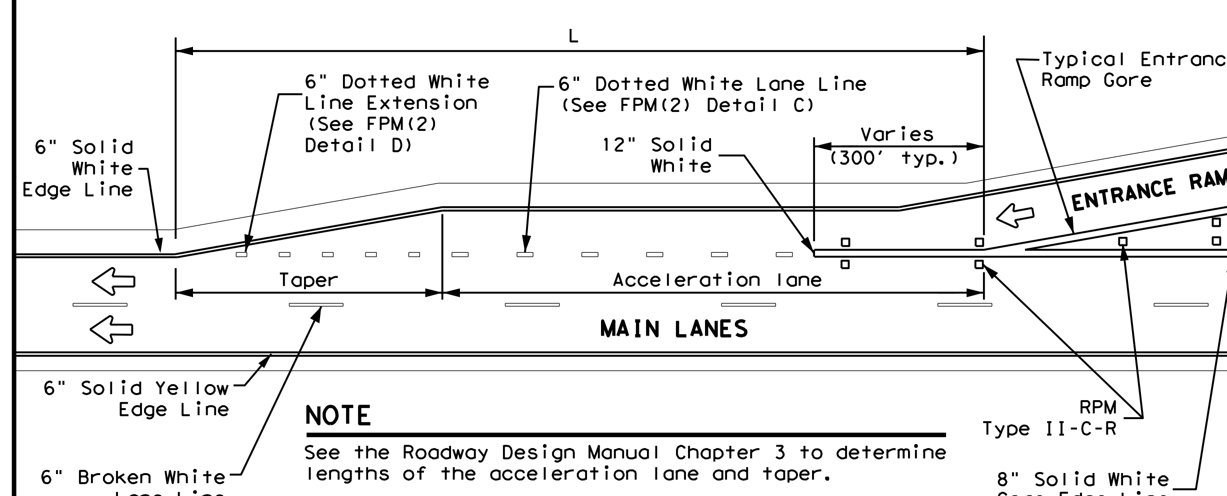
REFLECTORIZED RAISED PAVEMENT MARKER (RPM)



NOTES

1. Reflectorized raised pavement markers Type-II-C-R in the wrong way arrow shall have the clear face toward normal traffic and the red face toward the wrong way traffic.
2. Red reflectorized wrong way arrows, not to exceed two, may be placed on exit ramps. Locations of the arrows shall be as shown in the plans or as directed by the engineer.

WRONG WAY ARROW



NOTE

See the Roadway Design Manual Chapter 3 to determine lengths of the acceleration lane and taper.

PARALLEL ACCELERATION LANE

Texas Department of Transportation
Traffic Safety Division Standard

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS

FPM(1)-22

FILE: fpm(1)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 5-74 8-00 2-12 4-92 2-08 10-22 5-00 2-10	2374	03	098	IH 20
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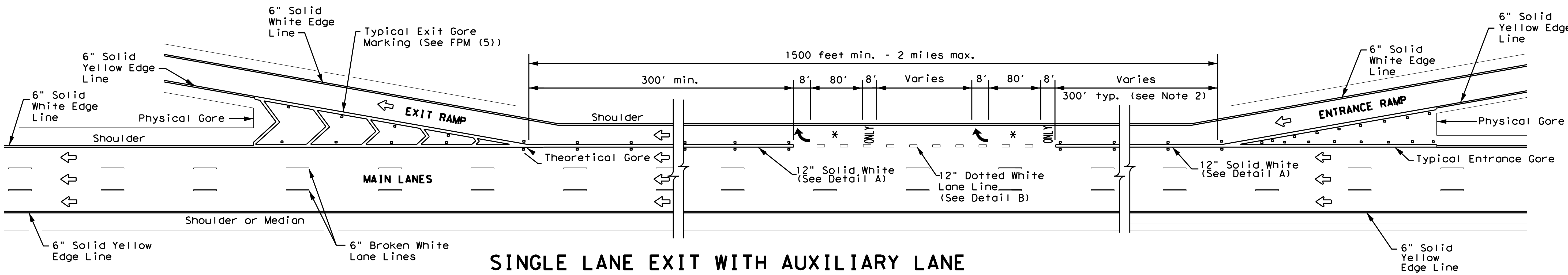
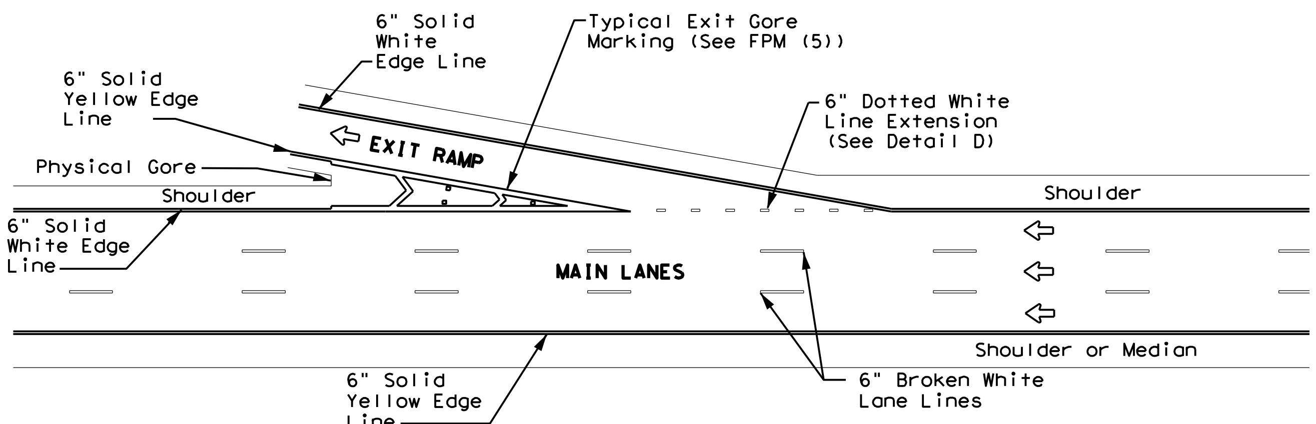
23A



SINGLE LANE EXIT WITH AUXILIARY LANE

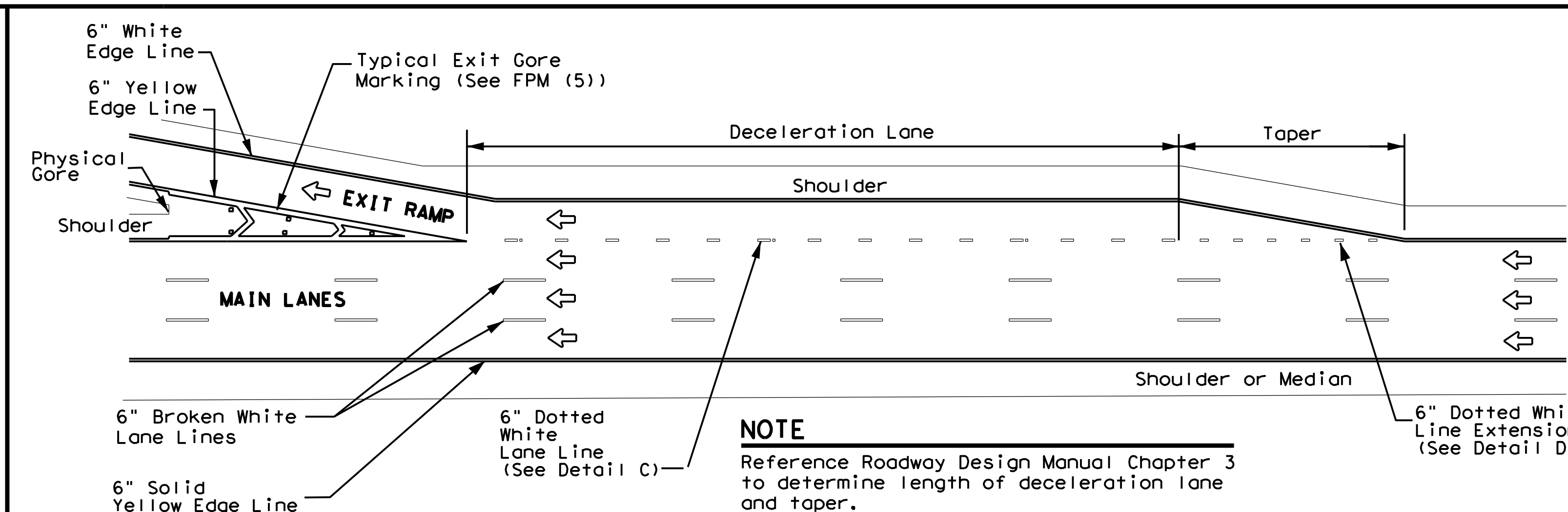
(See Note 2)



NOTE

Reference Roadway Design Manual Chapter 3 to determine if tapered deceleration lane may be used.

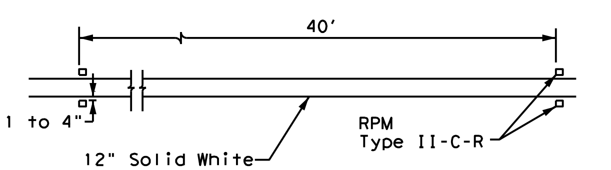
TAPERED DECELERATION LANE



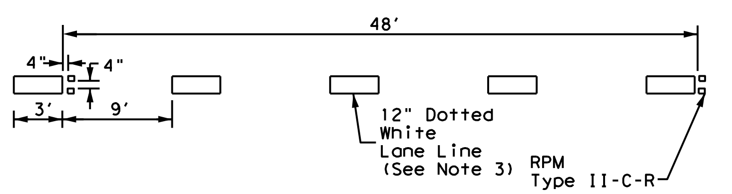
NOTE

Reference Roadway Design Manual Chapter 3 to determine length of deceleration lane and taper.

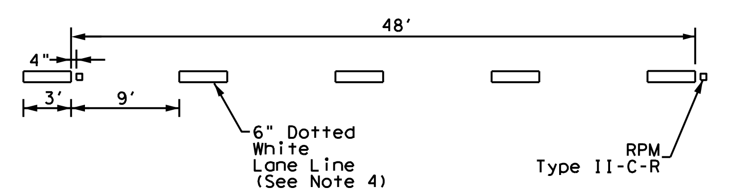
PARALLEL DECELERATION LANE



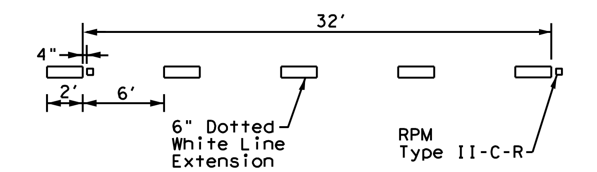
DETAIL A



DETAIL B



DETAIL C



DETAIL D

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 that continues beyond the interchange from an adjacent mandatory exit lane.
4. Normal (6") dotted lane line (see Detail C) is used at parallel acceleration and deceleration lanes.
5. See FPM(1) for traffic lane line pavement marking details.

LEGEND	
⇦	Traffic flow
↱	Pavement marking arrows (white)
▫	Reflectorized Raised Markers (RPM) Type II-C-R
*	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 Safety Division Standard

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMPS

FPM(2)-22

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© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
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238

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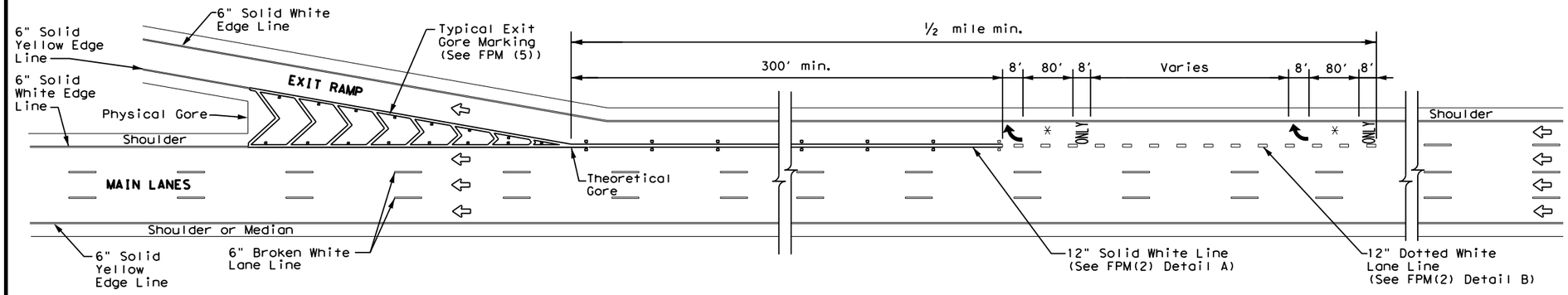
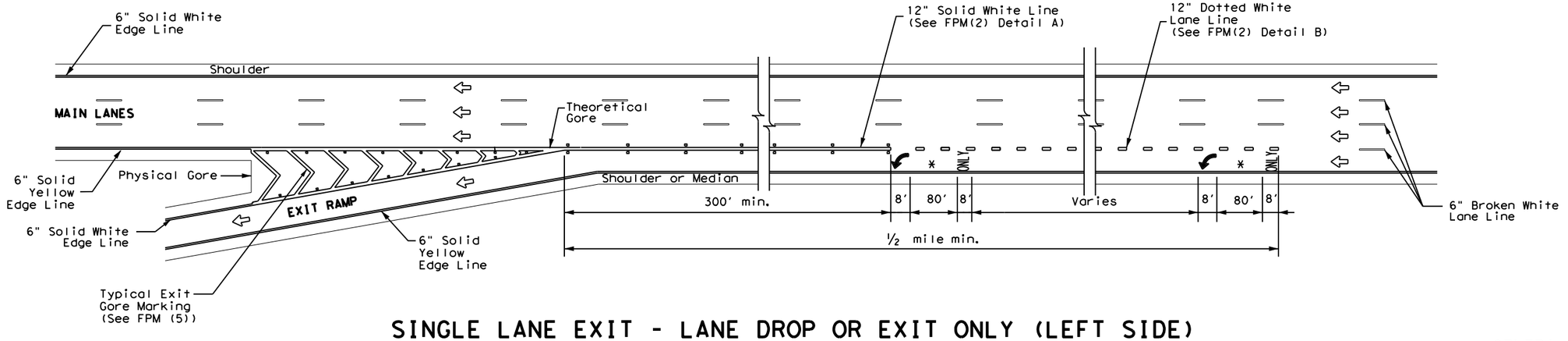


