DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	F 2022(387)		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	1
CHECK AM	CONTROL 2374	SECTION 03	JOB 091	

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

FEDERAL AID PROJECT
F 2022(387)
CSJ: 2374-03-091

IH 20

DALLAS COUNTY

LIMITS: FROM IH 35E
TO IH 45

TOTAL LENGTH OF PROJECT =

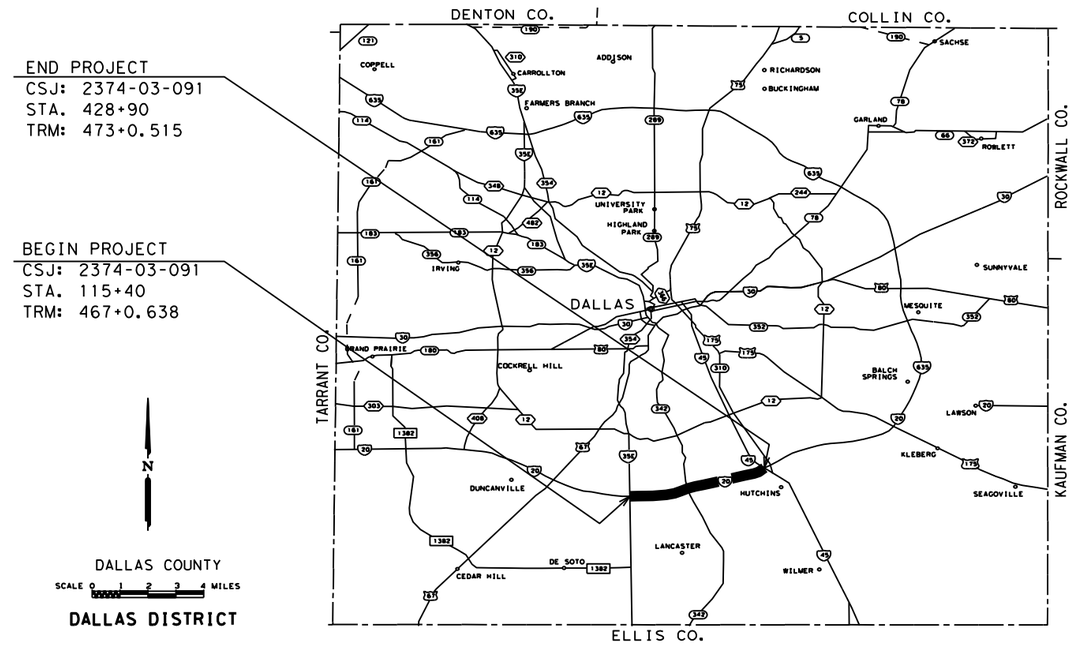
ROADWAY	= 29,488.00 FT.	= 5.585 MI.
BRIDGE	= 1,862.00 FT.	= 0.352 MI.
TOTAL	= 31,350.00 FT.	= 5.937 MI.

FOR THE CONSTRUCTION OF OVERLAY

CONSISTING OF: PLANING, CONCRETE FULL DEPTH REPAIR, OVERLAY, PAVEMENT MARKINGS

END PROJECT
CSJ: 2374-03-091
STA. 428+90
TRM: 473+0.515

BEGIN PROJECT
CSJ: 2374-03-091
STA. 115+40
TRM: 467+0.638



DALLAS COUNTY
SCALE 0 1 2 3 4 MILES

DALLAS DISTRICT

FUNCTIONAL CLASSIFICATION : INTERSTATE
DESIGN SPEEDS : N/A
ADT : 177,864 (2021)
ADT : 246,273 (2041)

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: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, MAY 1, 2012)

EQUATIONS: NONE
EXCEPTIONS: NONE
RAILROAD CROSSINGS: BNSF RR STA 376+37

WORK WAS COMPLETED ACCORDING TO THE PLANS AND CONTRACT.

_____, P.E.
Signature of Registrant & Date

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING 12/10/2021
DocuSigned by: _____, P.E.
DESIGN ENGINEER

RECOMMENDED FOR LETTING 12/19/2021
DocuSigned by: _____, P.E.
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT
CD610BED1D8A4E...

RECOMMENDED FOR LETTING 12/17/2021
DocuSigned by: _____, P.E.
AREA ENGINEER
01F881A42AA240C...

APPROVED FOR LETTING: 12/20/2021
DocuSigned by: _____, P.E.
DISTRICT ENGINEER
E252769DE3DE4F5...

INDEX OF SHEETS

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED PROFESSIONAL ENGINEER

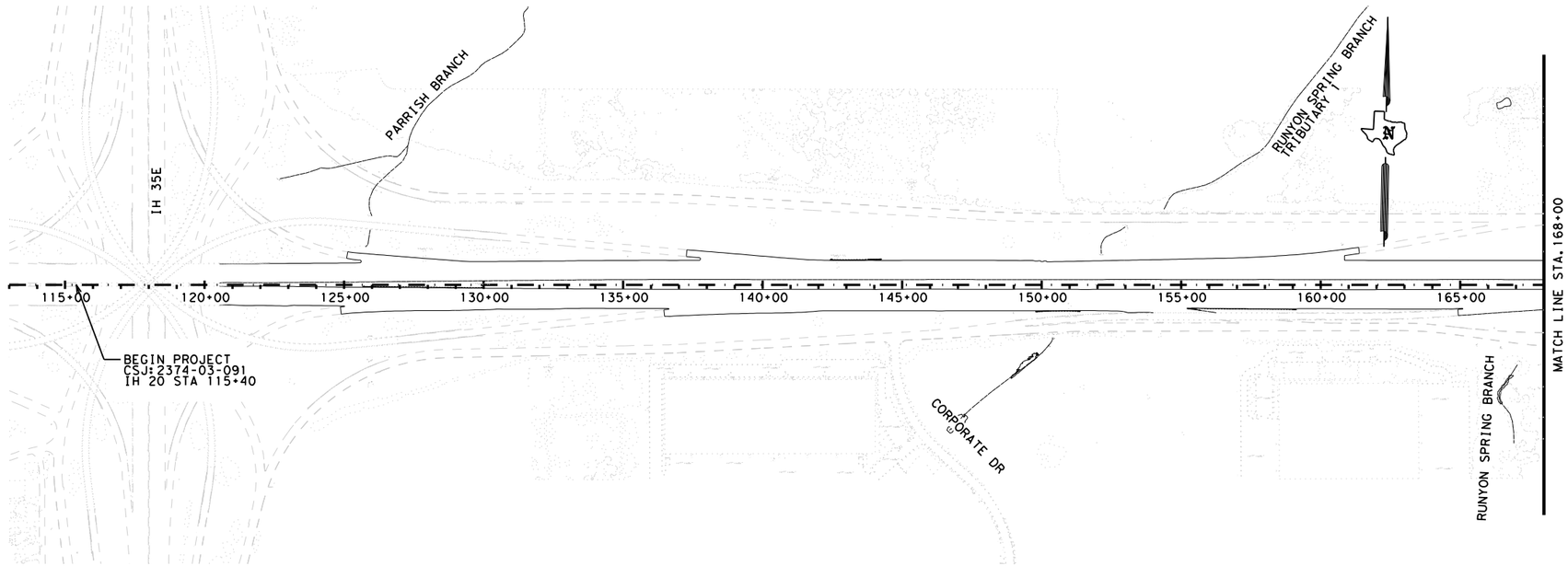
THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

Signature of Registrant, P.E. 2/03/2022 Date

IH 20
INDEX OF SHEETS

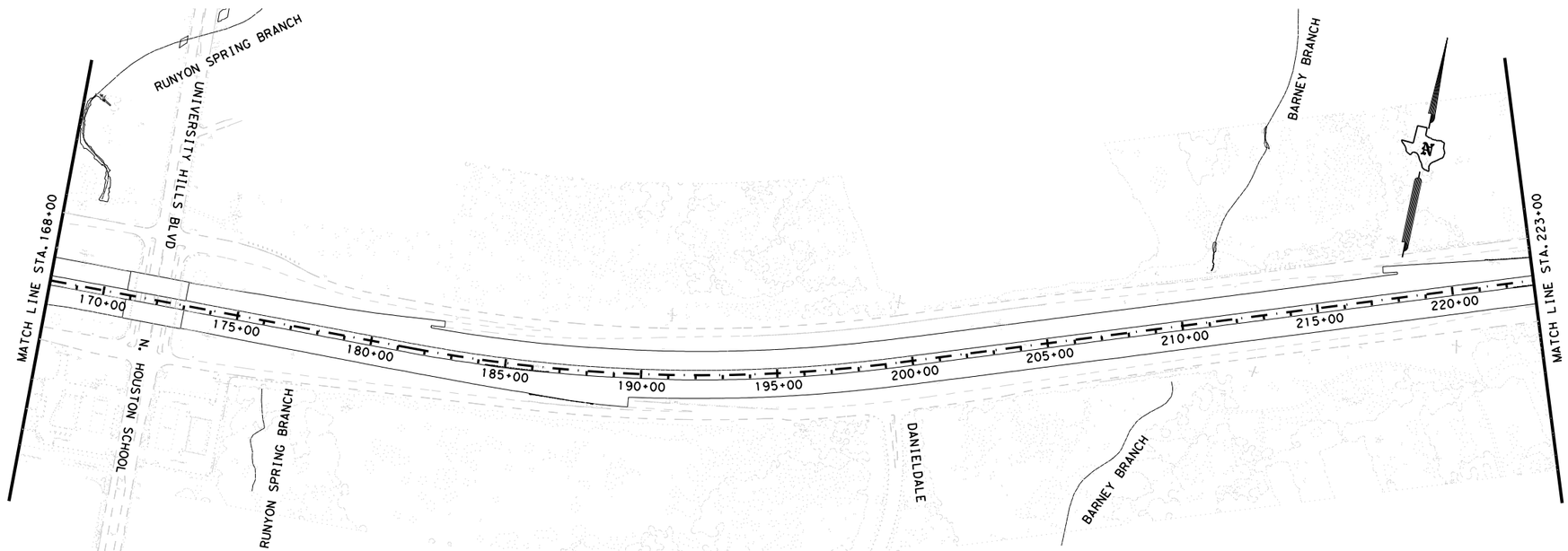
SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	2
	2374	03	091	