SINGLE LANE EXIT - LANE DROP OR EXIT ONLY

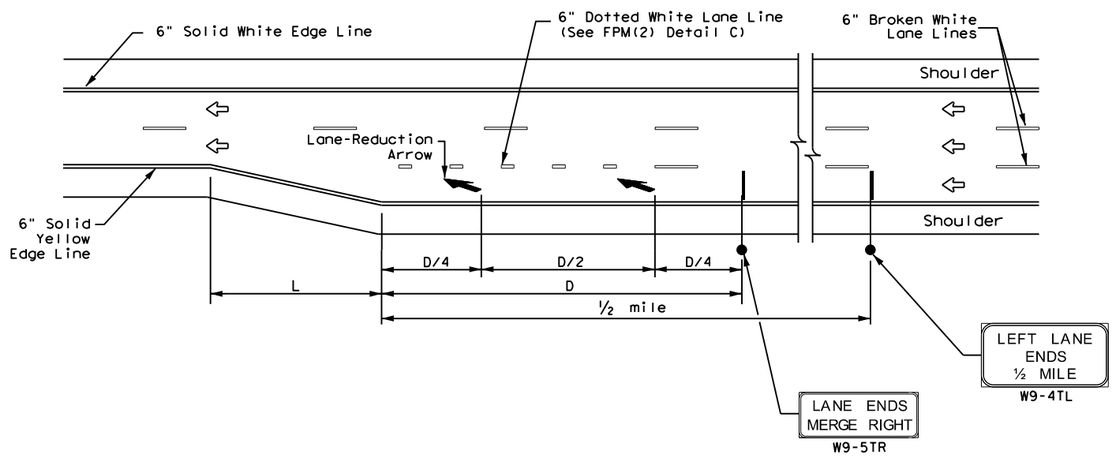
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

LEGEND	
⇦	Traffic flow
↱	Pavement marking arrows (white)
▫	Reflectorized Raised Markers (RPM) Type II-C-R
*	Arrow markings are optional, however "ONLY" is required if arrow is used



SINGLE LANE EXIT - LANE DROP OR EXIT ONLY (LEFT SIDE)



FREEWAY LANE REDUCTION

NOTES

1. Large Guide signs shall conform to the TxDOT Freeway Signing Handbook.
2. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
3. Arrows and sign details can be found in the Standard Highway Sign Designs for Texas (SHSD) at http://www.txdot.gov.
4. These guidelines may also be applied to the design of a right side lane reduction. Use LANE ENDS MERGE LEFT (W9-5TL) and RIGHT LANE ENDS 1/2 MILE (W9-4TR) signs in lieu of what is shown on drawing.

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	
80 MPH	1,500	
85 MPH	1,625	

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 FPM(2) Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Edge lines are not required in curb and gutter sections of frontage roads.
5. See FPM(1) for traffic lane line pavement marking details.

Texas Department of Transportation

Traffic Safety Division Standard

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

FPM(3)-22

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© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
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5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 10-22	DAL	DALLAS		166

23C

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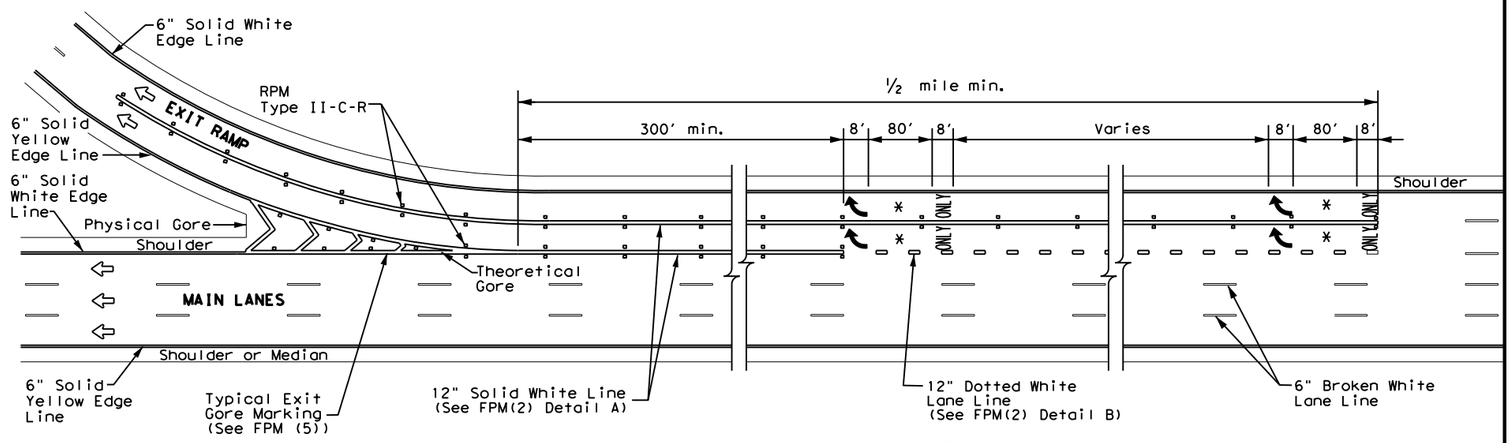


MULTIPLE LANE EXIT ONLY

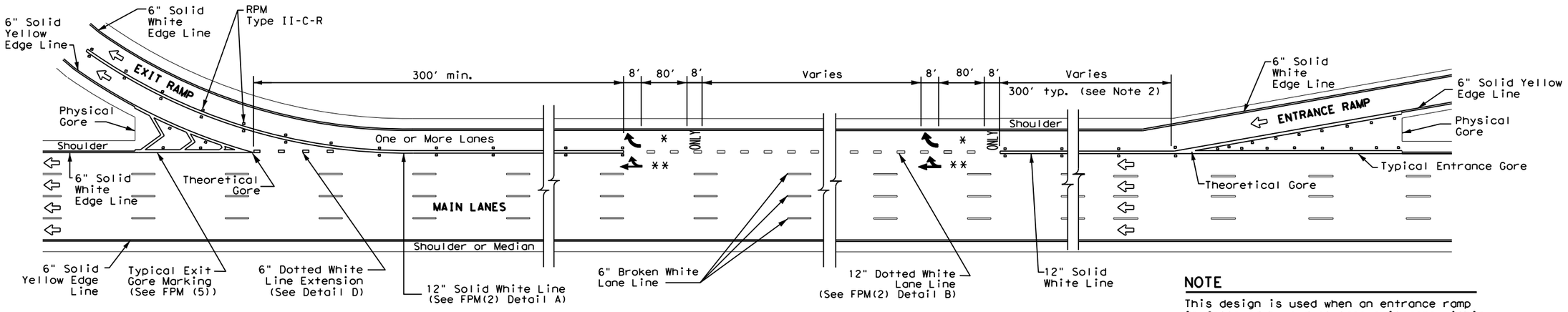
LEGEND	
⇦	Traffic Flow
▫	Reflectorized Raised Markers (RPM) Type II-C-R
↱	Pavement marking arrow (white)
*	Arrow markings are optional, however "ONLY" is required if arrow is used
**	Arrow markings are optional

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.

GENERAL NOTES

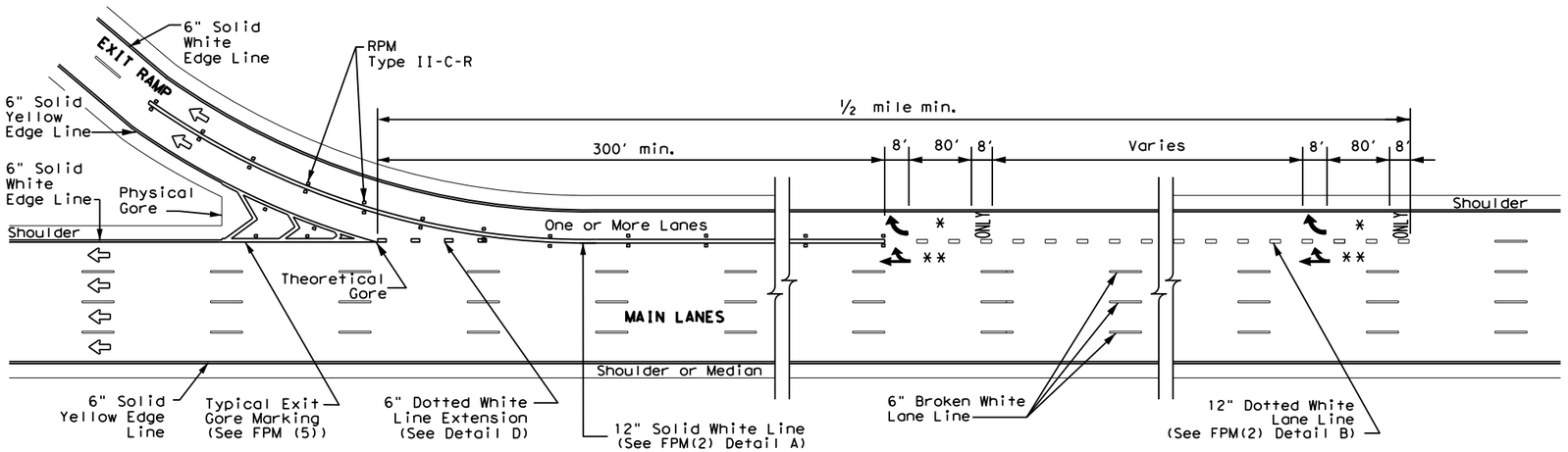
1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") dotted lane line (see FPM(2) Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Edge lines are not required in curb and gutter sections of frontage roads.
5. See FPM(1) for traffic lane line pavement marking details.



SINGLE LANE ENTRANCE WITH MULTIPLE LANE EXIT - EXIT ONLY WITH OPTION LANE

NOTE

This design is used when an entrance ramp is followed by a dual lane exit ramp within 2400' downstream (theoretical gore to theoretical gore).



MULTIPLE LANE EXIT - EXIT ONLY WITH OPTION LANE

Texas Department of Transportation — Traffic Safety Division Standard

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

FPM(4)-22

FILE: fpm(4)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
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2-77 2-10	DIST	COUNTY		SHEET NO.
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8-00 10-22				

230

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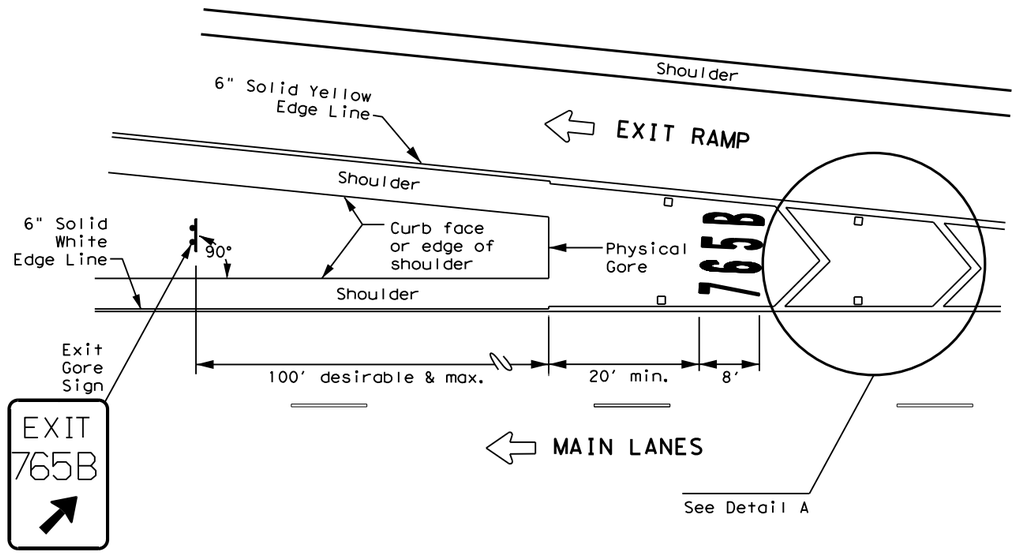
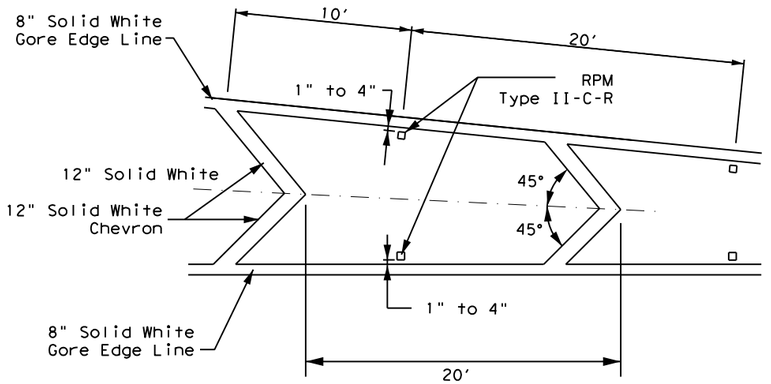
EXIT NUMBER PAVEMENT MARKING NOTES

1. Minimum 8 foot white exit number pavement 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. Numbers and Letters details can be found in the Standard Highway Design for Texas (SHSD) Section 12 at http://www.txdot.gov



MARKINGS WITH EXIT NUMBER



NOTES

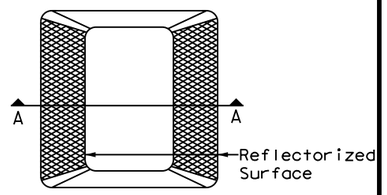
1. Raised pavement markers shall be centered between each chevron or neutral area line.
2. For more information, see Reflectorized Raised Pavement Marker Detail.

DETAIL A

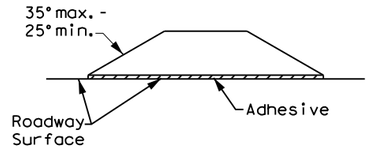
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

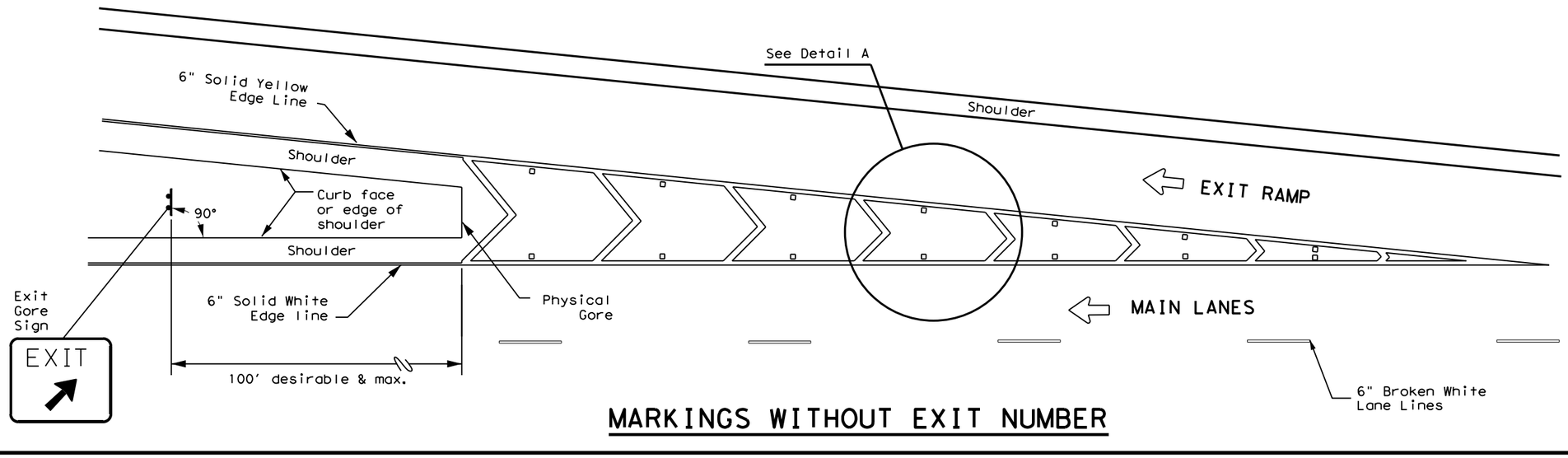


Type II (Top View)



SECTION A

REFLECTORIZED RAISED PAVEMENT MARKER (RPM)



MARKINGS WITHOUT EXIT NUMBER

Texas Department of Transportation

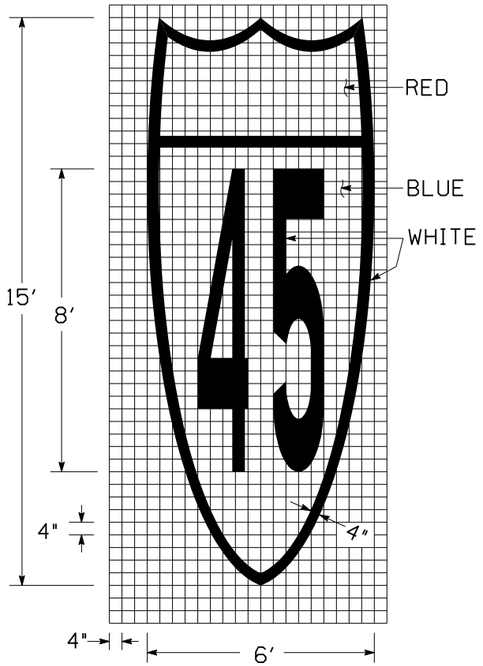
Traffic Safety Division Standard

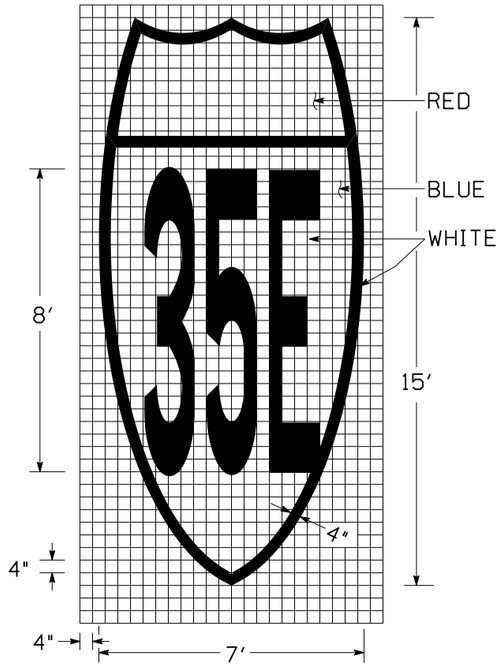
EXIT GORE PAVEMENT MARKINGS

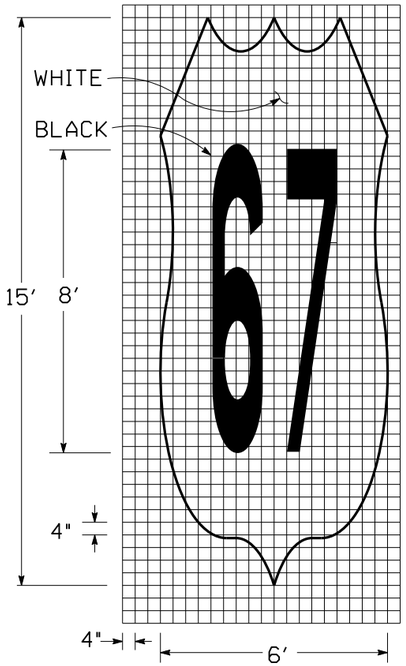
FPM(5)-22

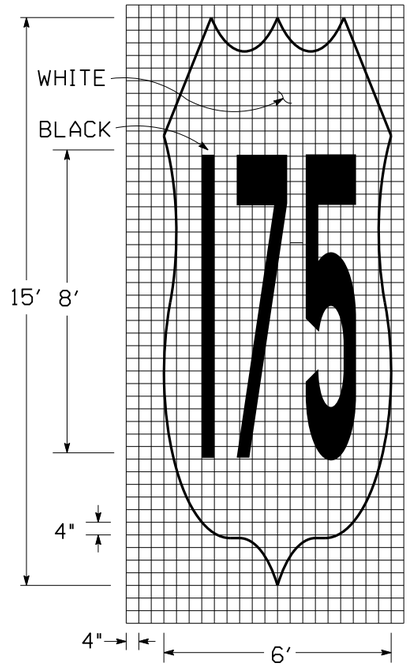
FILE: fpm(5)-22.dgn	DN:	CK:	DW:	CK:
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-19 10-22	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		168

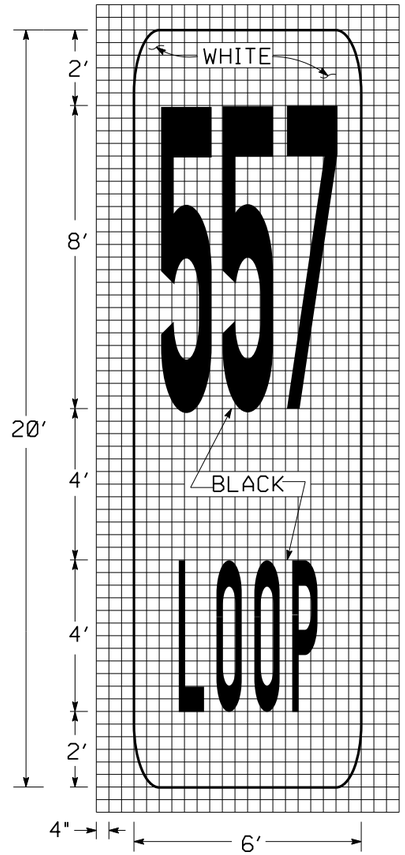
23E

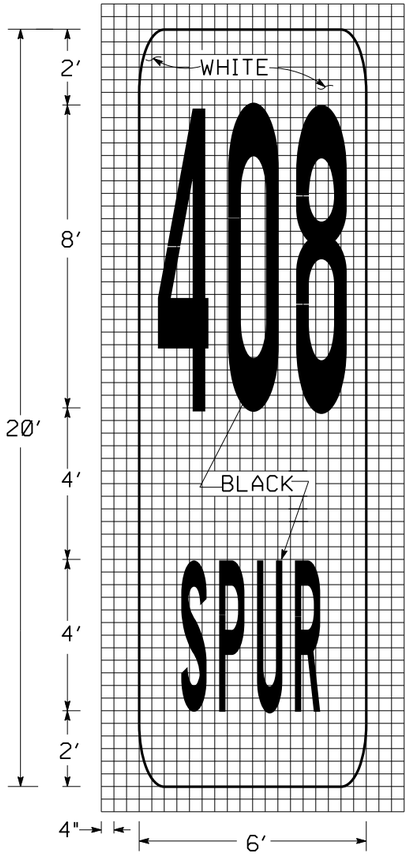


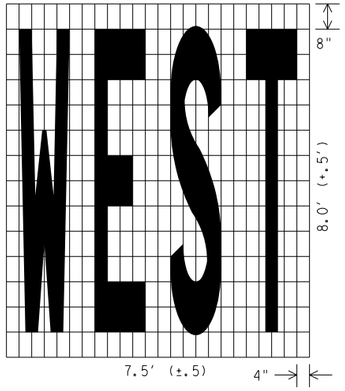


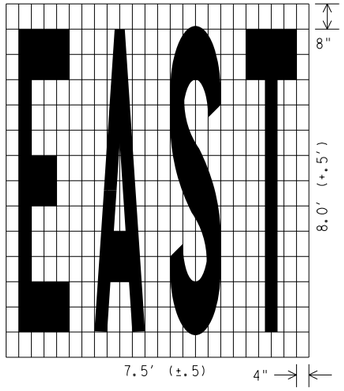


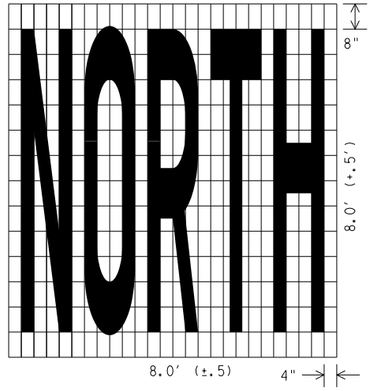


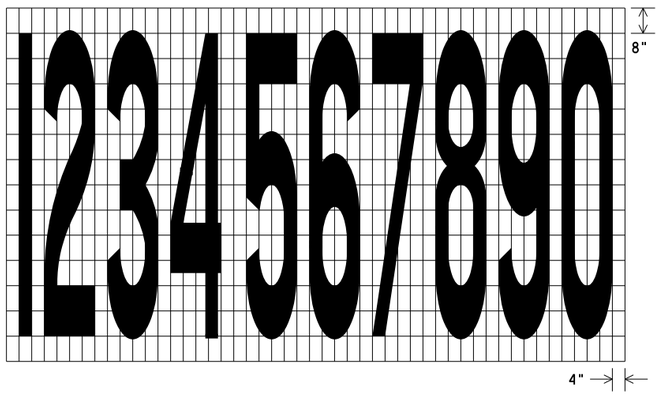


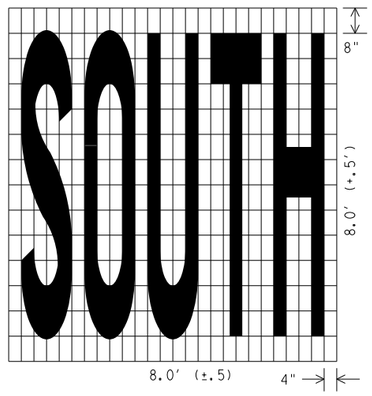


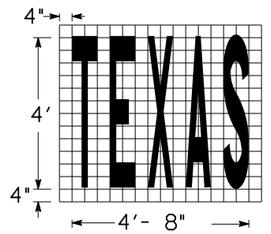


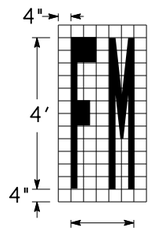












SCALE 1/4" = 1′

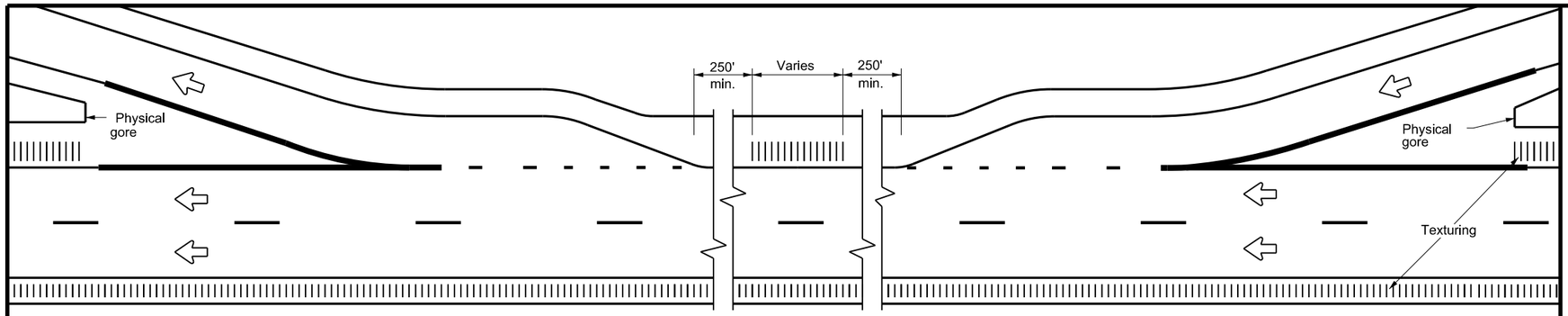
Texas Department of Transportation
Dallas District