0 250 500

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

Dung Nguyen P.E. 12/10/2021
Signature of Registrant & Date

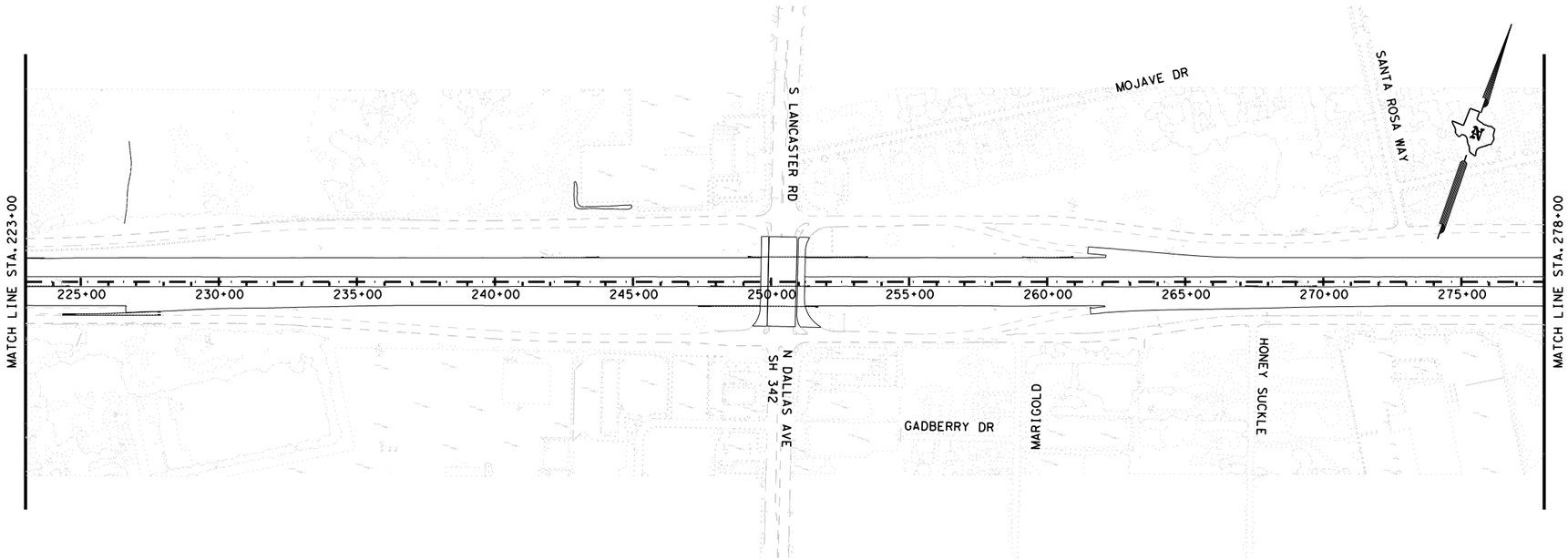
Texas Department of Transportation

IH 20

PROJECT LAYOUT

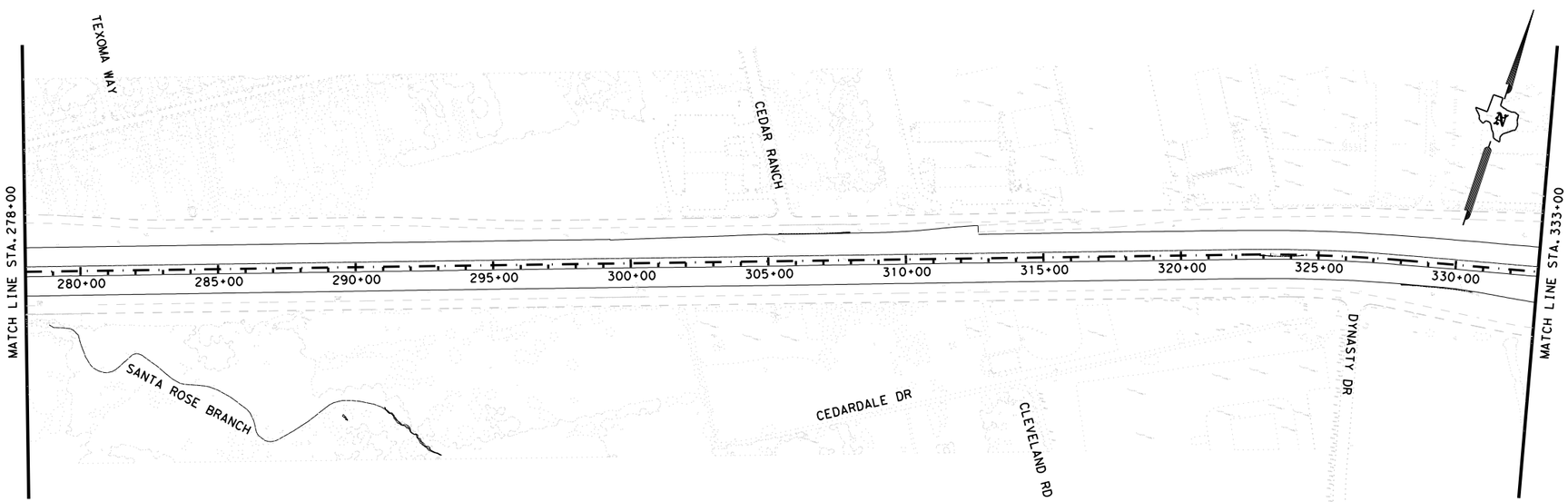
SCALE: 1"=500' SHEET 1 OF 3

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	3
	2374	03	091	



0 250 500

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. 12/10/2021 Date

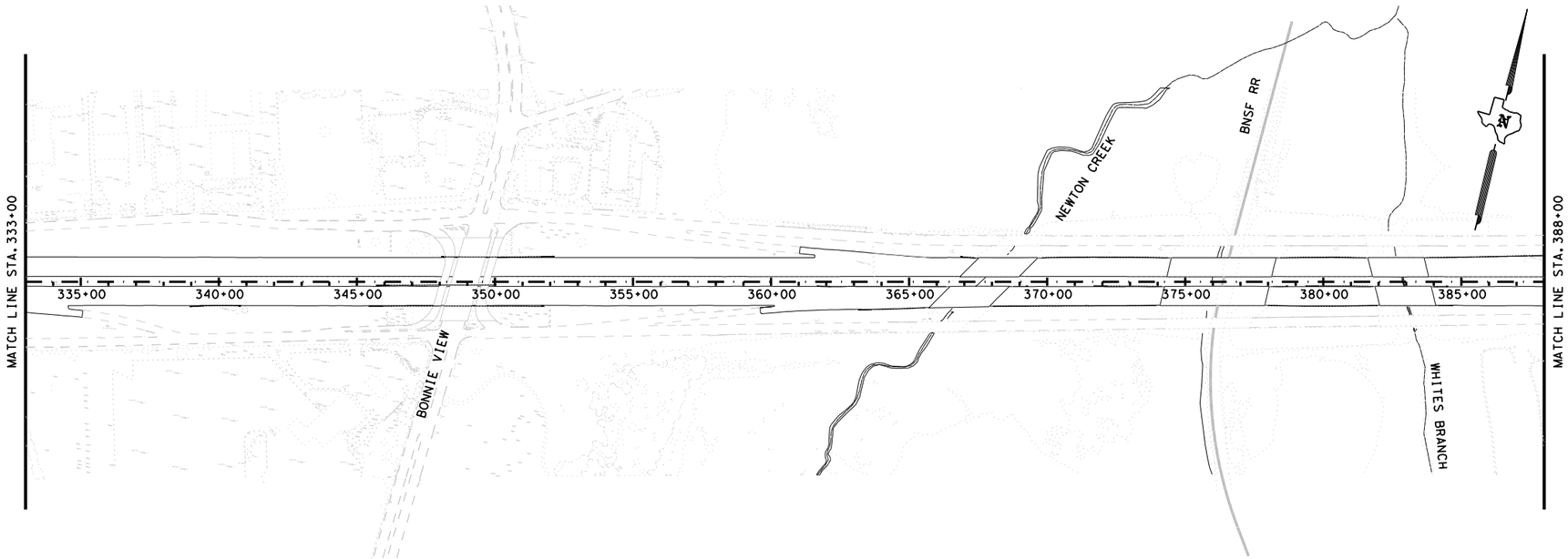
Texas Department of Transportation

IH 20

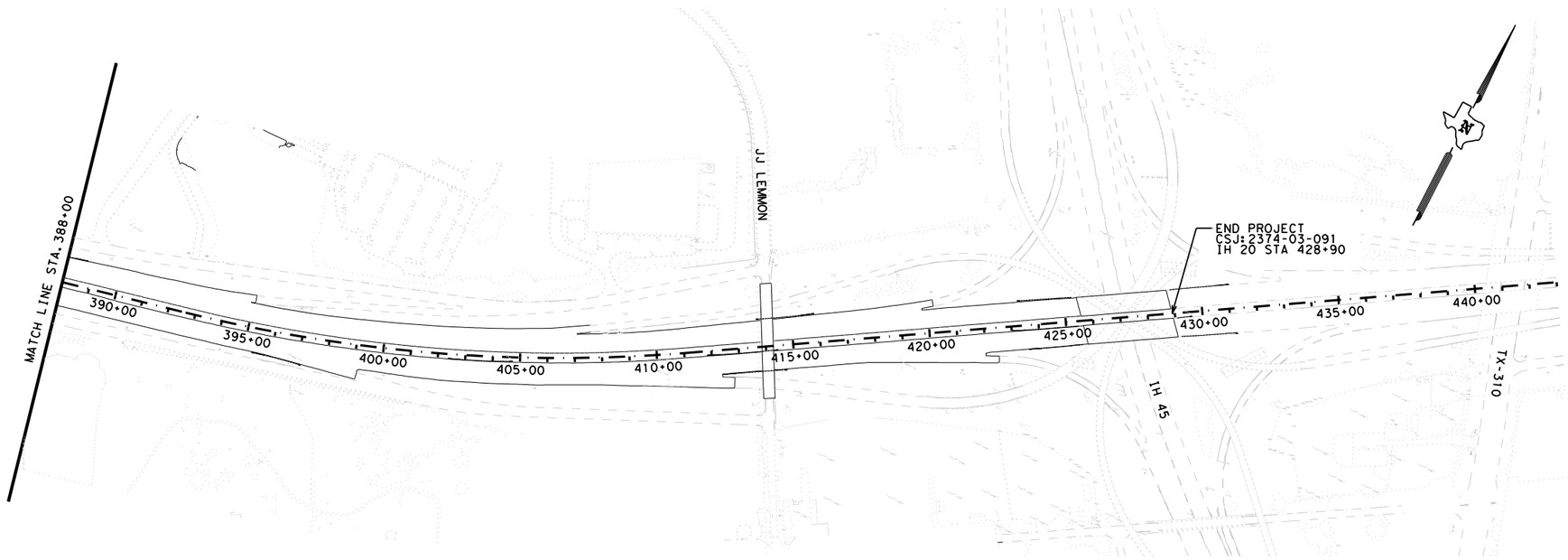
PROJECT LAYOUT

SCALE: 1"=500' SHEET 2 OF 3

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	4
	2374	03	091	



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

P.E. 12/10/2021
Signature of Registrant & Date

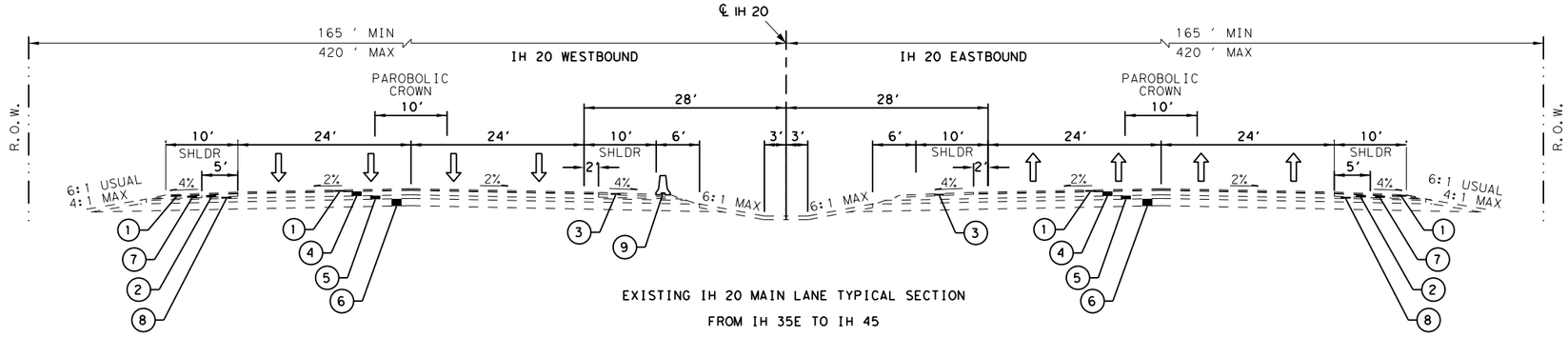
Texas Department of Transportation

IH 20

PROJECT LAYOUT

SCALE: 1"=500' SHEET 3 OF 3

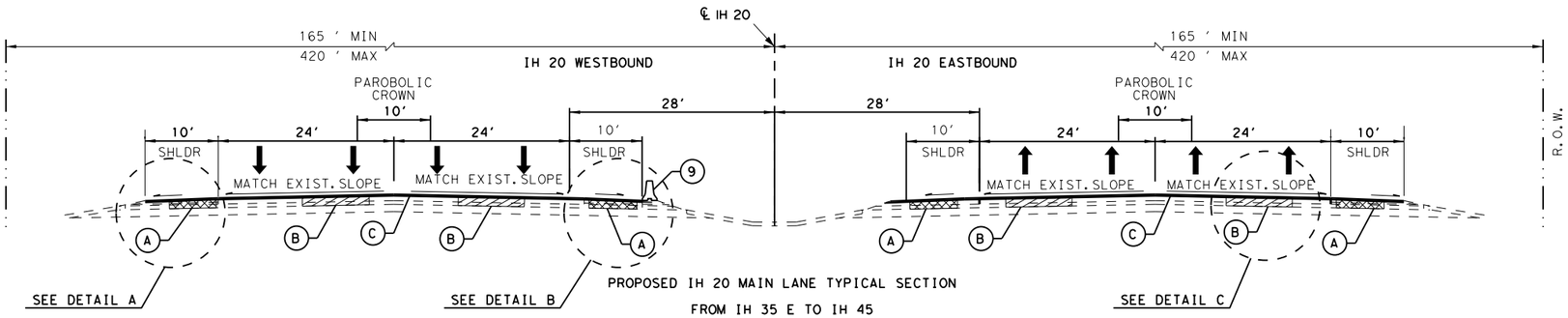
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	5
	2374	03	091	



EXISTING IH 20 MAIN LANE TYPICAL SECTION

FROM IH 35E TO IH 45

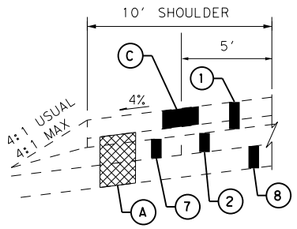
STA 120+55 TO 170+85
STA 173+03 TO 366+66
STA 368+81 TO 374+29
STA 378+09 TO 381+83
STA 383+87 TO 425+60



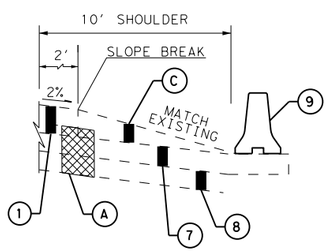
PROPOSED IH 20 MAIN LANE TYPICAL SECTION

FROM IH 35 E TO IH 45

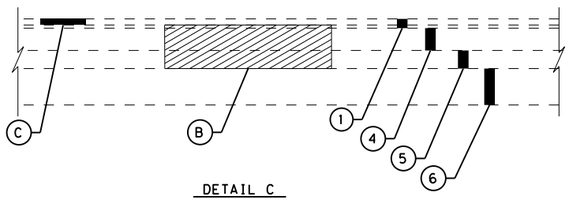
STA 120+55 TO 170+85
STA 173+03 TO 366+66
STA 368+81 TO 374+29
STA 378+09 TO 381+83
STA 383+87 TO 425+60



DETAIL A
TYP SHLDR TRANSITION



DETAIL B
SHLDR TRANSITION AT CONC BARRIER



DETAIL C
FULL DEPTH CONCRETE REPAIR

LEGEND

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

A. PROPOSED 8"FLEXIBLE PAVEMENT STRUCTURE (SPOT)(SUPERPAVE SP-B) (PG 64-22)AS IDENTIFIED IN THE FIELD BY ENGINEER FOR ASPHALT SHOULDERS REPAIR.

B. PROPOSED 8" FULL DEPTH REPAIR (CRCP) (HES)

C. MILL EXIST. 2.25" STONE MTRX ASPH., SPRAY MEMBRANE, THEN OVERLAY WITH 2.25"SMA (SMA-C SAC-A)(PG76-22).

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.

REFER TO BRIDGE REPAIR SHEETS FOR RELATED WORK DONE WITHIN THE FOLLOWING STATION RANGE:

- STA 115+40 TO STA 120+55 (NBI 18-057-0-2374-03-181 & NBI 18-057-0-2374-03-182)
- STA 170+85 TO STA 173+03 (NBI 18-057-0-2374-03-146 & NBI 18-057-0-2374-03-147)
- STA 366+66 TO STA 368+81 (NBI 18-057-0-2374-03-140 & NBI 18-057-0-2374-03-141)
- STA 374+29 TO STA 378+09 (NBI 18-057-0-2374-03-138 & NBI 18-057-0-2374-03-139)
- STA 381+83 TO STA 383+87 (NBI 18-057-0-2374-03-136 & NBI 18-057-0-2374-03-137)
- STA 425+60 TO STA 428+90 (NBI 18-057-0-2374-03-306 & NBI 18-057-0-2374-03-307)

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED PROFESSIONAL ENGINEER

P.E. 12/10/2021
Signature of Registrant & Date

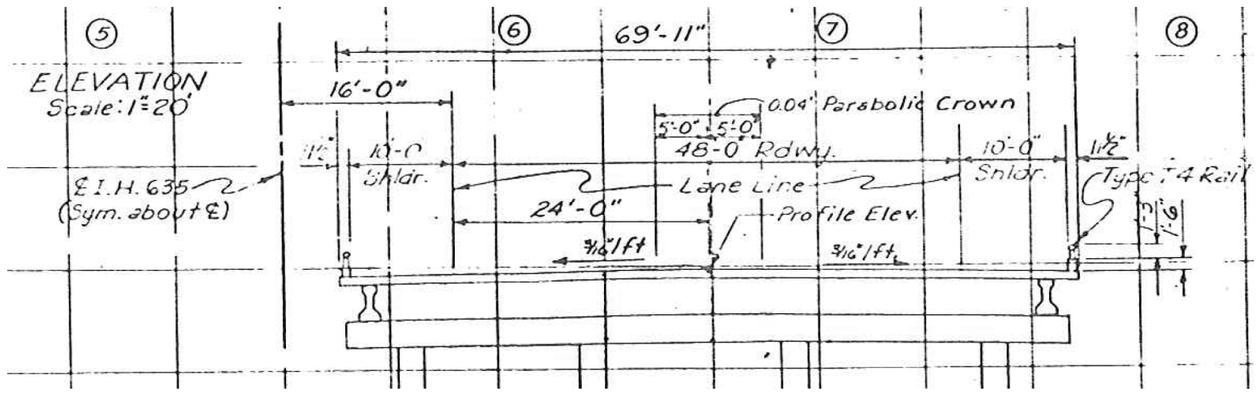
Texas Department of Transportation

IH 20
TYPICAL SECTIONS

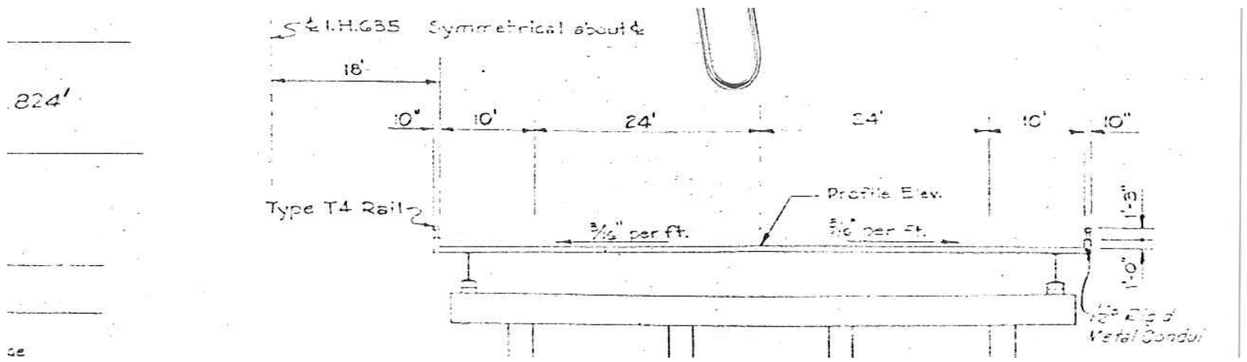
N.T.S.

SHEET 1 OF 3

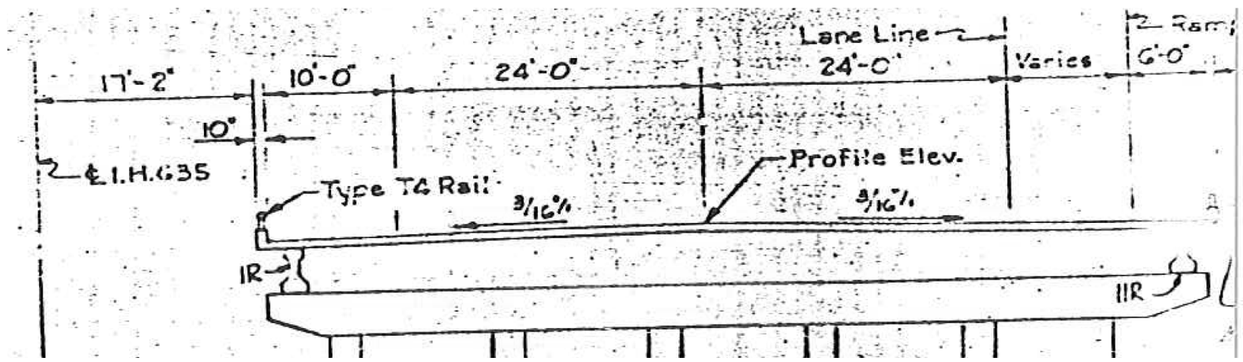
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS IS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	6
	2374	03	091	



TYPICAL IH 35E OVERPASS BRIDGE
(NBI 18-057-0-2374-03-181 & 18-057-0-2374-03-182)
STA. 115+40 to 120+55



TYPICAL HOUSTON SCHOOL OVERPASS BRIDGE
(NBI 18-057-0-2374-03-146 & 18-057-0-2374-03-147)
STA. 170+85 to 173+03



TYPICAL NEWTON CREEK OVERPASS BRIDGE
(NBI 18-057-0-2374-03-140 & 18-057-0-2374-03-141)
STA. 366+66 to 368+81

REFER TO BRIDGE REPAIR SHEETS FOR RELATED WORK DONE WITHIN THE FOLLOWING STATION RANGE:

- STA 115+40 TO STA 120+55 (NBI 18-057-0-2374-03-181 & NBI 18-057-0-2374-03-182)
- STA 170+85 TO STA 173+03 (NBI 18-057-0-2374-03-146 & NBI 18-057-0-2374-03-147)
- STA 366+66 TO STA 368+81 (NBI 18-057-0-2374-03-140 & NBI 18-057-0-2374-03-141)
- STA 374+29 TO STA 378+09 (NBI 18-057-0-2374-03-138 & NBI 18-057-0-2374-03-139)
- STA 381+83 TO STA 383+87 (NBI 18-057-0-2374-03-136 & NBI 18-057-0-2374-03-137)
- STA 425+60 TO STA 428+90 (NBI 18-057-0-2374-03-306 & NBI 18-057-0-2374-03-307)

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

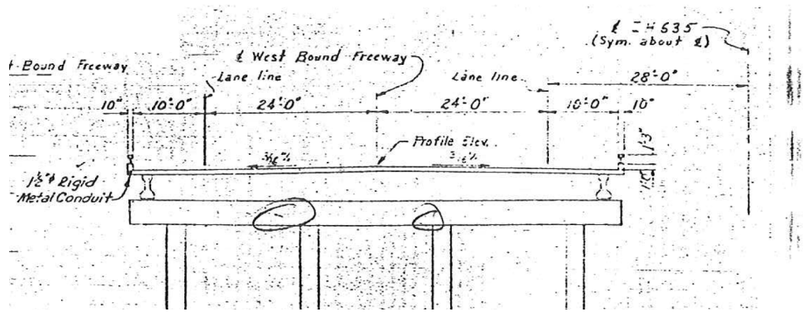
Signature of Registrant & Date P.E. 12/10/2021

Texas Department of Transportation

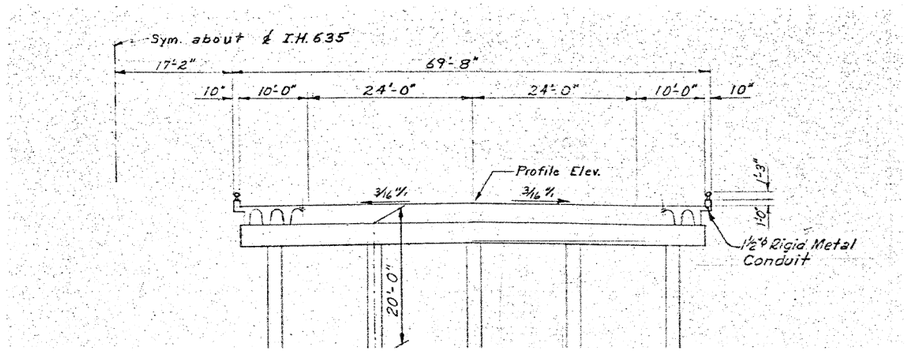
IH 20
TYPICAL SECTIONS

N. T. S. SHEET 2 OF 3

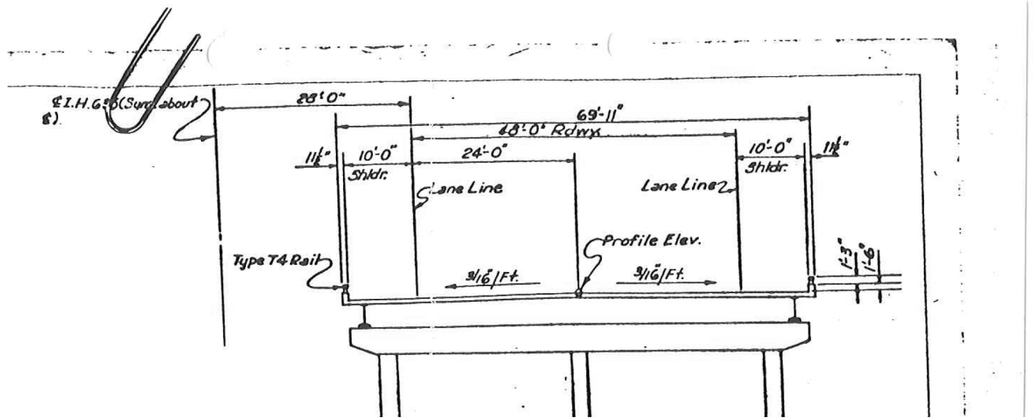
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
IS	6	SEE TITLE SHEET		IH 20
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
IS	TEXAS	DALLAS	DALLAS	
CHECK DN	CONTROL	SECTION	JOB	7
CHECK AM	2374	03	091	