PAVEMENT MARKING (SHIELD)

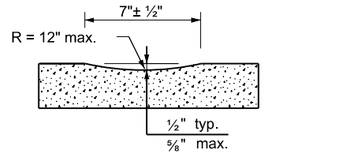
PM(SHIELD)-06(DAL)

FILE:	DN:	CK:	DW:	CK:	
© TxDOT 2006	DIST	FED REG	PROJECT NO.		SHEET
REVISIONS	18	6	SEE TITLE SHEET		169
	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	DALLAS		2374	03	098	IH 20

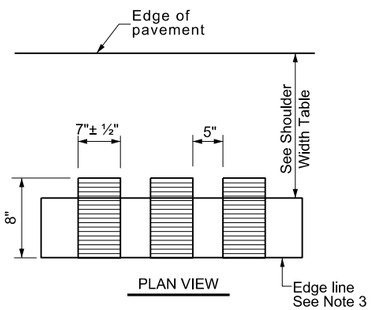
DATE: 3/17/2023 3:06:45 PM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\1H20\2374030098\Sheets\STNDRTF\rs(1)-23.dgn



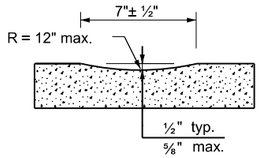
TYPICAL RUMBLE STRIP PLACEMENT AT EXIT AND ENTRANCE RAMPS



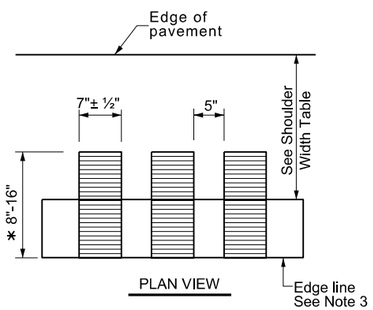
PROFILE VIEW
OPTION 1



CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

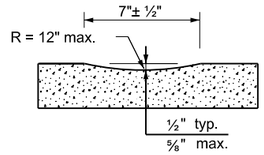


PROFILE VIEW
OPTION 2

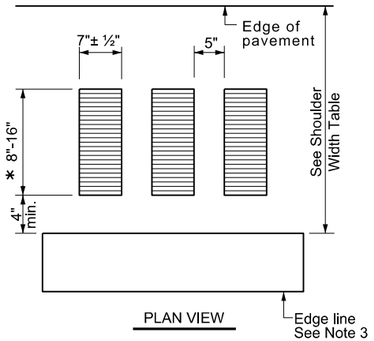


* This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

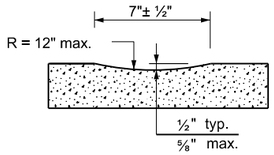


PROFILE VIEW
OPTION 3

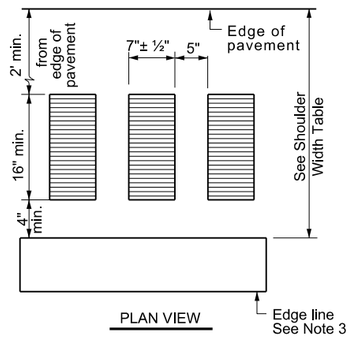


* This distance may vary based on width of shoulder

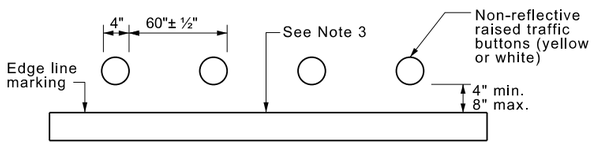
CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PROFILE VIEW
OPTION 4

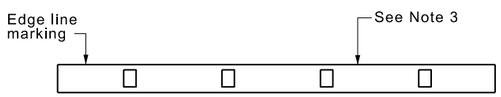


CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW
OPTION 5

RAISED EDGE LINE
(Rumble Strips)



PLAN VIEW
OPTION 6

PROFILE EDGE LINE MARKINGS
(Rumble Strips)

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use standard sheets PM(2) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.
5. Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.
6. Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.
7. Consideration should be given to noise levels when edge line rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

9. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
10. Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble stripe.

WHEN INSTALLING RAISED OR PROFILE EDGE LINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.
15. Raised profile thermoplastic markings used as edge lines may substitute for buttons.

SHOULDER WIDTH TABLE

EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5, or 6	Option 1, 2, 3, 5, or 6	Option 2, 4, 5, or 6

Texas Department of Transportation

Traffic Safety Division Standard

EDGE LINE RUMBLE STRIPS ON FREEWAYS AND DIVIDED HIGHWAYS RS(1)-23

FILE: rs(1)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	098	IH 20
4-06 1-23	DIST	COUNTY		SHEET NO.
2-10	DAL	DALLAS		170
10-13				

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept in the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
2374-03-098 (IH 20)

1.2 PROJECT LIMITS:
From: IH 45

To: IH 635

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 32.6617731° (N), (Long) 96.7265462 °(W)

END: (Lat) 32.6990456°(N), (Long) 96.6276624°(W)

1.4 TOTAL PROJECT AREA (Acres): 120

1.5 TOTAL AREA TO BE DISTURBED (Acres): 2.44

1.6 NATURE OF CONSTRUCTION ACTIVITY:
Planning, Concrete full depth repair, Overlay, Pavement markings, and bridge repair and culvert riprap repair

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Trinty Clay, 0 to 1 % slopes, frquentley flooded	Trinty and Smilar soils: 85% Minor Componenets: 15%
Rader-Mabank complex, 0 to 2 % slopes	Rader and Similar soils: 65% Mabenk and similar soils: 20% Minor Components: 15%
Rader-Urban Land complex, 0 to 2 % slopes	Rader and similar soils: 65% Urban Land: 20% Minor Components :15%
Wlison Clay Loam, 0 to 1 % slopes	Wilson and similar soils: 85% Minor Componenets: 15%
Mabank fine sandy loam, 0 to 1% slopes	Mbank and similar soils: 100%
Native grass (95% cover) and shrubs (5%) vegetation cover the area. Healthy, dense, and fully grown.	

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):
PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☑ PSLs determined during preconstruction meeting
☐ PSLs determined during construction
☐ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

☑ Mobilization
☑ Install sediment and erosion controls
☐ Blade existing topsoil into windrows, prep ROW, clear and grub
☑ Remove existing pavement
☐ Grading operations, excavation, and embankment
☐ Excavate and prepare subgrade for proposed pavement widening
☐ Remove existing culverts, safety end treatments (SETs)
☑ Remove existing metal beam guard fence (MBGF), bridge rail
☐ Install proposed pavement per plans
☐ Install culverts, culvert extensions, SETs
☑ Install mow strip, MBGF, bridge rail
☐ Place flex base
☐ Rework slopes, grade ditches
☐ Blade windrowed material back across slopes
☐ Revegetation of unpaved areas
☑ Achieve site stabilization and remove sediment and erosion control measures
☑ Other: Removing / installing Riprap, cleaning debris.
☐ Other: bridge repair
☐ Other:

1.10 POTENTIAL POLLUTANTS AND SOURCES:

☑ Sediment laden stormwater from stormwater conveyance over disturbed area
☑ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
☑ Solvents, paints, adhesives, etc. from various construction activities
☑ Transported soils from offsite vehicle tracking
☑ Construction debris and waste from various construction activities
☐ Contaminated water from excavation or dewatering pump-out water
☐ Sanitary waste from onsite restroom facilities
☑ Trash from various construction activities/receptacles
☐ Long-term stockpiles of material and waste
☑ Other: Concrete pouring and washout, concrete milling, Concrete saw cutting
☐ Other:
☐ Other:

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody
Trinity River (0805) and its tributaries, and Prairie Creek and it tributaries	* Upper Trinity River [Segment 0805; impaired by Bacteria in water (Recreation Use) and by Dioxin and PCBs in edible tissue]
Tributary to Fivemile creek	Fivemile Creek (Segment 0805D)

* See TNRCC TMDL report and Implementation Plan info: "Nine Total Maximum Daily Loads for Legacy Pollutants in Streams 0805, 0841, and 0841A."

1.12 ROLES AND RESPONSIBILITIES: TxDOT

X Development of plans and specifications
X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
X Post Construction Site Notice
X Submit NOI/CSN to local MS4
X Perform SWP3 inspections
X Maintain SWP3 records and update to reflect daily operations
X Complete and submit Notice of Termination to TCEQ
X Maintain SWP3 records for 3 years
☐ Other:
☐ Other:
☐ Other:

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

X Day To Day Operational Control
X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
X Post Construction Site Notice
X Submit NOI/CSN to local MS4
X Maintain schedule of major construction activities
X Install, maintain and modify BMPs
X Complete and submit Notice of Termination to TCEQ
X Maintain SWP3 records for 3 years
☐ Other:
☐ Other:
☐ Other:

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED PROFESSIONAL ENGINEER

P.E. 3/17/2023
Signature of Registrant & Date

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			171
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	DALLAS	
CONT.	SECT.	JOB	HIGHWAY NO.
2374	03	098	IH 20

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☑ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ ☑ Permanent Planting, Sodding or Seeding
- ☑ ☐ Biodegradable Erosion Control Logs
- ☑ ☐ Rock Filter Dams/ Rock Check Dams
- ☑ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☑ ☐ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☑ Other: Vegetation lined ditches (permanent)
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☑ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☑ ☐ Sediment Control Fence
- ☑ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- ☐ ☐ Sedimentation Basin
  - ☑ Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 3,600 cubic feet of storage per acre drained
  - ☐ Required (>10 acres), but not feasible due to:
    - ☐ Available area/Site geometry
    - ☐ Site slope/Drainage patterns
    - ☐ Site soils/Geotechnical factors
    - ☐ Public safety
    - ☐ Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
Stone Riprap (18 IN)	STA 470+00	STA 472+00
Stone Riprap (18 IN)	STA 538+00	STA 539+00
Concrete Riprap	STA 642+00	STA 645+00

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- ☑ Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☑ Loaded haul trucks to be covered with tarpaulin
- ☑ Stabilized construction exit
- ☐ Other: Dampen disturbed soil areas as needed for dust control.
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☑ Chemical Management
- ☑ Concrete and Materials Waste Management
- ☑ Debris and Trash Management
- ☑ Dust Control
- ☐ Sanitary Facilities
- ☑ Other: _____

- Avoid storing portable sanitary units, concrete washouts or chemicals within 50 feet upgradient of a receiving water or drainage conveyance without adequate pollution controls.
- Capture saw-cutting debris and concrete slurry for proper disposal.
- Maintain paved surfaces free of project sedimentation and debris.

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

1. Vegetative buffer zone not feasible from STA. 470+00 to STA. 472+00 TRIBUTARY TO FIVEMILE CREEK (DRAW) at bridge class culvert due to the work performed installing stone riprap. BMPs to protect stream include Rock Filtered Dams and sediment control fence.
2. Vegetative buffer zone not feasible from STA. 538+00 to STA. 539+00 TRIBUTARY TO TRINITY RIVER (DRAW) at bridge class culvert due to the work performed installing stone riprap. BMPs to protect stream include Rock Filtered Dams and sediment control fence.
3. Vegetative buffer zone not feasible from STA. 642+00 to STA. 645+00 TRIBUTARY TO PRAIRIE CREEK (DRAW) at bridge class culvert due to the work performed installing concrete riprap. BMPs to protect stream include sediment control fence.

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- ☑ Fire hydrant flushings
- ☑ Irrigation drainage
- ☑ Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- ☑ Potable water sources
- ☑ Springs
- ☑ Uncontaminated groundwater
- ☑ Water used to wash vehicles or control dust
- ☑ Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED PROFESSIONAL ENGINEER

Signature of Registrant & Date, P.E. 3/17/2023

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			172
STATE	STATE DIST.	COUNTY	
TEXAS	DAL	DALLAS	
CONT.	SECT.	JOB	HIGHWAY NO.
2374	03	098	IH 20

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 damage resulting from its use.

Notes To Designer:
1. *Do not alter Sheet Design or Font style, size or weight - match text attributes.*
2. *If additional space is needed for a numbered section, fence and adjust sections up or down as needed for proportioning and readability but do not relocate from its relative position.*
3. *All areas should be addressed thoroughly and verify the necessary pay items are set up to support actions needed.*

Filled Out: XX/XX/XXXX
Prepared by: Name/Section

I. STORMWATER POLLUTION PREVENTION PLAN-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 adjacent MS 4 Operator(s) that receive discharges from this project. They need to be notified prior to construction activities.
(Note: Leave blank only if no adjacent MS 4 Operator(s) are affected.)

1. City of Dallas Phase I MS4 contact Kevin Hurley
2. City of Hutchins Phase II MS4 contact Scott Metcalf
3. City of Balch Springs Phase II MS4 contact William Freeman

☐ No Action Required ☒ Required Action

Action Number:

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. No equipment is allowed in any sream channel below the ordinary High Water Mark except on approved temporary stream crossings or drill pads.

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# 3(a)

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. Bridge - STA 471+00 - IH 20 over Draw - Stream Impacts
2. Bridge - STA 539+00 - IH 20 over Draw - Stream Impacts
3. Bridge - STA 643+00 - IH 20 ML over Draw - Stream Impacts

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 for applicable 401 General Conditions:
(Note: If CORP Permit not required, do not check boxes.)

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

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

Action Number:

1.

2.

3.

IV. VEGETATION RESOURCES

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

☒ No Action Required ☐ Required Action

Action Number:

1.