TYPICAL BNSF RR OVERPASS BRIDGE
(NBI 18-057-0-2374-03-138 & 18-057-0-2374-03-139)
STA. 374+29 to 378+09



TYPICAL WHITES BRANCH OVERPASS BRIDGE
(NBI 18-057-0-2374-03-181 & 18-057-0-2374-03-182)
STA. 381+83 to 383+87



TYPICAL IH 45 OVERPASS BRIDGE
(NBI 18-057-0-2374-03-181 & 18-057-0-2374-03-182)
STA. 425+60 to 428+90

REFER TO BRIDGE REPAIR SHEETS FOR RELATED WORK DONE WITHIN THE FOLLOWING STATION RANGE:

- STA 115+40 TO STA 120+55 (NBI 18-057-0-2374-03-181 & NBI 18-057-0-2374-03-182)
- STA 170+85 TO STA 173+03 (NBI 18-057-0-2374-03-146 & NBI 18-057-0-2374-03-147)
- STA 366+66 TO STA 368+81 (NBI 18-057-0-2374-03-140 & NBI 18-057-0-2374-03-141)
- STA 374+29 TO STA 378+09 (NBI 18-057-0-2374-03-138 & NBI 18-057-0-2374-03-139)
- STA 381+83 TO STA 383+87 (NBI 18-057-0-2374-03-136 & NBI 18-057-0-2374-03-137)
- STA 425+60 TO STA 428+90 (NBI 18-057-0-2374-03-306 & NBI 18-057-0-2374-03-307)

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

P.E. 12/20/2021
Signature of Registrant & Date

Texas Department of Transportation

IH 20
TYPICAL SECTIONS

N.T.S. SHEET 3 OF 3

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	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	8
	2374	03	091	

SPECIFICATION DATA

Table 1: Basis of Estimate for Permanent Construction					
Item	Description	Thickness	Rate		Quantity
346	STONE-MTRX-ASPH SMA-C SAC A PG76-22	2.25”	110	Lbs./SY/In	64,242 Ton
3002	Membrane Underseal	N/A	0.20	Gal/SY	96,134 Gal
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 0.82 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 required no formal consultation 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.

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

Amanda Moser: Amanda.Moser@txdot.gov
Nathan Petter: Nathan.Petter@txdot.gov

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

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

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

The following standard detail sheets have been modified*:*
C-RAIL-R (MOD)

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.

Coordinate lane closures and work areas with contractors of adjacent propjects including:
2374-03-074 (IH 20 at Bonnie View Road Bridge Widening)
2374-03-096 (IH 20 at IH 35E Bridge Rehab)

Item 6:
This project has structures with surface coatings which contain hazardous constituent which is asbestos. Contractor is responsible for the health and safety of his employees and compliance with all OSHA standards and regulations.

Paint containing hazardous materials will be removed by a third party, 10.1.1

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

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 (noon on December 31 thru 10:00 pm January 1)
- Easter Holiday weekend (noon on Friday thru 10:00 pm Sunday)
- Memorial Day weekend (noon on Friday thru 10:00pm Monday)
- Independence Day (noon on July 3 thru 10:00 pm on July 5)
- Labor Day weekend (noon on Friday thru 10:00 pm Monday)
- Thanksgiving Holiday (noon on Wednesday thru 10:00 pm Sunday)
- Christmas Holiday (noon on December 23 thru 10:00 pm December 26)

No significant traffic generator events identified.

Item 8:
This Project will be a Standard Workweek in accordance with Article 8.3.1.4.

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 105:
Saw existing asphalt along neat lines where portions are to be left in place temporarily or permanently. Sawing is not paid for directly, but is subsidiary to this item.

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

Properly dispose of unsalvageable material at your own expense.

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.

The use of windrow pick-up equipment is allowed except on the first course of roadway material placed over the subgrade.

Item 346:
Use aggregate that meets the Surface Aggregate Classification (SAC) requirement of Class A.

Provide PG binder 76-22 in Type C mixture.

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.

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.

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 451:
Salvage all existing rails and posts removed from this project on the bridges on IH 20 at IH 45 (NBI 18-057-0-2374-03-306 and NBI 18-057-0-2374-03-307) and haul to and stockpile at the

TxDOT office at 1424 High Meadows Way, Cedar Hill, TX 75104. The work involved in hauling this material will not be paid for directly, but will be considered subsidiary to this item

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.

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.

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 (CW12-2P) 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 12". 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.

Lanes 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

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

Traffic Control Plans with Lane Closures causing backups of 20 minutes or greater in duration will be modified by the Engineer.

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

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.

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

TCP 3 Series	Scenario	Required TMA/TA
(3-2)-13	All	3
(3-3)-14	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
(6-6)-12	All		1 Per Lane	
(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 2374-03-091 **DISTRICT** Dallas **COUNTY** Dallas
HIGHWAY IH 20

							TOTAL EST.	TOTAL FINAL
			CONTROL SECTION JOB		**2374-03-091**			
			PROJECT ID		**A00066985**			
			COUNTY		**Dallas**			
			HIGHWAY		**IH 20**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL		
	104-6028	REMOVING CONC (MISC)		SY	635.000		635.000	
	105-6074	REMOVING STAB BASE AND ASPH PAV (4")		SY	668.000		668.000	
	346-6002	STONE-MTRX-ASPH SMA-C SAC-A PG76-22		TON	64,242.000		64,242.000	
	351-6004	FLEXIBLE PAVEMENT STRUCTURE REPAIR(8")		SY	2,719.000		2,719.000	
	354-6067	PLAN ASPH CONC PAV(0" TO 2.25")		SY	480,672.000		480,672.000	
	361-6002	FULL - DEPTH REPAIR CRCP (8")		SY	2,585.000		2,585.000	
	401-6001	FLOWABLE BACKFILL		CY	13.000		13.000	
	428-6001	PENETRATING CONCRETE SURFACE TREATMENT		SY	24,173.000		24,173.000	
	429-6004	CONC STR REPAIR(RAPID DECK REP(PRT DPT)		SF	341.000		341.000	
	429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)		SF	908.000		908.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)		CY	668.000		668.000	
	438-6004	CLEANING AND SEALING EXIST JOINTS(CL7)		LF	2,670.000		2,670.000	
	451-6024	RETROFIT RAIL (TY SSTR)		LF	4,816.000		4,816.000	
	454-6008	HEADER TYPE EXPANSION JOINT		CF	456.000		456.000	
	454-6009	JOINT SEALANT		LF	1,824.000		1,824.000	
	499-6001	ADJUST STL SHOES		EA	11.000		11.000	
	500-6001	MOBILIZATION		LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING		MO	14.000		14.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)		LF	1,000.000		1,000.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)		LF	1,000.000		1,000.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")		LF	1,000.000		1,000.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)		LF	1,000.000		1,000.000	
	512-6005	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)		LF	760.000		760.000	
	512-6029	PORT CTB (MOVE)(F-SHAPE)(TY 1)		LF	3,760.000		3,760.000	
	512-6053	PORT CTB (REMOVE)(F-SHAPE)(TY 1)		LF	760.000		760.000	
	514-6036	PERM CTB (TRAN SSCB TO SSTR) (MOD)		LF	160.000		160.000	
	533-6003	RUMBLE STRIPS (SHOULDER) ASPHALT		LF	117,952.000		117,952.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)		LF	9,575.000		9,575.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)		EA	21.000		21.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION		EA	38.000		38.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE		LF	9,420.000		9,420.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION		EA	21.000		21.000	
	542-6003	REMOVE DOWNSTREAM ANCHOR TERMINAL		EA	12.000		12.000	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)		EA	3.000		3.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)		EA	35.000		35.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)		EA	36.000		36.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)		EA	14.000		14.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 2374-03-091 **DISTRICT** Dallas **COUNTY** Dallas
HIGHWAY IH 20

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**2374-03-091**			
		PROJECT ID		**A00066985**			
		COUNTY		**Dallas**			
		HIGHWAY		**IH 20**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA	3.000		3.000	
	545-6010	CRASH CUSH ATTEN (INSTL)(L)(W)(TL3)	EA	1.000		1.000	
	545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	2.000		2.000	
	658-6013	INSTL DEL ASSM (D-SW)SZ (BRF)CTB	EA	28.000		28.000	
	658-6026	INSTL DEL ASSM (D-SY)SZ (BRF)CTB	EA	28.000		28.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	231.000		231.000	
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	26,532.000		26,532.000	
	666-6039	REFL PAV MRK TY I (W)12"(LNDP)(100MIL)	LF	393.000		393.000	
	666-6042	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	880.000		880.000	
	666-6081	REFL PAV MRK TY I(W)(ENTR GORE)(100MIL)	EA	14.000		14.000	
	666-6084	REFL PAV MRK TY I(W)(EXIT GORE)(100MIL)	EA	12.000		12.000	
	666-6162	RE PV MRK TY I(BLACK)6"(SHADOW)(100MIL)	LF	46,980.000		46,980.000	
	666-6224	PAVEMENT SEALER 4"	LF	7,448.000		7,448.000	
	666-6225	PAVEMENT SEALER 6"	LF	5,520.000		5,520.000	
	666-6228	PAVEMENT SEALER 12"	LF	55.000		55.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	62,700.000		62,700.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	46,980.000		46,980.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	62,700.000		62,700.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	2,476.000		2,476.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	7,448.000		7,448.000	
	677-6002	ELIM EXT PAV MRK & MRKS (6")	LF	2,760.000		2,760.000	
	678-6001	PAV SURF PREP FOR MRK (4")	LF	7,448.000		7,448.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	5,520.000		5,520.000	
	678-6006	PAV SURF PREP FOR MRK (12")	LF	55.000		55.000	
	721-6002	FIBER REINFORCED POLYMER PATCHING MATLS	LB	24,648.000		24,648.000	
	778-6001	CONCRETE RAIL REPAIR (IN-KIND)	LF	8.000		8.000	
	780-6004	CNC CRCK REPAR(DISCRETE)(ROUT AND SEAL)	LF	150.000		150.000	
	784-6120	REP STL BRIDGE MEMBER (WELD REPAIR)	LF	24.000		24.000	
	785-6010	BRIDGE JOINT REPLACEMENT (ARMOR)	LF	214.000		214.000	
	3002-6001	MEMBRANE UNDERSEAL	GAL	96,134.000		96,134.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	452.000		452.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	226.000		226.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 2374-03-091 **DISTRICT** Dallas **COUNTY** Dallas
HIGHWAY IH 20

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**2374-03-091**			
		PROJECT ID		**A00066985**			
		COUNTY		**Dallas**			
		HIGHWAY		**IH 20**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	18	RAILROAD FLAGGING: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

LOCATION	512 6005	512 6029	512 6053	545 6003	545 6005	545 6019	662 6109
	PORT CTB (FUR & INST) (F-SHAPE) (TY 1)	PORT CTB (MOVE) (F-SHAPE) (TY 1)	PORT CTB (REMOVE) (F-SHAPE) (TY 1)	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	380	1,878	380	7	2	1	13,266
IH 20 WB	380	1,878	380	7	1	1	13,266
PROJECT TOTALS	**760**	**3,756**	**760**	**14**	**3**	**2**	**26,532**

SUMMARY OF ROADWAY ITEMS

LOCATION	104 6028	105 6074 *	346 6002	351 6004	354 6067	361 6002	432 6045	454 6008	454 6009	502 6001	533 6003	540 6001	540 6006	540 6016	542 6001
	REMOVING CONC (MISC)	REMOVING STAB BASE AND ASPH PAV (4")	STONE-MTRX-ASPH SMA-C SAC-A PG76-22	FLEXIBLE PAVEMENT STRUCTURE REPAIR(8")	PLAN ASPH CONC PAV(0" TO 2.25")	FULL - DEPTH REPAIR CRCP (8")	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
	SY	SY	TON	SY	SY	SY	CY	CF	LF	MO	LF	LF	EA	EA	LF
IH 20 EB	264	468	32,121	1,345	241,532	1,307	468	228	912	14	58,976	6,450	13	28	6,342
IH 20 WB	371	200	32,121	1,374	239,140	1,278	200	228	912		58,976	3,125	8	10	3,078
PROJECT TOTALS	**635**	**668**	**64,242**	**2,719**	**480,672**	**2,585**	**668**	**456**	**1,824**	**14**	**117,952**	**9,575**	**21**	**38**	**9,420**

SUMMARY OF ROADWAY ITEMS

LOCATION	542 6002	542 6003	542 6004	544 6001	544 6003	545 6010	658 6013	658 6026	658 6061	721 6002	3002 6001	6001 6002	6185 6002	6185 6005
	REMOVE TERMINAL ANCHOR SECTION	REMOVE DOWNSTREAM ANCHOR TERMINAL	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	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	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	EA	EA	EA	EA	EA	EA	EA	EA	EA	LB	GAL	EA	DAY	DAY
IH 20 EB	15	9	3	25	26	1	14	14	152	12,463	48,306	1	452	226
IH 20 WB	6	3		10	10		14	14	79	12,185	47,828	1		
PROJECT TOTALS	**21**	**12**	**3**	**35**	**36**	**1**	**28**	**28**	**231**	**24,648**	**96,134**	**2**	**452**	**226**

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	506 6038	506 6039	506 6042	506 6043
	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF	LF	LF
IH 20 EB	500	500	500	500
IH 20 WB	500	500	500	500
PROJECT TOTALS	**1,000**	**1,000**	**1,000**	**1,000**

* THIS BID ITEM IS FOR EXISTING MBGF REMOVAL.

IH 20

SUMMARY OF QUANTITIES

SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	11
	2374	03	091	

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	666 6039	666 6042	666 6081	666 6084	666 6162	666 6224	666 6225	666 6228	666 6303	666 6306	666 6315	672 6010	677 6001	677 6002	678 6001
	REFL PAV MRK TY I (W)12" (LNDP) (100MIL)	REFL PAV MRK TY I (W)12" (SLD) (100MIL)	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 4"	PAVEMENT SEALER 6"	PAVEMENT SEALER 12"	RE PM W/RET REQ TY I (W)4" (SLD) (100MIL)	RE PM W/RET REQ TY I (W)6" (BRK) (100MIL)	RE PM W/RET REQ TY I (Y)4" (SLD) (100MIL)	REFL PAV MRKR TY II-C-R	ELIM EXT PAV MRK & MRKS (4")	ELIM EXT PAV MRK & MRKS (6")	PAV SURF PREP FOR MRK (4")
	LF	LF	EA	EA	LF	LF	LF	LF	LF	LF	LF	EA	LF	LF	LF
IH 20 EB	393	880	8	6	23,490	3,724	2,760	55	31,350	23,490	31,350	1,300	3,724	1,380	3,724
IH 20 WB			6	6	23,490	3,724	2,760		31,350	23,490	31,350	1,176	3,724	1,380	3,724
PROJECT TOTALS	**393**	**880**	**14**	**12**	**46,980**	**7,448**	**5,520**	**55**	**62,700**	**46,980**	**62,700**	**2,476**	**7,448**	**2,760**	**7,448**

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	678 6002	678 6006
	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (12")
	LF	LF
IH 20 EB	2,760	55
IH 20 WB	2,760	
PROJECT TOTALS	**5,520**	**55**

SUMMARY OF BRIDGE ITEMS

LOCATION	401 6001	428 6001	429 6004	429 6007	438 6004	451 6024	499 6001	514 6036	778 6001	780 6004	785 6010
	FLOWABLE BACKFILL	PENETRATING CONCRETE SURFACE TREATMENT	CONC STR REPAIR(RAPID DECK REP(PRT DPT)	CONC STR REPAIR (VERTICAL & OVERHEAD)	CLEANING AND SEALING EXIST JOINTS(CL7)	RETROFIT RAIL (TY SSTR)	ADJUST STL SHOES	PERM CTB (TRAN SSCB TO SSTR) (MOD)	CONCRETE RAIL REPAIR (IN-KIND)	CONC CRCK REPR(DISCRETE)(R OUT AND SEAL)	BRIDGE JOINT REPLACEMENT (ARMOR)
	CY	SY	SF	SF	LF	LF	EA	LF	LF	LF	LF
IH 20											
18-057-0-2374-03-146		1,647	60							150	
18-057-0-2374-03-147		1,647									
18-057-0-2374-03-144		3,575	40	40	202		1				
18-057-0-2374-03-140			30		212	481			8		200
18-057-0-2374-03-141	7	1,621	66	64		481		40			14
18-057-0-2374-03-138		2,872	25	136	432	784					
18-057-0-2374-03-139		2,872	10	90	432	784		40			
18-057-0-2374-03-136		1,542	24	246	432	423					
18-057-0-2374-03-137		1,542		76	576	423		40			
18-057-0-2374-03-308		1,867	16		168						
18-057-0-2374-03-306	2	2,494	6	128	72	720	5				
18-057-0-2374-03-307	4	2,494	64	128	144	720	5	40			
PROJECT TOTALS	**13**	**24,173**	**341**	**908**	**2,670**	**4,816**	**11**	**160**	**8**	**150**	**214**

unit price
Special Provision Number

IH 20

SUMMARY OF QUANTITIES

SHEET 2 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	12
	2374	03	091	

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.

8. WHEN ADJUSTING STEEL SHOES (ITEM 499), CLOSE THE LANE OF TRAFFIC CLOSEST TO WHERE THE WORK IS TAKING PLACE. IF THE STEEL SHOE IS LOCATED IN THE MIDDLE LANE, CLOSE THE MIDDLE LANE IN ADDITION TO THE LANE ADJACENT TO THE MIDDLE LANE AS TO NOT ALLOW TRAFFIC ON BOTH SIDES OF THE WORK AREA SUBMIT LIFTING PLANS AND CALCULATIONS TO THE ENGINEER FOR APPROVAL. ALL WORK ASSOCIATED WITH ADJUSTING STEEL SHOES WILL BE PAID FOR UNDER PAY ITEM 499-600 "ADJUST STL SHOES".

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 & INLAY 2.25" SMA C FROM 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 346.
- 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

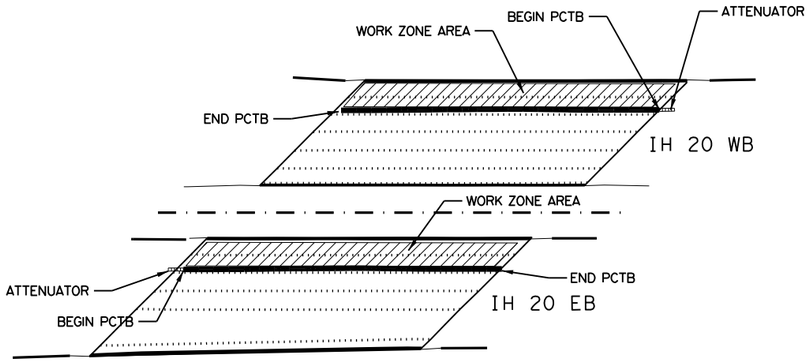
P.E. 2/1/2022
Signature of Registrant & Date

IH 20

TCP NARRATIVE

SHEET 1 OF 1

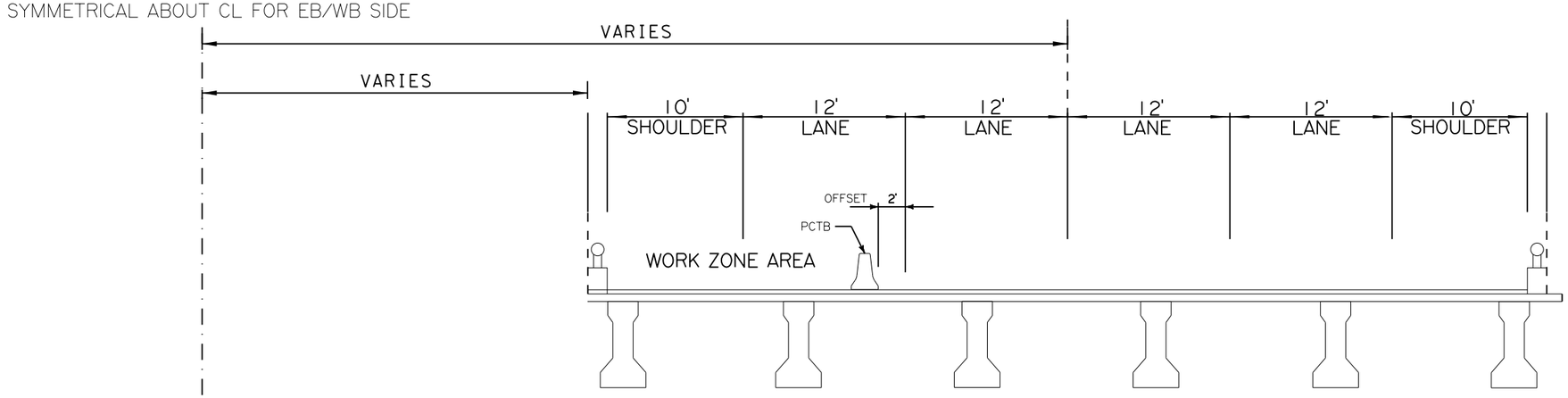
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	13
	2374	03	091	



TYPICAL BRIDGE PLAN VIEW

℄ IH 20

SYMMETRICAL ABOUT CL FOR EB/WB SIDE

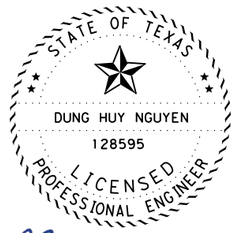


TCP TYPICAL SECTION - N.T.S.

IH 20 @ NEWTON CREEK OVERPASS
IH 20 @ BNSF RR OVERPASS
IH 20 @ WHITES BRANCH OVERPASS
IH 20 @IH 45 OVERPASS

TCP NOTES:

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



D. Nguyen P.E. 12/10/2021
Signature of Registrant & Date

IH 20
TCP DETAIL

SHEET 1 OF 1

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	14
	2374	03	091	

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		43	IH 20 EB EXIT 468	155+21	TL-3	UNI	EXIST	N/A	PCTB	24"	32"			1						X		
2		43	IH 20 EB EXIT 468	155+21	TL-3	UNI	EXIST	N/A	PCTB	24"	32"		1					X				
3		53	NEWTON CREEK EB	366+66	TL-3	UNI	EXIST	N/A	PCTB	24"	32"		1								X	
4		53	NEWTON CREEK WB	368+81	TL-3	UNI	EXIST	N/A	PCTB	24"	32"		1								X	
5		53	NEWTON CREEK EB	366+66	TL-3	UNI	EXIST	N/A	PCTB	24"	32"				1						X	
6		53	NEWTON CREEK WB	368+81	TL-3	UNI	EXIST	N/A	PCTB	24"	32"				1						X	
7		53-54	BNSF RR EB	378+09	TL-3	UNI	EXIST	N/A	PCTB	24"	32"				1						X	
8		53-54	BNSF RR WB	374+29	TL-3	UNI	EXIST	N/A	PCTB	24"	32"				1						X	
9		53-54	BNSF RR EB	378+09	TL-3	UNI	EXIST	N/A	PCTB	24"	32"				1						X	
10		53-54	BNSF RR WB	374+29	TL-3	UNI	EXIST	N/A	PCTB	24"	32"				1						X	
11		54	WHITES BRANCH EB	381+83	TL-3	UNI	EXIST	N/A	PCTB	24"	32"				1						X	
12		54	WHITES BRANCH WB	383+87	TL-3	UNI	EXIST	N/A	PCTB	24"	32"				1						X	
13		54	WHITES BRANCH EB	381+83	TL-3	UNI	EXIST	N/A	PCTB	24"	32"				1						X	
14		54	WHITES BRANCH WB	383+87	TL-3	UNI	EXIST	N/A	PCTB	24"	32"				1						X	
15		56	IH 45 EB	425+60	TL-3	UNI	EXIST	N/A	PCTB	24"	32"				1						X	
16		56	IH 45 WB	428+90	TL-3	UNI	EXIST	N/A	PCTB	24"	32"				1						X	
17		56	IH 45 EB	425+60	TL-3	UNI	EXIST	N/A	PCTB	24"	32"				1						X	
18		56	IH 45 WB	428+90	TL-3	UNI	EXIST	N/A	PCTB	24"	32"				1						X	
19		56	IH 45 EB	425+60	TL-3	UNI	EXIST	N/A	PCTB	24"	32"			1							X	
20		56	IH 45 WB	428+90	TL-3	UNI	EXIST	N/A	PCTB	24"	32"			1							X	
												TOTALS	3	3	14							

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. & Date 12/21/2021

CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:		CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		
	DALLAS	DALLAS		
	FEDERAL AID PROJECT			SHEET NO.
	SEE TITLE SHEET			15