2.

3.

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

☐ No Action Required ☒ Required Action

Action Number:

1. Follow Special Notes.

Special Notes:

1. Avoid harming all wildlife species if encountered and allow them to safely leave the project site. Due diligence should be used to avoid killing or harming any wildlife species in the implementation of transportation projects.

2. 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 immediated area, and contact the Engineer immediately.

3. The Migratory Bird Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade or transport any migratory bird, nest, young, feather or egg in part or in whole, without a federal permit issued in accordance within the Act's policies and regulations. The contractor would remove all old migratory bird nests from any structure or trees where work would be done from October 1 to February 15. In addition, the contractor would be prepared to prevent migratory birds from building nest(s) between February 15 to October 1. In the event that migratory birds are encountered on-site during project construction, efforts to avoid adverse impacts on protected birds, active nests, eggs and/or young would be observed.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice
CGP:	Construction General Permit
DSHS:	Texas Department of State Health Services
FHWA:	Federal Highway Administration
MOA:	Memorandum of Agreement
MOU:	Memorandum of Understanding
MS4:	Municipal Separate Stormwater Sewer System
MBTA:	Migratory Bird Treaty Act
NOT:	Notice of Termination
NWP:	Nationwide Permit
NOI:	Notice of Intent
SPCC:	Spill Prevention Control and Countermeasure
SW3P:	Storm Water Pollution Prevention Plan
PCN:	Pre-Construction Notification
PSL:	Project Specific Location
TCEQ:	Texas Commission on Environmental Quality
TPDES:	Texas Pollutant Discharge Elimination System
TPWD:	Texas Parks and Wildlife Department
TxDOT:	Texas Department of Transportation
T&E:	Threatened and Endangered Species
USACE:	U.S. Army Corp of Engineers
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 Safety Data Sheets (SDS) 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 SDS. In the event of a spill, take actions to mitigate the spill as indicated in the SDS, 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, canisters, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation(s) or replacement(s) (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 Number:

1. NBI 18-057-0-2374-03-166: IH 20 WB over Prairie Creek (STA 612+00)
2. NBI 18-057-0-2374-03-167: IH 20 EB over Prairie Creek (STA 612+00)
3. NBI 18-057-0-2374-03-168: IH 20 ML over Draw (STA 643+00)
4. NBI 18-057-0-2374-03-190: IH 20 over Draw (STA 471+00)
5. NBI 18-057-0-2374-03-191: IH 20 over Draw (STA 539+00)

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action Number:

1.

GENERAL NOTE:

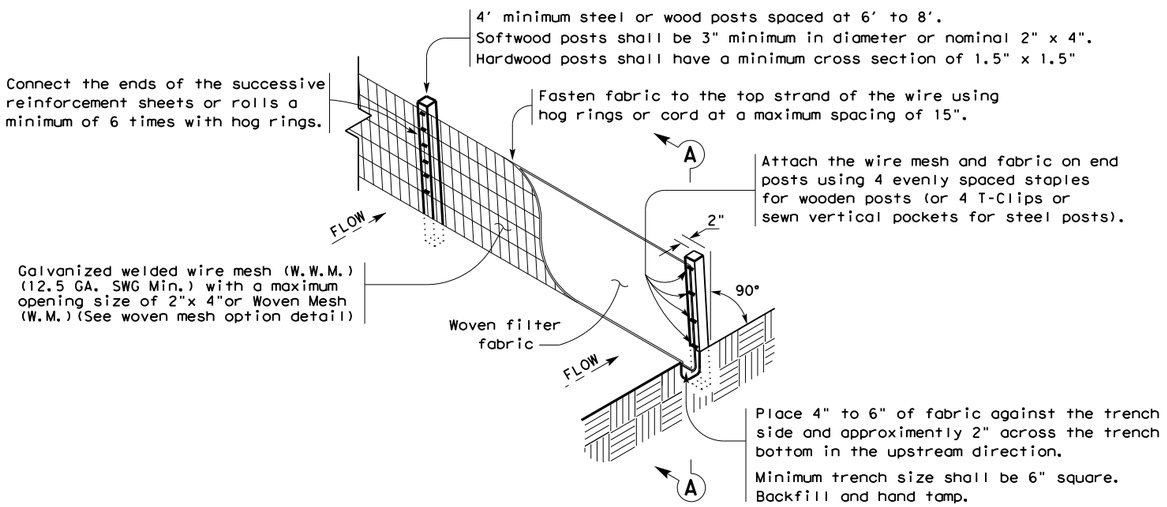
Any change orders and/or deviations from the final design must be reported to the Engineer prior to commencement of construction activities, as additional environmental clearance may be required.

LAST REVISION: 1/15/15

 Texas Department of Transportation
Dallas District

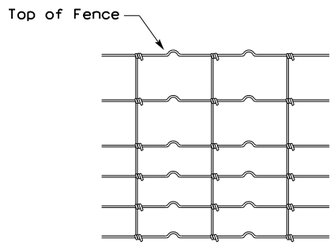
ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)

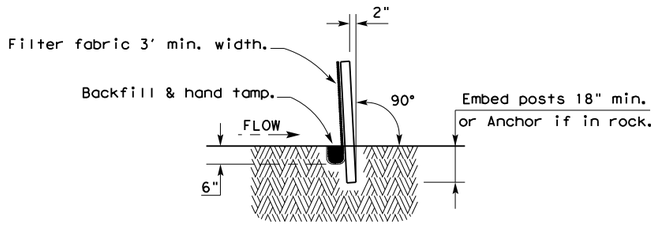
FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		IH 20
STATE	DISTRICT	COUNTY	
TEXAS	DALLAS	Dallas	
CONTROL	SECTION	JOB	SHEET NO.
2374	03	098	173



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.

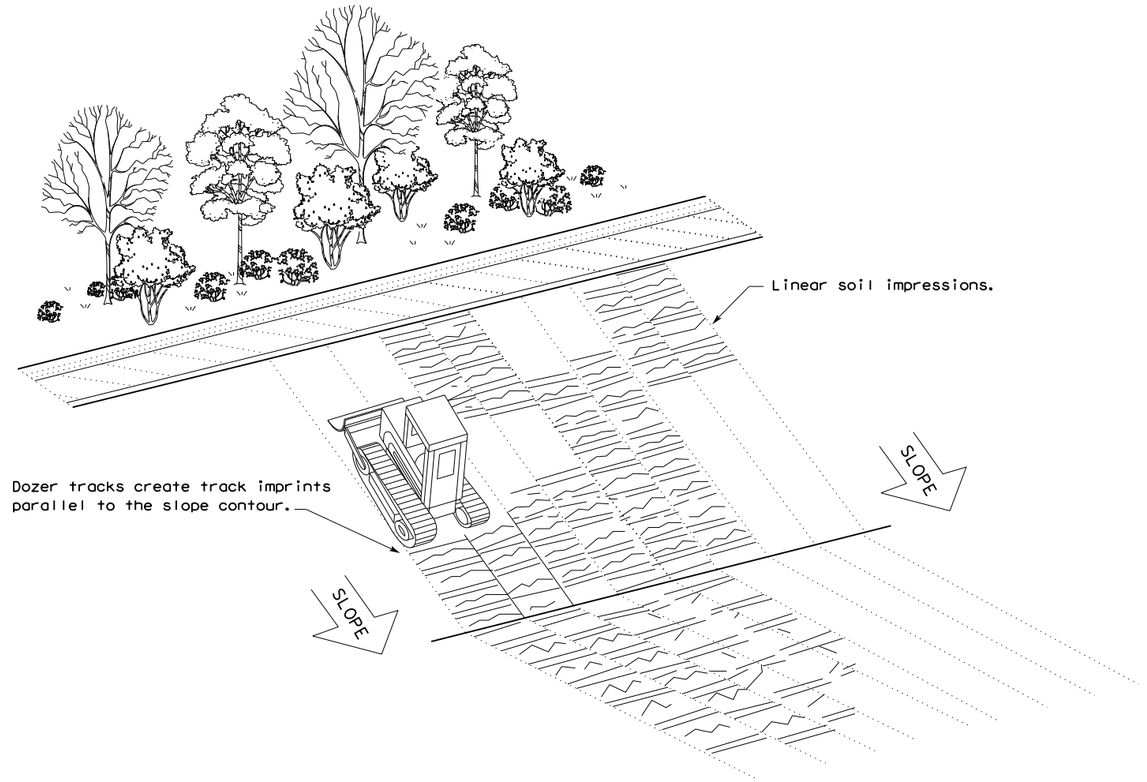
LEGEND

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	2374	03	098		IH 20	
	DIST	COUNTY			SHEET NO.	
	DAL	DALLAS			174	

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DATE: 3/17/2023
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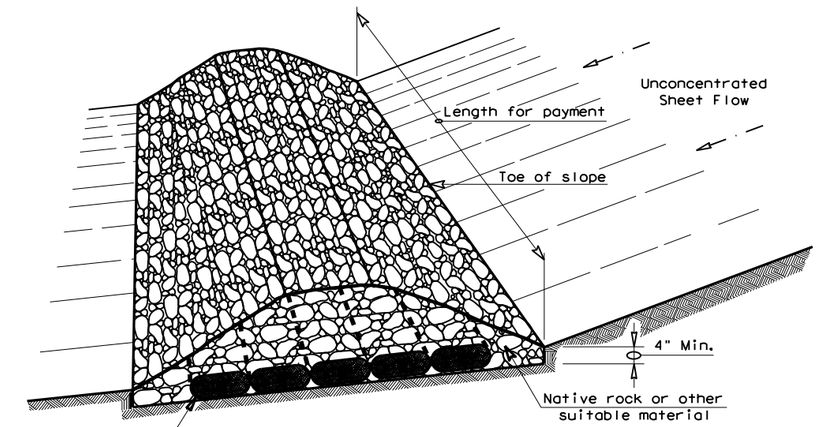
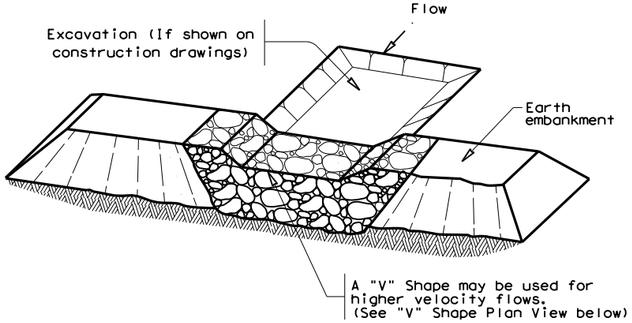


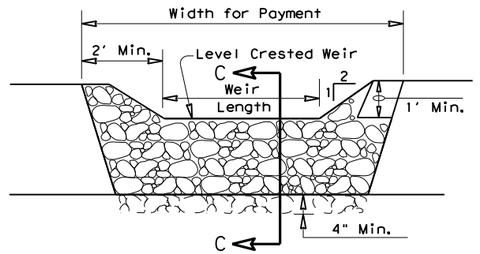
FILTER DAM AT TOE OF SLOPE

RFD1

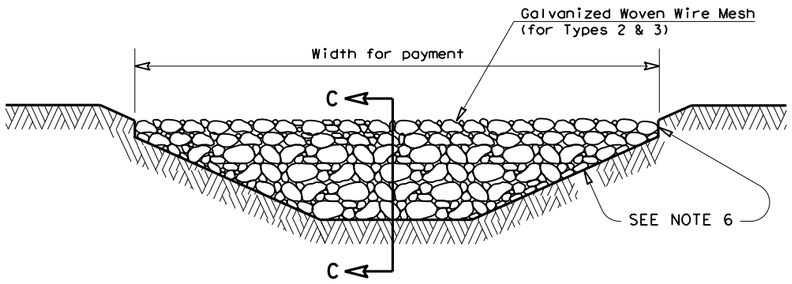


FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2

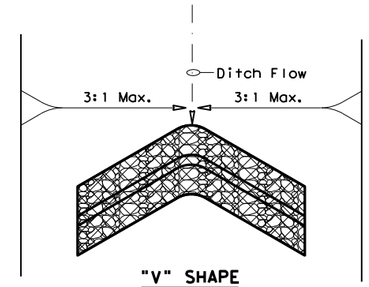


PROFILE

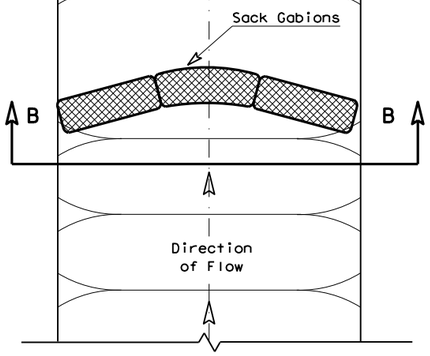


FILTER DAM AT CHANNEL SECTIONS

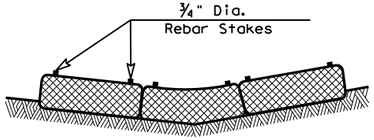
RFD1 — OR — RFD2 — OR — RFD3



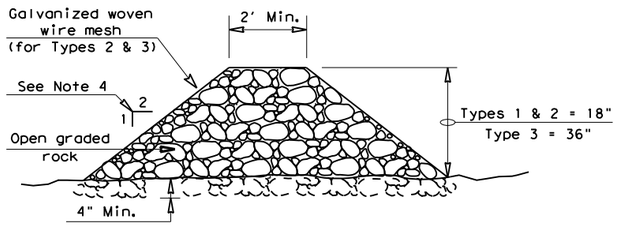
"V" SHAPE
PLAN VIEW



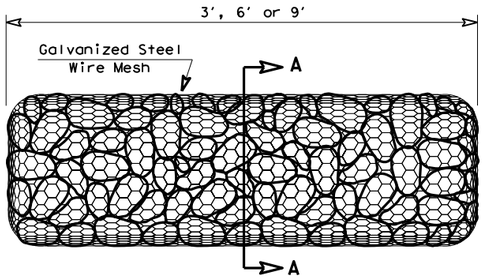
PLAN VIEW



SECTION B-B

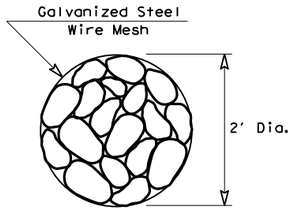


SECTION C-C



TYPE 4 (SACK GABIONS)

RFD4



SECTION A-A

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.