DATE: 12/10/2021 8:49:18 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\STANDARD\bc-21.dgn

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

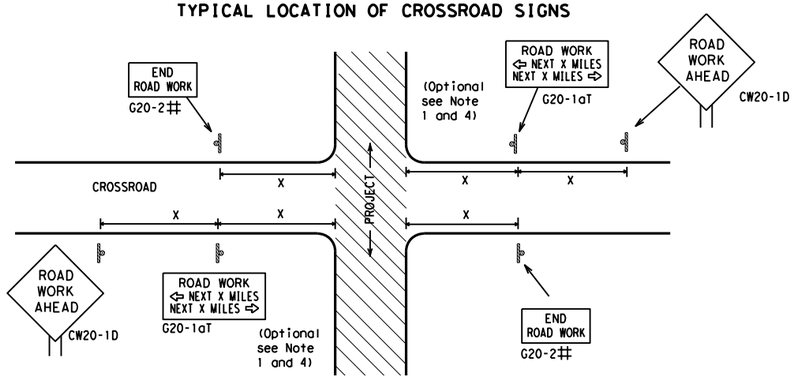
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

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	2374	03	091	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
5-10 5-21	DALLAS	DALLAS		16

DATE: 12/10/2021 8:49:18 AM
FILE: \\TXDOT40VDALHQV\Data\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\SNDTCP\bc-21.dgn

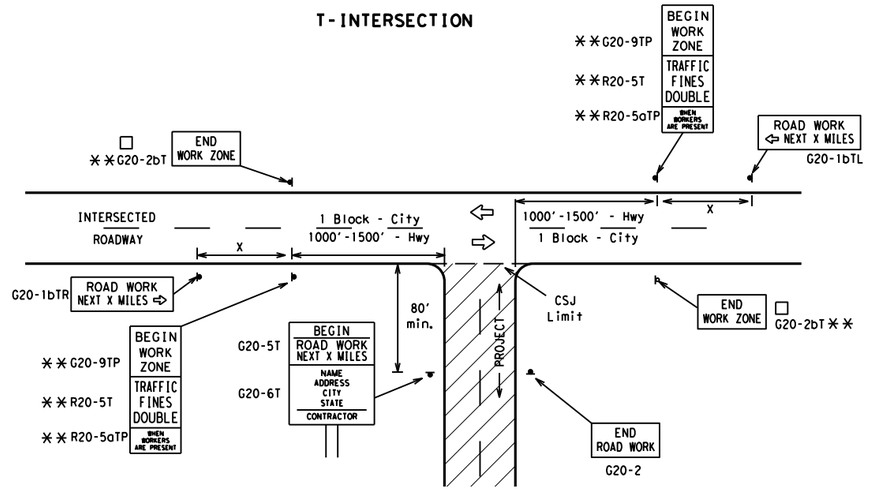
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

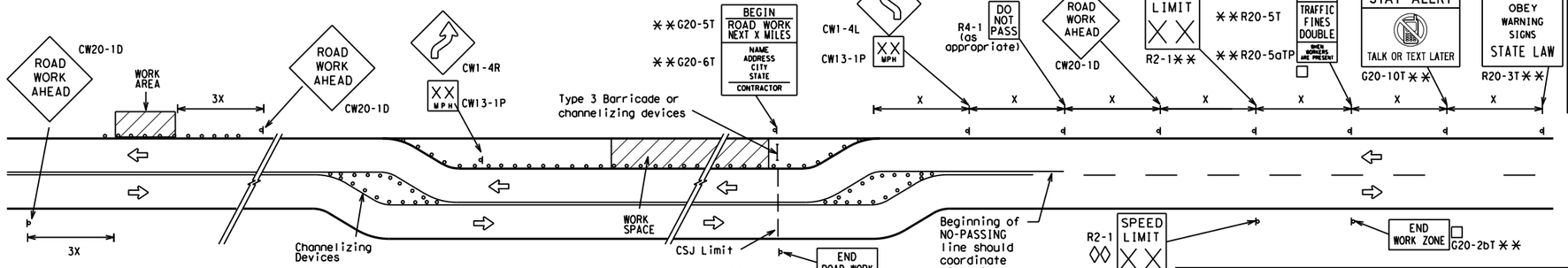
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

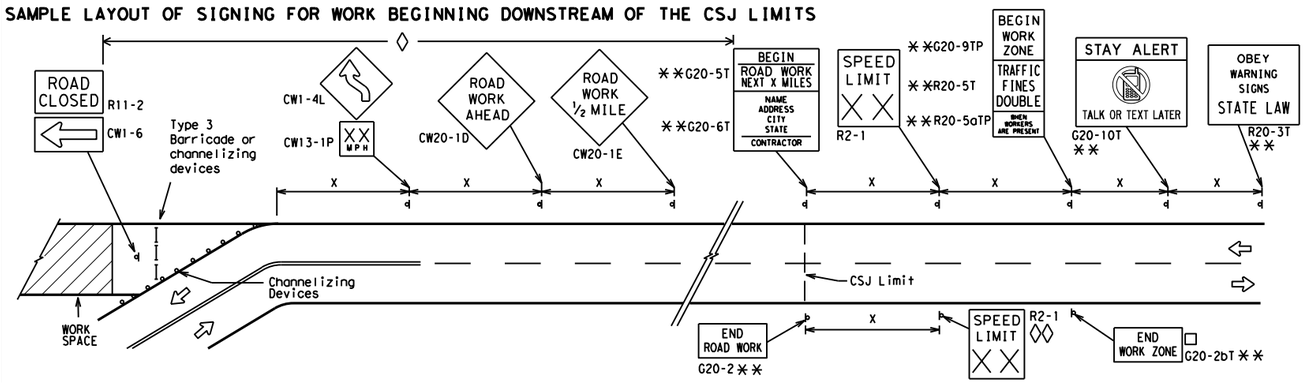
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

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

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

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

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DALLAS	DALLAS		17

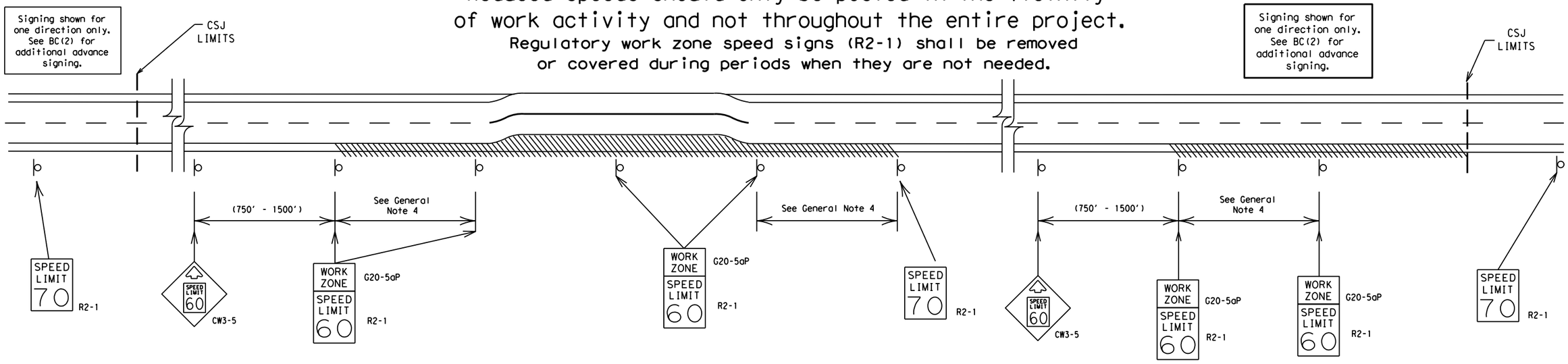
DATE: 12/10/2021 8:49:19 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\2374030\Sheets\STANDARDS\bc-21.dgn

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

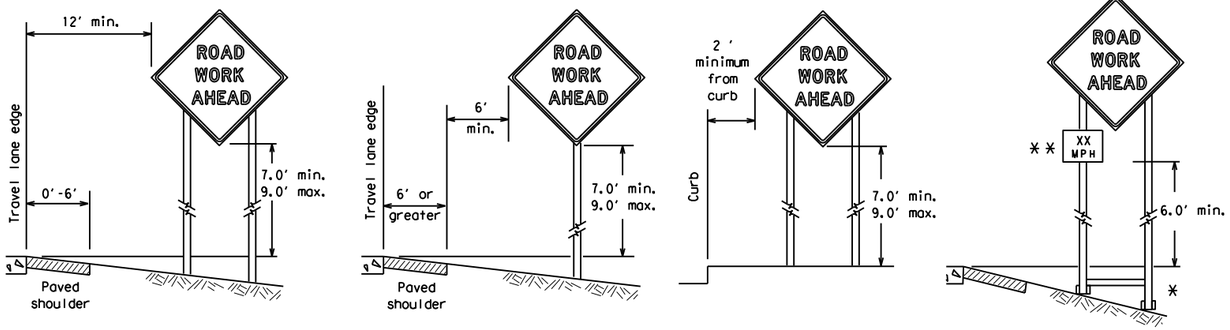
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DALLAS	DALLAS		18

DATE: 12/10/2021 8:49:19 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\on\1H20\2374030\91\Sheets\SIND\TCP\bc-21.dgn

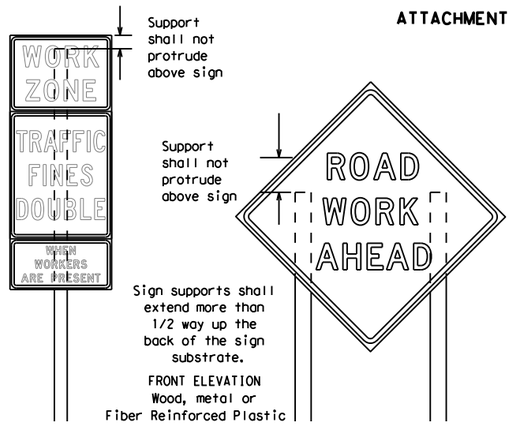
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

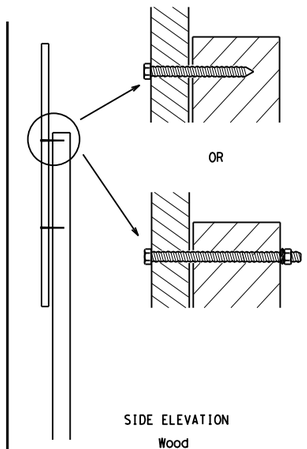


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





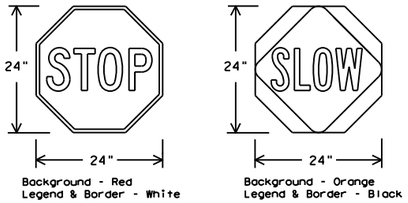
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

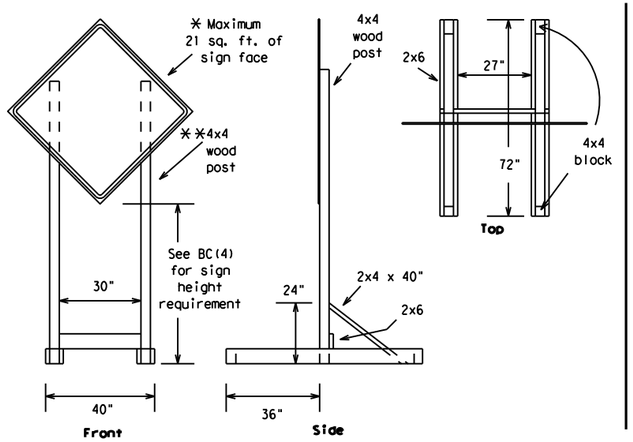
Texas Department of Transportation | Traffic Safety Division Standard

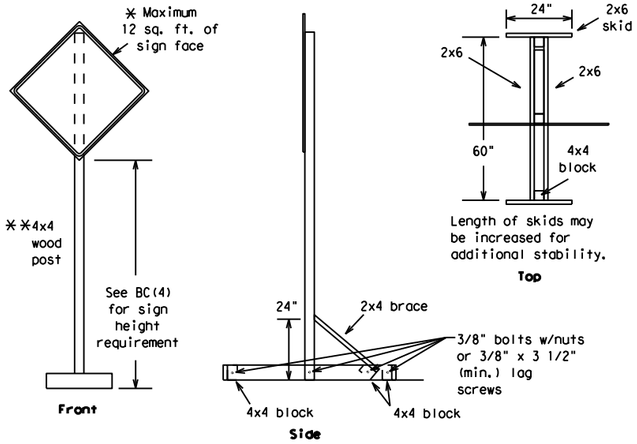
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

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	091	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DALLAS	DALLAS		19

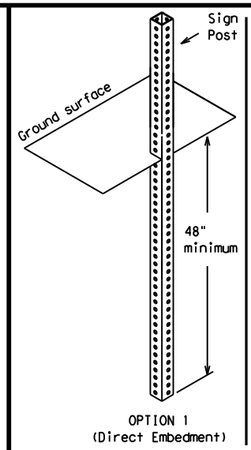
DATE: 12/10/2021 8:49:19 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\SIND\TCP\bc-21.dgn

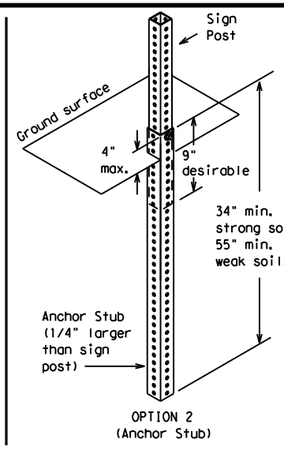


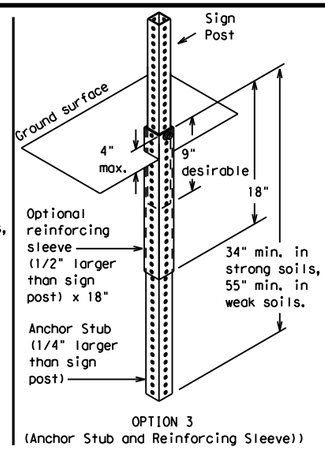


SKID MOUNTED WOOD SIGN SUPPORTS

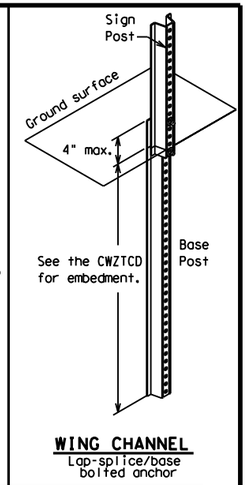
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







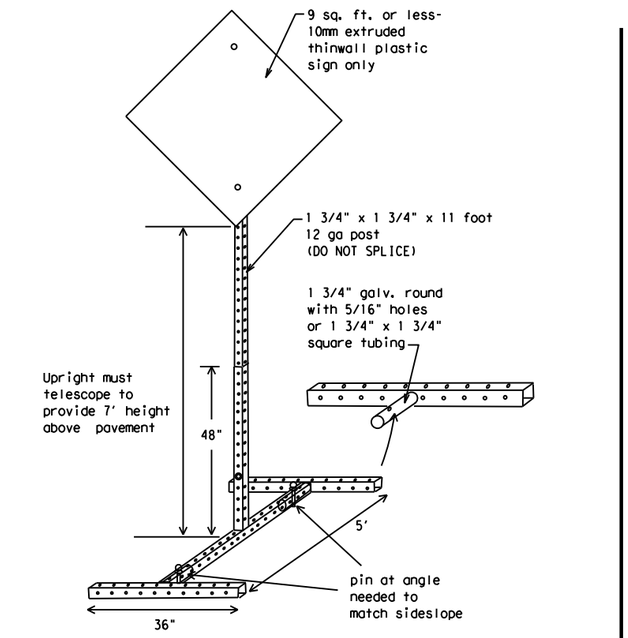
PERFORATED SQUARE METAL TUBING

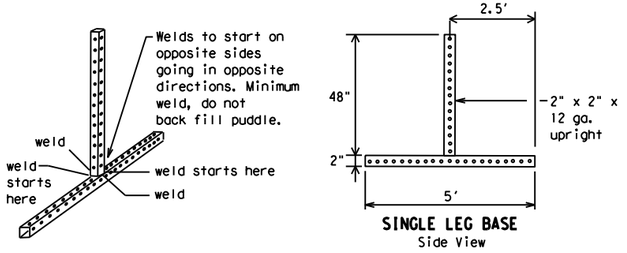


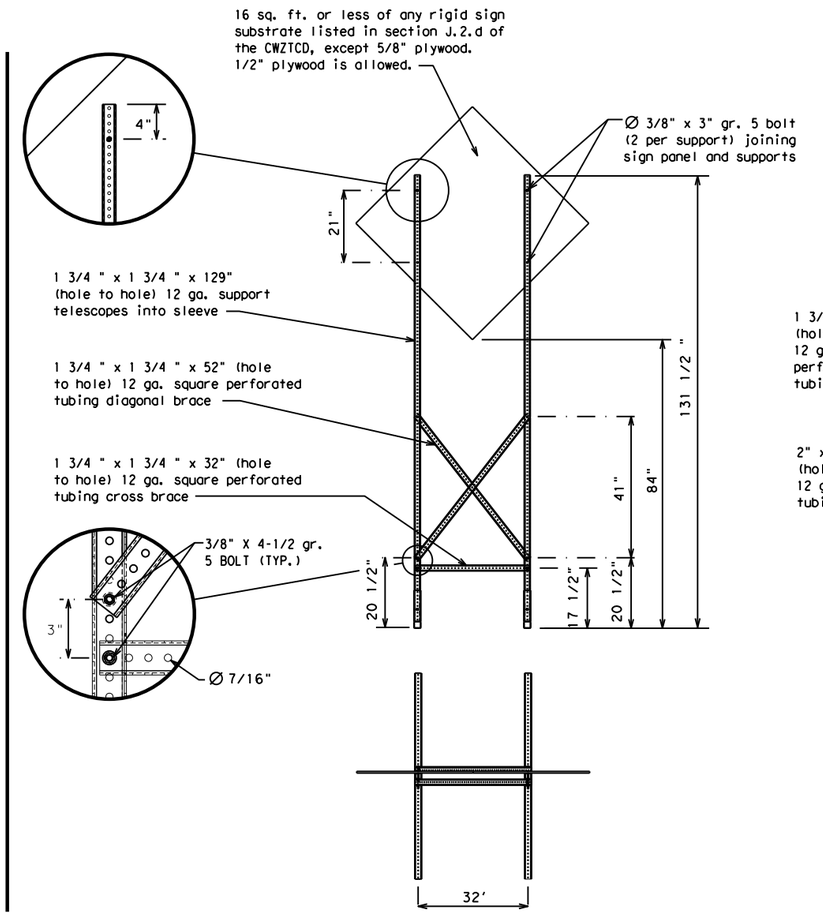
WING CHANNEL
Lap-splice/base bolted anchor

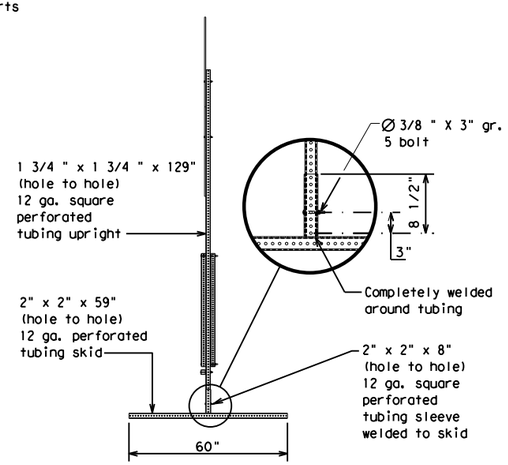
GROUND MOUNTED SIGN SUPPORTS

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









SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DALLAS	DALLAS		20

DATE: 12/10/2021 8:49:20 AM
FILE: \\TXDOT40VDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\SSNDVTCP\bc-21.dgn

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		Other Condition List	
FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED	ROADWORK XXX FT	ROAD REPAIRS XXXX FT
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT	FLAGGER XXXX FT	LANE NARROWS XXXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT	RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
RIGHT X LANES CLOSED	RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
CENTER LANE CLOSED	DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED	DETOUR X MILE	ROUGH ROAD XXXX FT
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE	ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
EXIT CLOSED	RIGHT LN TO BE CLOSED	BUMP XXXX FT	US XXX EXIT X MILES
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT	LANES SHIFT *
XXXXXXXX BLVD CLOSED			

* 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		Location List	Warning List	** Advance Notice List
MERGE RIGHT	FORM X LINES RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM- X PM
DETOUR NEXT X EXITS	USE XXXXX RD EXIT	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX-XX X PM-X AM
USE EXIT XXX	USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	WATCH FOR TRUCKS	XXXXXXX TO XXXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	EXPECT DELAYS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS	PREPARE TO STOP		DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT	END SHOULDER USE		DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES	WATCH FOR WORKERS			TONIGHT XX PM- XX AM
STAY IN LANE *				

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

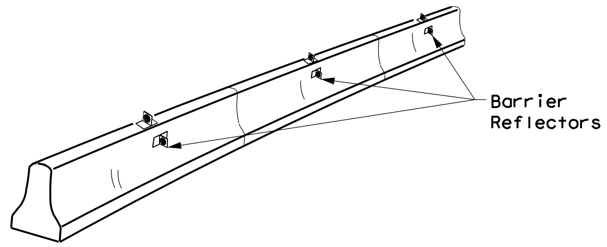
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

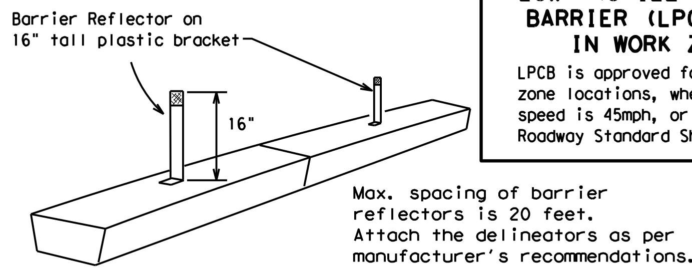
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DALLAS	DALLAS		21

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)

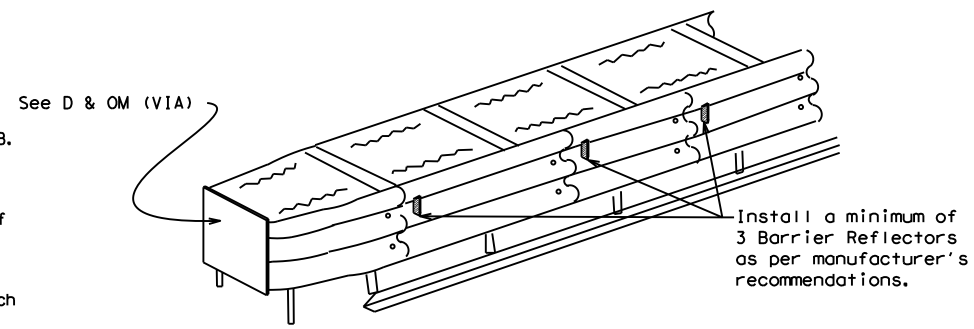


LOW PROFILE CONCRETE BARRIER (LPCB)

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.

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.



DELINEATION OF END TREATMENTS

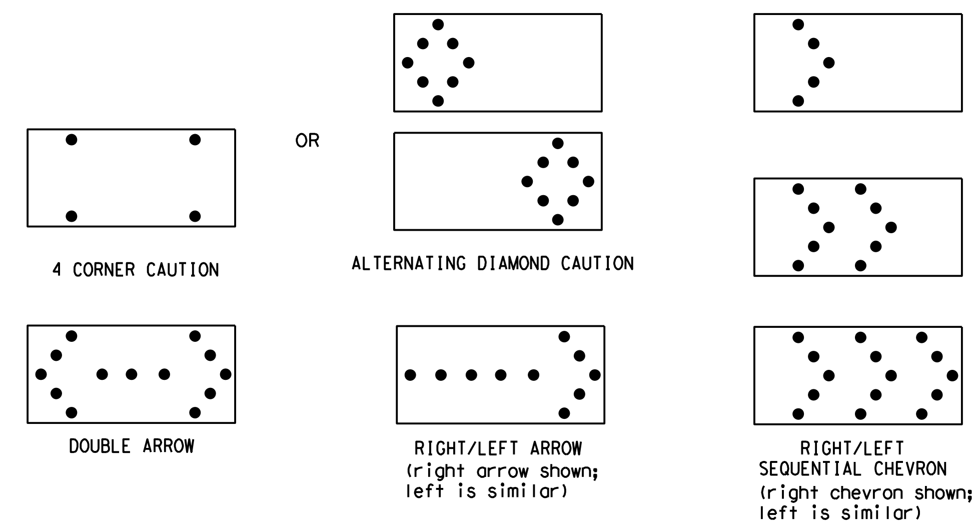
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

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

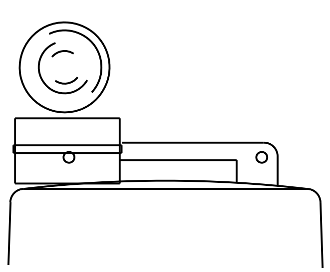
TYPE	MINIMUM SIZE	MINIMUM NUMBER OF PANEL LAMPS	MINIMUM VISIBILITY DISTANCE
B	30 x 60	13	3/4 mile
C	48 x 96	15	1 mile

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



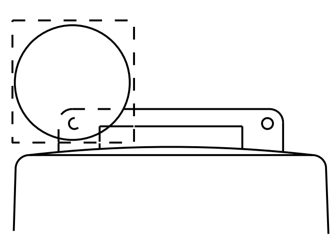
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.