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
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	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		175

DATE: 3/17/2023
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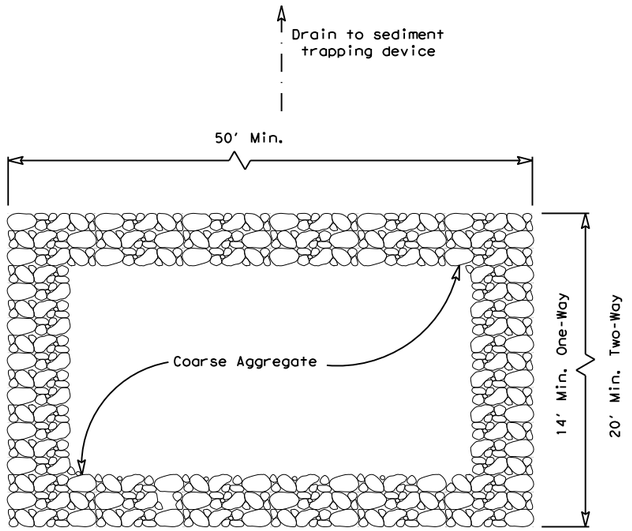
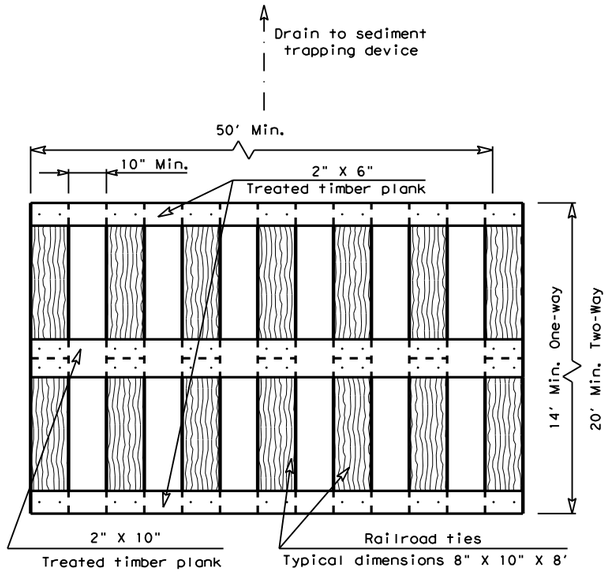
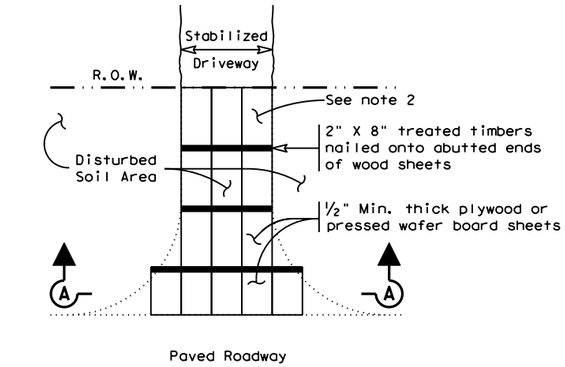


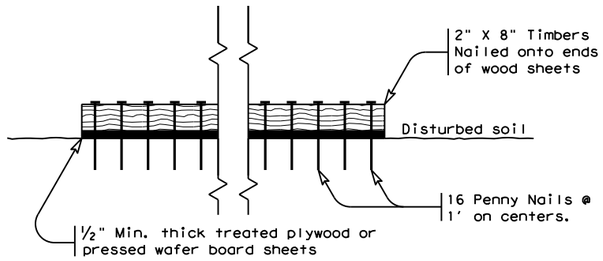
PLAN VIEW



PLAN VIEW



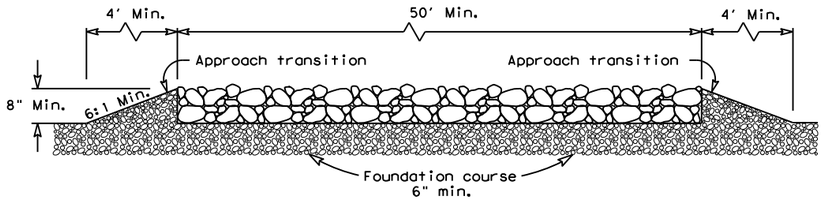
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

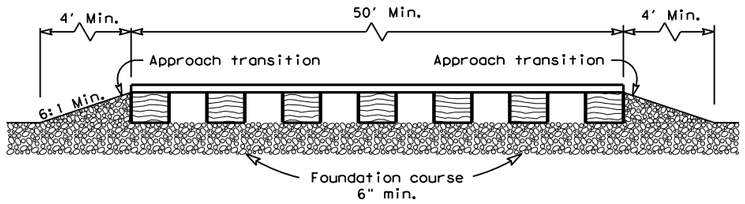
SHORT TERM



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
	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		176

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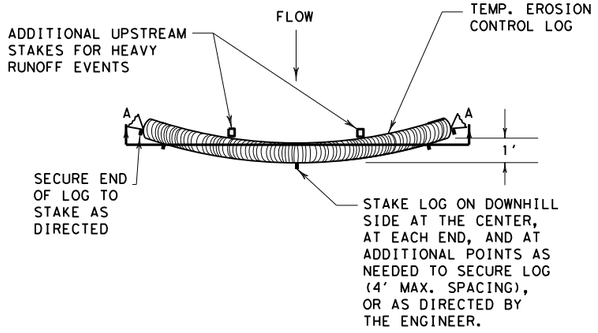
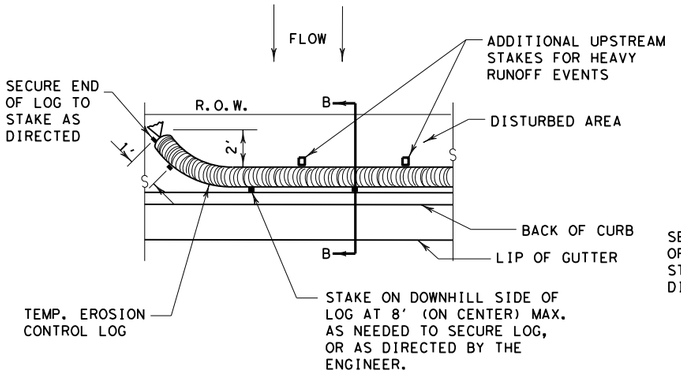


PLAN VIEW



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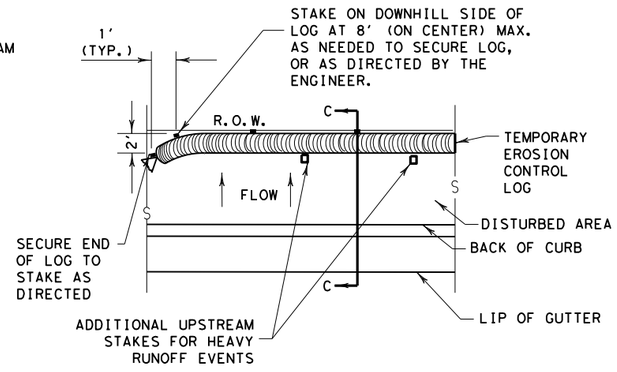

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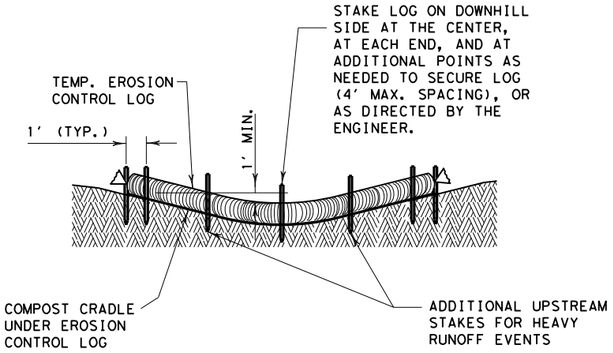
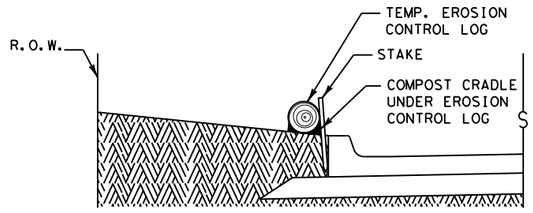


SECTION A-A

EROSION CONTROL LOG DAM

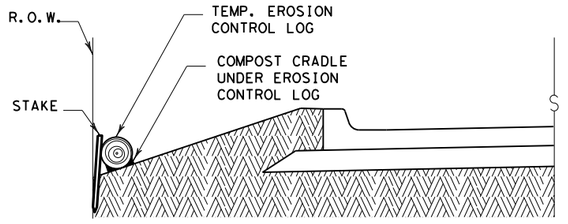
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

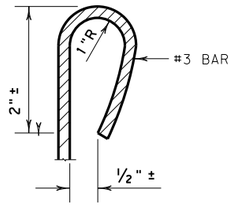
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

GENERAL NOTES:

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

LEGEND

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

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

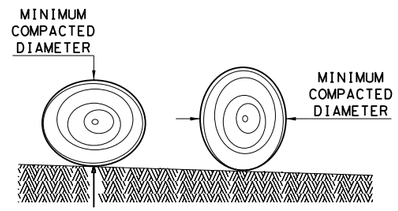
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

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

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

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



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SHEET 1 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

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© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
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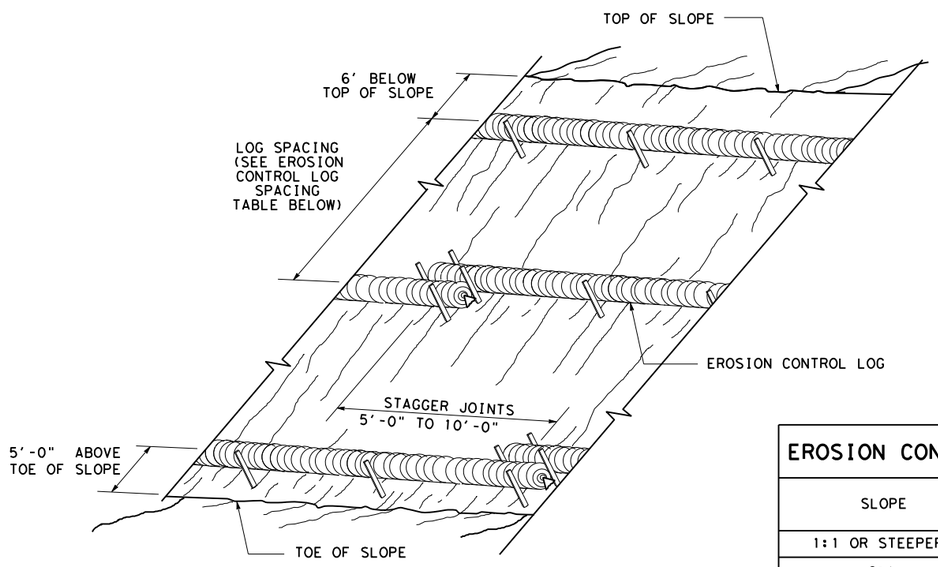
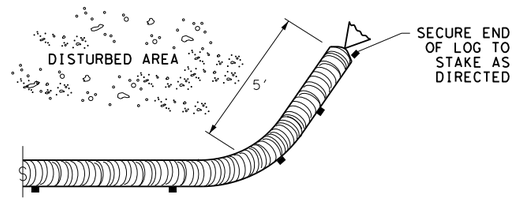


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

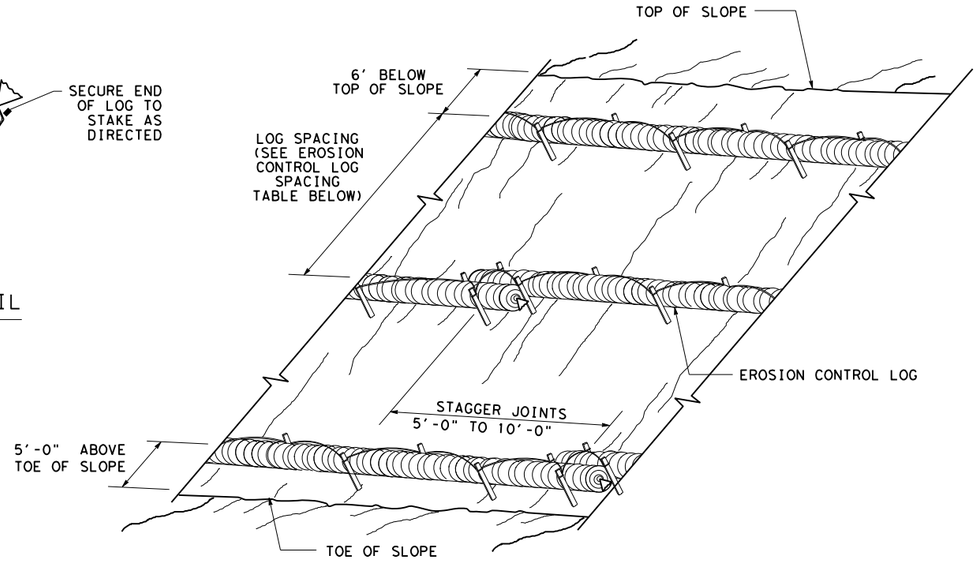
CL-SST



END SECTION RAP DETAIL

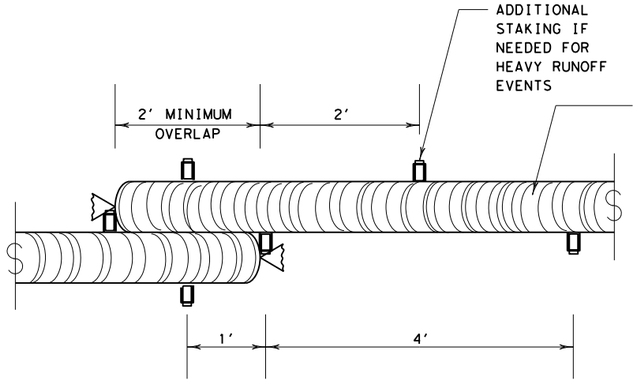
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

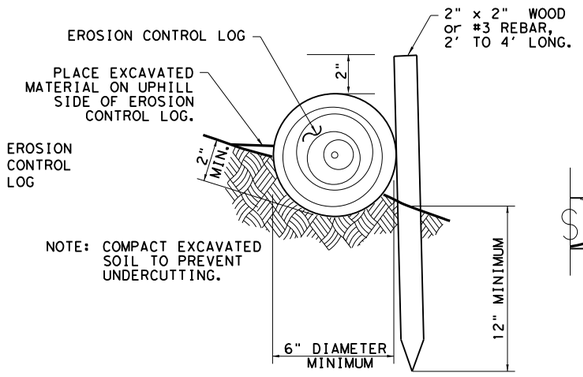
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

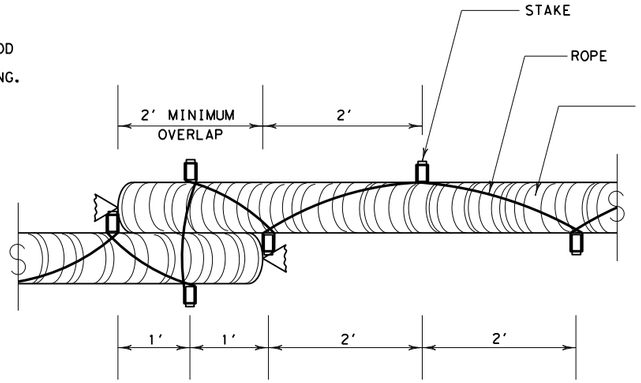


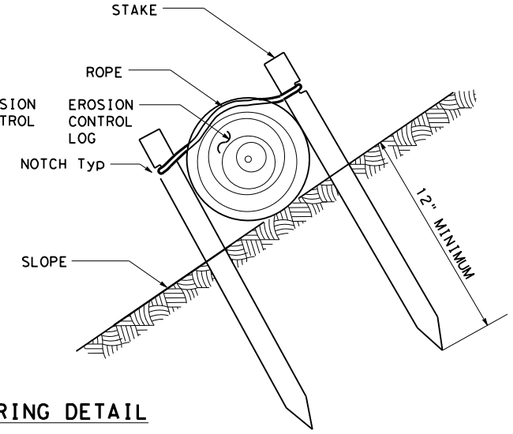


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

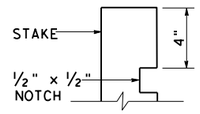
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

Design Division Standard

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

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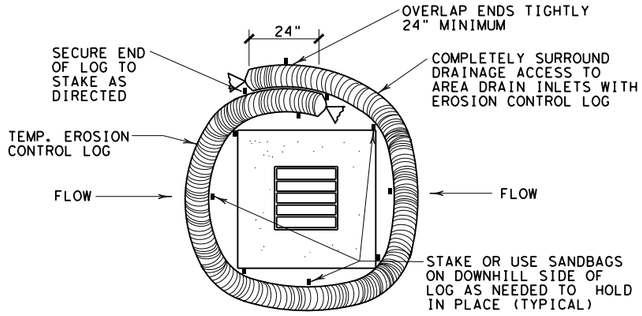
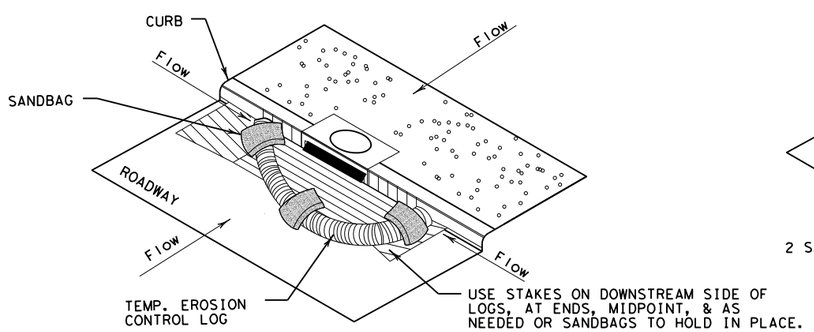


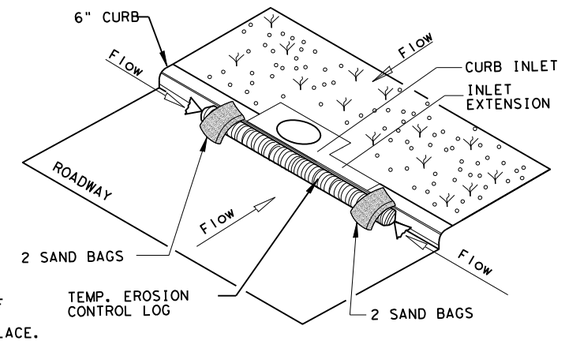
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

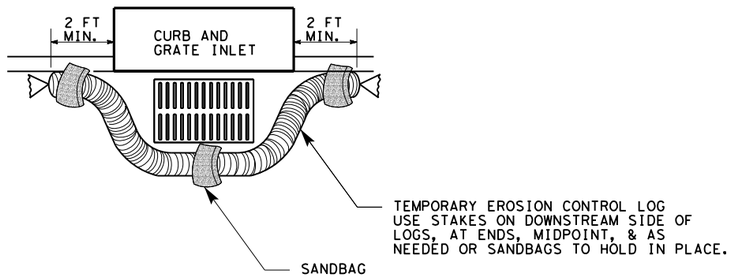
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

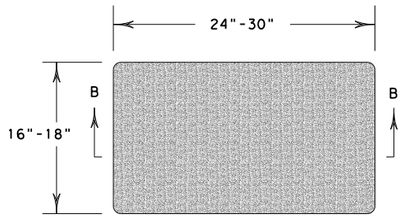
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

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REVISIONS	2374	03	098	IH 20		
	DIST	COUNTY		SHEET NO.		
	DAL	DALLAS		179		

USER ID

SURFACE PREPARATION ITEM 160* TOPSOIL SY / ITEM 161* COMPOST MANUF. TOPSOIL (BOS) (4") SY

SURFACE PREPARATION

Prepare planting area surface BEFORE placing Topsoil, Compost, Fertilizer, Seed and/or Sod.
Once project area has been completed to final lines, grade and compaction, remove objectionable materials from planting area surface and cultivate existing surface to a depth of 4 inches, unless otherwise specified or directed.

Refer to Items 160 and 161 of TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown in plans. Materials and construction shall meet all specifications.

TOPSOIL NOTES:
1. When Topsoil is specified under Item 160, use suitable material salvaged from the project ROW in accordance with Item 160 specifications, and/or secure additional good material from approved sources.
2. Topsoil shall include only the top 6 inches of its native surface, and be easily cultivated, fertile, erosion-resistant and free of objectionable materials.
3. Topsoil obtained from sites outside of the ROW must come from approved sources and have a pH between 5.5 and 8.5 su.
4. Place Topsoil on pre-cultivated surface, spread to a uniform loose cover at thickness specified, and shape per plans. Water and roll the finished surface with a light roller or other suitable equipment per Item 160.3; do not over-compact.

COMPOST NOTES:
1. When Compost Manufactured Topsoil (4") is specified under Item 161, use compost meeting all requirements of Item 161.2 and Table 1. Provide quality control (QC) documentation and obtain Engineer approval prior to compost delivery.
2. Contractor shall provide tickets/invoices that document material type, quantity and placement for all compost delivered.
3. Additional topsoil may be required to be imported to achieve the compost/topsoil mix ratio. Topsoil must meet Item 160 specifications.

APPLICATION OF COMPOST MANUFACTURED TOPSOIL (4")

AFTER Surface Preparation, uniformly spread a 1-inch layer of compost on-grade with 3 inches topsoil over pre-cultivated planting area. (25% compost and 75% topsoil = 1" compost and 3" topsoil.)
Then mix compost and topsoil together by cultivating the compost into the topsoil (by till or disk) to a 4-inch (4") depth.
Roll the finished surface with a light corrugated drum; do not over-compact.

FERTILIZER ITEM 166* FERTILIZER AC

SOIL ANALYSIS FOR FERTILIZER APPLICATION RATE

Unless otherwise stated in the plans, Contractor shall perform at least one soil analysis on each project before fertilization, and submit results to Engineer with recommended fertilizer rates based on soil analysis.
Engineer may direct sample location(s). Soil analysis may be waived if both compost and sod are used on entire project.

FERTILIZER NOTES:
1. Refer to Item 166 of TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown in plans. Materials and construction shall meet all specifications.
2. Apply fertilizer BEFORE seeding, or AFTER placing sod.
3. Use fertilizer containing nitrogen (N), phosphoric acid (P) and potash (K) nutrients, unless otherwise specified. At least 50% of the Nitrogen component shall be a slow-release sulfur-coated urea as described in Item 166.3. Do not apply more than 60 lbs Nitrogen per acre without Engineer concurrence.
4. Deliver fertilizer in bags, clearly labeled to show contents, unless otherwise specified or approved prior to delivery. When non-bagged, loose fertilizer is approved, provide documentation for each load of material delivered, to validate authenticity of the material.
5. Apply fertilizer uniformly, as a dry, granular material, essentially dust-free, and do not mix with water for application as a slurry.
6. When both temporary and permanent seeding are specified for the same area, apply half of the required fertilizer before the temporary seeding operation and the other half before the permanent seeding operation.

SEEDING FOR EROSION CONTROL ITEM 164* DRILL SEEDING AC

RECOMMENDED PLANTING SEASON	PERMANENT RURAL SEED MIX ITEM 164 - DRILL SEEDING (PERM) (RURAL)(CLAY)	Pure Live Seed Rate**	PERMANENT URBAN SEED MIX ITEM 164 - DRILL SEEDING (PERM) (URBAN)(CLAY)	Pure Live Seed Rate**	TEMPORARY DRILL SEED MIX ITEM 164 - DRILL SEEDING (TEMP) (WARM OR COOL)	Pure Live Seed Rate**
WARM SEASON Mar.15th, April, May, June, July, August, Sept. 15th	Green Sprangletop (Van Horn)	- 1.0 lbs/AC	Green Sprangletop (Leptochloa dubia)	- 0.3 lbs/AC	Foxtail Millet (Setaria italica)	- 34 lbs/AC
	Sideoats Grama (Haskell)	- 1.0 lbs/AC	Sideoats Grama (El Reno)(Bouteloua curtipendula)	- 3.6 lbs/AC		
	Texas Grama (Atascosa)	- 1.0 lbs/AC	Buffalograss (Texoka)(Buchloe dactyloides)	- 1.6 lbs/AC		
	Hairy Grama (Chaparral)	- 0.4 lbs/AC	Bermudagrass (Cynodon dactylon)	- 2.4 lbs/AC		
	Shortspike Windmillgrass (Welder)	- 0.2 lbs/AC				
	Little Bluestem (OK Select)	- 0.8 lbs/AC				
	Purple Prairie Clover (Cuero)	- 0.6 lbs/AC				
	Engelmann Daisy (Eldorado)	- 0.75lbs/AC				
	Illinois Bundleflower	- 1.3 lbs/AC				
	Awnless Bushsunflower (Plateau)	- 0.2 lbs/AC				
COOL SEASON Sept 16th, Oct, Nov, Dec, Jan, Feb, Mar 14th					Tall Fescue (Festuca arundinaceae)	- 4.5 lbs/AC
					Western Wheatgrass (Agropyron smithii)	- 5.6 lbs/AC
					Red Winter Wheat (Triticum aestivum)	- 34 lbs/AC
					Cereal Rye	- 34 lbs/AC

SEEDING NOTES:
1. When seeding is specified under Item 164, refer to TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown. Materials and construction shall meet specifications.
2. Conduct seeding upon completion of each applicable construction stage (dependent upon planting season requirements), without compensation for additional move-ins.
3. Place seed AFTER preparing planting area surface. Refer to Surface Preparation detail this sheet, as well as Topsoil Item 160 and Compost Manufactured Topsoil Item 161 when specified. Apply fertilizer per Item 166 BEFORE seeding, per specifications and this sheet, to help drill the fertilizer into the soil.
4. When temporary grasses are well-established and more than 2 inches tall, mow planting area before seeding permanent grasses; mowing for this purpose will be subsidiary. When vegetation is not already well-established, cultivate planting area to a depth as described in Item 164.3, before temporary seeding and before permanent seeding.
5. Seed material must be appropriate to the location, soil type and season. Use the seed mix species and pure live seed rates designated in Tables 1-4 of the TxDOT 2014 Standard Specifications* for Item 164, unless otherwise specified.
6. All seed shall meet labeling, delivery, analysis, and testing requirements described in Item 164.2.1. Deliver seed in labeled, unopened bags or containers to Engineer prior to planting.
7. Uniformly plant seed over the designated planting area, along the contour of slopes, and drill seed to a depth as described in Item 164.3.4.
8. Hydroseeding may be allowed, when specified or Engineer concurs.
9. Implement and continue Vegetative Watering per the schedule, rate and volume specified under Item 168.

TXDOT REFERENCE MATERIALS:
- * "STANDARD SPECIFICATIONS FOR CONSTRUCTION AND MAINTENANCE OF HIGHWAYS, STREETS, AND BRIDGES" 2014
- "A GUIDANCE TO ROADSIDE VEGETATION ESTABLISHMENT" 2004
- ONLINE TRAINING COURSE: MNT415 REVEGETATION DURING CONSTRUCTION
- DALLAS DISTRICT "VEGETATION ESTABLISHMENT GUIDELINES"

SODDING FOR EROSION CONTROL ITEM 162* BLOCK SOD (BERMUDA) SY

BLOCK OR ROLL SOD	COMMON NAME	BOTANICAL NAME
	Common Bermuda Grass	Cynodon dactylon

SODDING NOTES:
1. Refer to Item 162 of TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown in plans. Materials and construction shall meet all specifications.
2. Place sod between the average date of the last freeze in the Spring and 6 weeks before the average date of the first freeze in the Fall, per the Texas Almanac for the project area.
3. Place sod only AFTER soil surface preparation is complete as detailed in this sheet. Dry soil may require pre-watering.
4. Place all sod (blocks or rolls) within 24 hours of delivery to the site, and keep moist from the time it is dug up until it is planted. Sod with dried roots will not be accepted.
5. Place sod with joints alternating on each row to prevent all joints from lining up, and place blocks firmly against adjacent blocks. Roll, tamp and trim sod per Item 162.3.
6. Place fertilizer promptly AFTER sodding operation is complete in each area.
7. Water sod immediately following placement, and continue Vegetative Watering per Item 168.

VEGETATIVE WATERING FOR ESTABLISHING SEED AND SOD ITEM 168* VEGETATIVE WATERING MG

WATERING SCHEDULE

SEASON (Usual Months)	RATE	TIME SCHEDULE	TOTAL WATER ESTIMATE
SPRING & FALL (March, April, May, October)	7,000 gallons/acre per working day	Vegetative watering for seed shall begin on the day after rainfall described below and continue for 60 consecutive working days; vegetative watering for sod shall begin on the day the sod is placed and continue for a minimum of 15 consecutive working days.	420,000 gallons/acre (60 working days)
SUMMER (June, July, August, September)	12,000 gallons/acre per working day		720,000 gallons/acre (60 working days)
WINTER (November through February)	1,000 gallons/acre per working day	Vegetative watering for seed and/or sod shall begin on the day after placement for 15 consecutive working days	15,000 gallons/acre (15 working days)

Notes: Rate and frequency may be adjusted, with the approval of the Engineer, to meet site conditions (especially with sod).
For informational purposes only: 1,000 gallons equals 1 MG

VEGETATIVE WATERING NOTES:
1. Refer to Item 168 of TxDOT 2014 Standard Specifications* for specifications, dimensions, volumes, and measurements that have been modified or not shown in plans. Materials and construction shall meet all specifications.
2. Use clean water free of industrial waste and other substances harmful to vegetation growth, per Item 168.2.
3. Use Vegetative Watering to keep the seed bed moist during germination; not to provide initial watering. After drill seeding, postpone watering operations until site receives at least 1/2-inch of natural rainfall in a single day. Delay watering operations for warm season grasses until soil temperature exceeds 70 degrees F.
4. For sod, water immediately.
5. All water distribution equipment shall be furnished and operated to provide water at a uniform and controllable rate. Use a metering device on all watering equipment.
6. Evenly distribute water over entire area designated for seeding and/or sodding, using even spray patterns that do not disturb seed bed and/or dislodge seed from seed bed.
7. Do not water between the hours of 12:00 p.m. and 6:00 p.m. when daytime temperatures exceed 95 degrees F.
8. After initial establishment period, continue intermittent watering of newly established seed or sod at a rate of approximately 1-inch water/week, during summer months until end of contract.
9. If 1/4-inch or more of rainfall occurs on site on any given working day, no vegetative watering will be needed on that working day. (Note: 1/4-inch rain equals 7,000 gallons of water per acre.)
10. Should the Contractor fail to apply the specified amount of water within the time allowed, any seed or sod in poor condition shall be replaced, fertilized, and watered at Contractor's expense.

**Note: The amount of Pure Live Seed (PLS) in one pound of bulk seed is based on three factors: % Purity, % Germination, and % Dormant. Use the following formula to calculate PLS in bulk seed: PLS = % Purity X (% Germination + % Dormant) Ensure that the specified amount of pure live seed is placed.

ROADSIDE MOWING ITEM 730* PROJECT MAINTENANCE AC

MOWING NOTES:
1. During project construction, once seed is established, use mowing to promote permanent grasses by mowing any remaining temporary grasses.
2. Also mow established turf and ROW grasses in designated areas of project limits as specified or directed by Engineer.
3. Remove litter and debris prior to mowing.
4. Do not mow on wet ground when soil rutting can occur.
5. Hand-trim around obstructions and stormwater control devices as needed.
6. Maintain paved surfaces free of tracked soils and clipped vegetation.

SEQUENCE OF WORK:
- CULTIVATE SURFACE SOIL.
- PREPARE / PLACE TOPSOIL, OR
- PREPARE / PLACE COMPOST MANUFACTURED TOPSOIL.
- APPLY FERTILIZER AND THEN PLACE SEEDING, OR
- PLACE SOD AND THEN APPLY FERTILIZER.
- CONDUCT VEGETATIVE WATERING.
- CONDUCT ROADSIDE MOWING, AS DIRECTED.

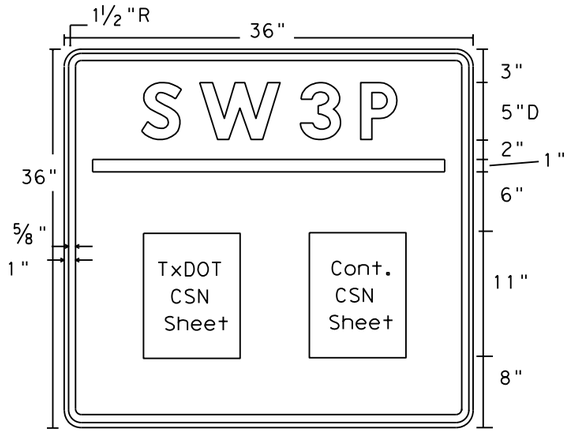
Texas Department of Transportation

VEGETATION ESTABLISHMENT SHEET
(DALLAS DISTRICT)

TEMPLATE REVISION DATE: 02/21/19

DESIGN	FED.RD. DIV.NO.	PROJECT NO.		HIGHWAY NO.
CPB	6	(See Title Sheet)		IH 20
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
XXX	TEXAS	DALLAS	DALLAS	
CHECK	CONTROL	SECTION	JOB	180
XXX	2374	03	098	
CHECK				
XXX				

DATE



SW3P SIGN

TxDOT & Contractor Construction Site Note (CSN)

Sign Dimensions

36" X 36"

Letters - White
Numbers - White
Border - White
Background - Blue

GENERAL NOTES:

1. The alphabets and lateral spacing between letters and numerals shall conform with the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways", (TMUTCD) latest edition, and the "Compliant Work Zone Traffic Control Devices List". Lateral spacing of text shall provide a balanced appearance. All materials shall conform to Department Specifications.
2. Legend and border may be applied by reverse screening process with transparent colored ink, cut-out white reflective sheeting applied to colored background or combination thereof. Background shall be reflective sheeting Type C.
3. CSN Sheets will be laminated and attached to the sign with an adhesive. Ensure sheets remain dry. (See Figure 1).
4. SW3P Signs should be placed just inside the ROW line at the project limits at a readable height. It may be placed perpendicular or parallel to ROW line. If the sign cannot be placed outside the clear zone, it will be mounted per TMUTCD requirements.
5. Final location of the signs will be as approved by the Engineer.

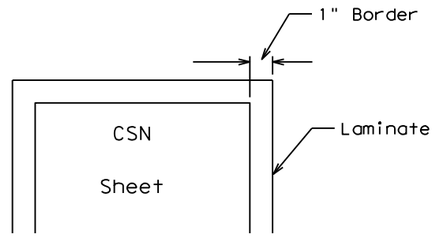
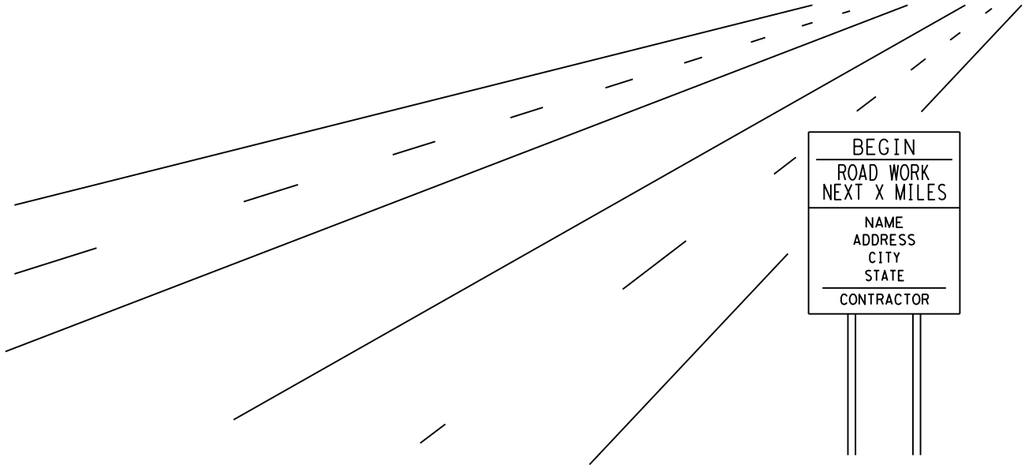
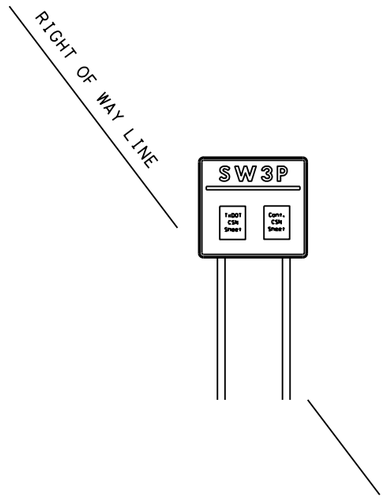


Figure 1





DEPARTMENT MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
FLAT SURFACE REFLECTIVE SHEETING	DMS-8300
VINYL NON-REFLECTIVE DECAL SHEETING	DMS-8320

COLOR	USAGE	REFLECTIVE SHEETING OR OTHER MATERIAL
BLUE	BACKGROUND	TYPE C (FLUORESCENT PRISMATIC)
WHITE	LEGEND & BORDERS	VINYL NON-REFLECTIVE DECAL SHEETING

Texas Department of Transportation
DALLAS DISTRICT STANDARD

SW3P SIGN SHEET

FILE:	DN: TxDOT	CK:	DW:	CK:	
	DISTRICT	PROJECT NO.			SHEET
REVISION DATE: 10-16-15	18	SEE TITLE SHEET			181
	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	DALLAS	2374	03	098	IH 20

LEVELS DISPLAYED
PATH:

DATE:
FILE:

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

DOT #: 763646X
Crossing Type: RR UNDER
RR Company Owning Track at Crossing: UPRR
Operating RR Company at Track: UPRR
RR MP: 255.560
RR Subdivision: ENNIS
City: HUTCHINS
County: DALLAS
CSJ at this Crossing: 2374-03-098
Highway/Roadway name crossing the railroad: IH 20
# of regularly scheduled trains per day at this crossing: 0
# of switching movements per day at this crossing: 0
% of estimated contract cost of work within railroad ROW: <1%

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

State's contractor will perform planing, concrete full depth repair, overlay, and pavement marking installation inside the RR ROW.

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)

Traffic control.

III. FLAGGING & INSPECTION

of Days of Railroad Flagging Expected: 0

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

Contact Information for Flagging:

☐ UPRR - UP.info@railpros.com
Call Center 877-315-0513, Select #1 for flagging
☐ 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 _____

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: UPRR Maintenance Consent Letter. TxDOT CST to assist.
☐ Required: Contractor to obtain (see Item 5, Article 8.4)
With the following railroad companies: _____

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

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

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

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

Contractor must incorporate Construction Inspection into anticipated construction schedule.

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

_____
_____
_____

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 the UPRR Railroad Emergency Line
at 800-848-8715
Location: DOT# 763646X
RR Milepost: 255.560
Subdivision: ENNIS

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	2374	03	098	IH 20	
9/2021	DIST	COUNTY		SHEET NO.	
	DAL	DALLAS		182	

PART 1 - GENERAL

1.01 DESCRIPTION

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

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

1.02 REQUEST FOR INFORMATION / CLARIFICATION

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

1.03 PLANS / SPECIFICATIONS

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

PART 2 - UTILITIES AND FIBER OPTIC

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

PART 3 - CONSTRUCTION

3.01 GENERAL

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

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

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

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

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

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

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

3.02 RAILROAD OPERATIONS

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

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

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

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

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

3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES

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

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

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

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

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

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

3.04 INSURANCE

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

3.05 RAILROAD SAFETY ORIENTATION

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

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

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

3.06 COOPERATION

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

3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES

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

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

3.08 APPROVAL OF REDUCED CLEARANCES

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

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

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

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	18	DALLAS		183

DATE:
FILE:

3.09 MAINTENANCE OF RAILROAD FACILITIES

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

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

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

3.10 SITE INSPECTIONS BY RAILROAD's DESIGNATED REPRESENTATIVE

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

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

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

3.11 RAILROAD REPRESENTATIVES

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

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

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

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

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

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

3.12 COMMUNICATIONS AND SIGNAL LINES

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

3.13 TRAFFIC CONTROL

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

3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK

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

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

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

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

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

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

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

3.15 RAILROAD FLAGGING

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

3.16 CLEANING OF RIGHT-OF-WAY

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

DATE:
FILE:

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	2374	03	098	IH 20
	DIST	COUNTY		SHEET NO.
	18	DALLAS		184