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

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.

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 2374	SECT 03	JOB 091	HIGHWAY IH 20
REVISIONS 9-07 8-14 7-13 5-21	DIST DALLAS		COUNTY DALLAS	SHEET NO. 22

DATE: 12/10/2021 8:49:21 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\2374030091\Sheets\STND\TCP\bc-21.dgn

DATE: 12/10/2021 8:49:21 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\23740309 1\Sheets\STIND\TCP\bc-21.dgn

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

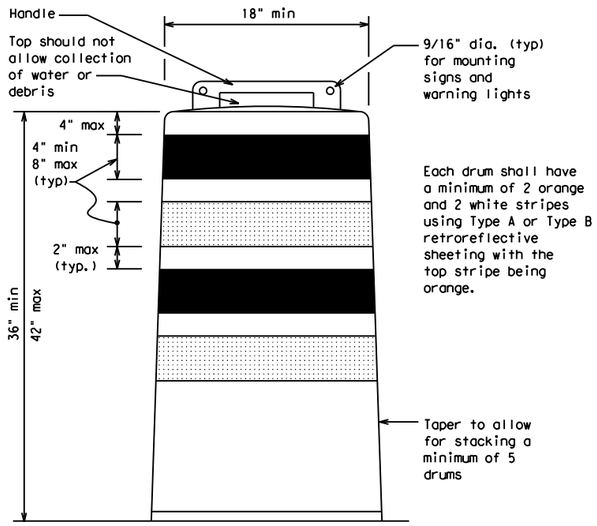
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

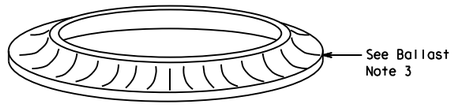
RETROREFLECTIVE SHEETING

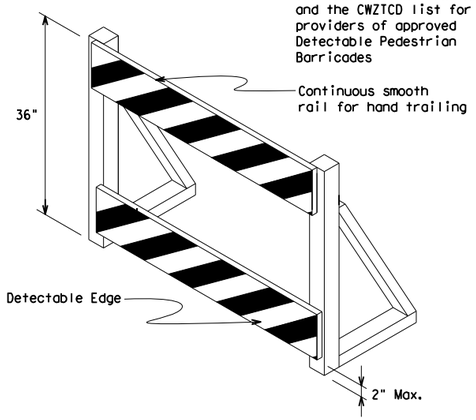
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

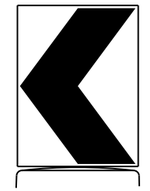




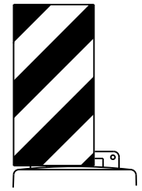


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

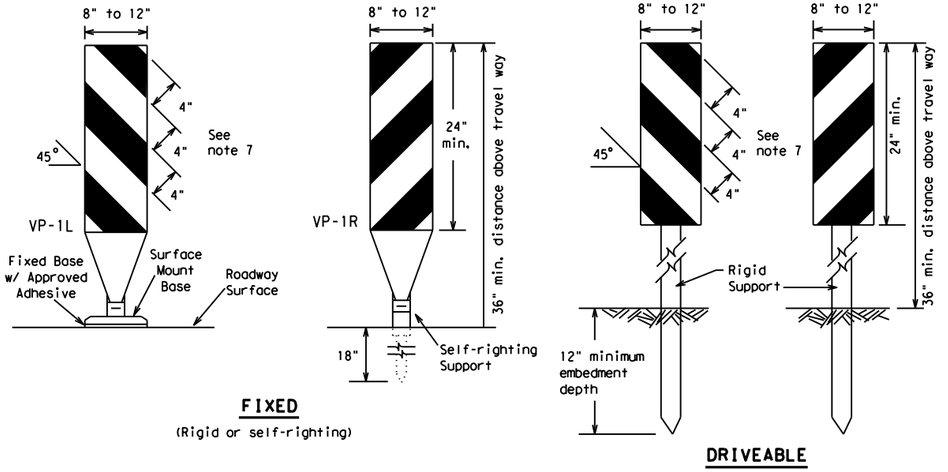
Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

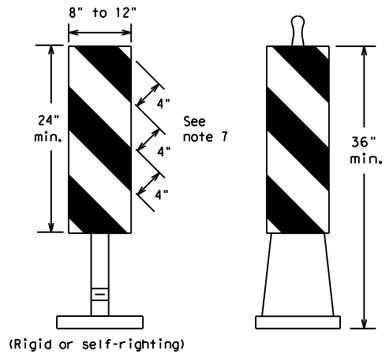
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	DALLAS	DALLAS		23
7-13				

DATE: 12/10/2021 8:49:21 AM
FILE: \\TXDOT4DDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\2374030\91\Sheets\STND\TCP\bc-21.dgn



FIXED
(Rigid or self-righting)

DRIVEABLE

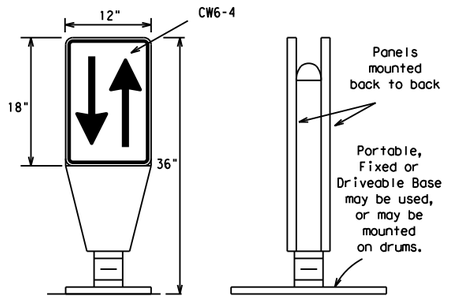


(Rigid or self-righting)

PORTABLE

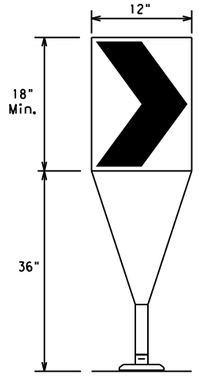
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



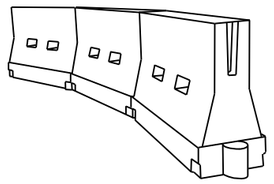
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

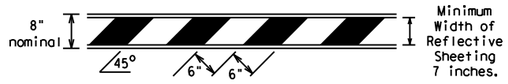
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DALLAS	DALLAS		24

DATE: 12/10/2021 8:49:22 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\ON\IH20\237403091\Sheets\SIND\TCP\bc-21.dgn

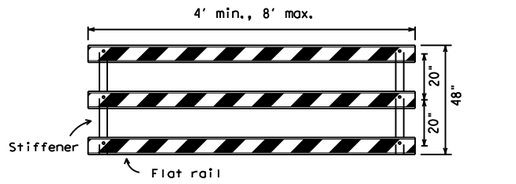
TYPE 3 BARRICADES

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.



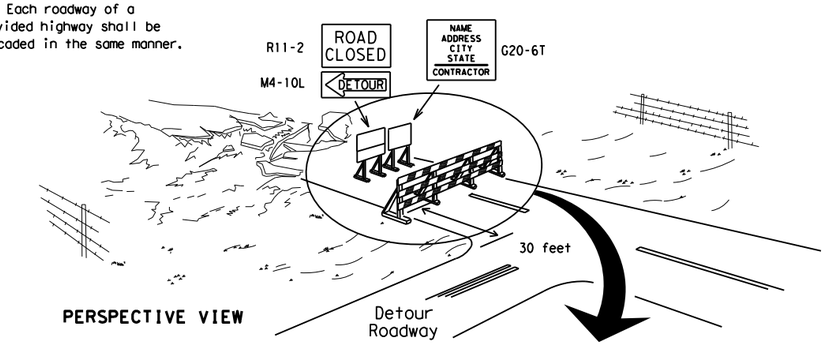
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

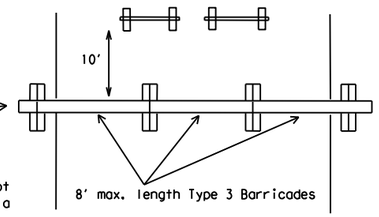
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

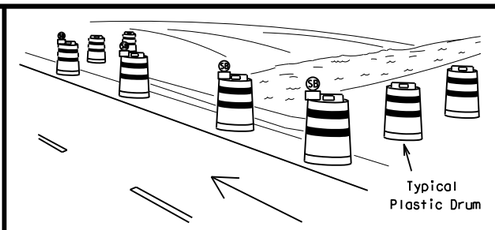
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

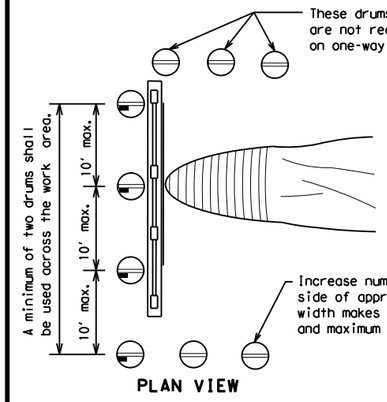
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

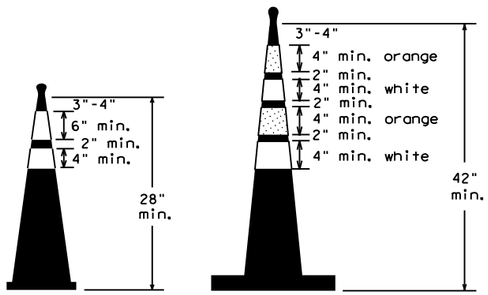
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



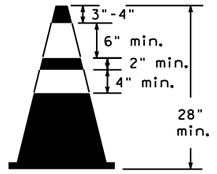
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

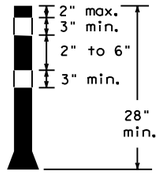
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

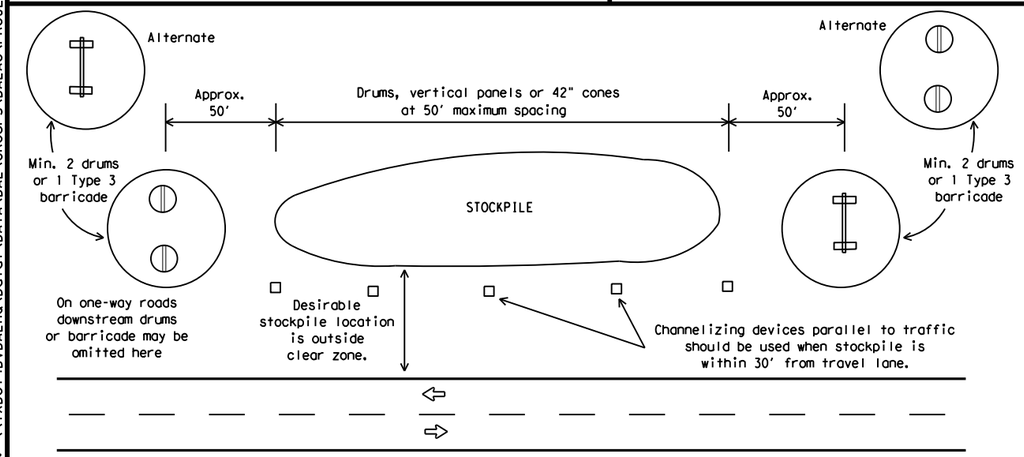


Tubular Marker

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	091	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	DALLAS	DALLAS		25

DATE: 12/10/2021 8:49:22 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\23740309\Sheets\SIND\TCP\bc-21.dgn

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.

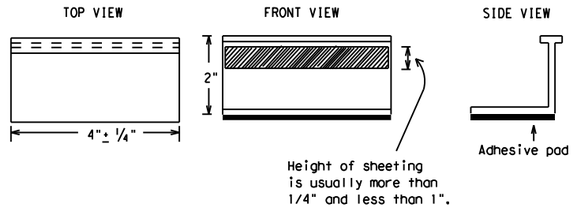
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

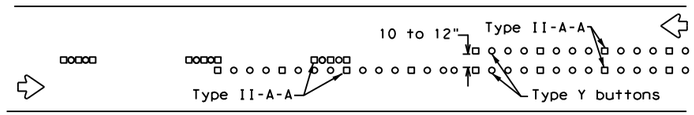
BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	DALLAS	DALLAS		26
11-02 8-14				

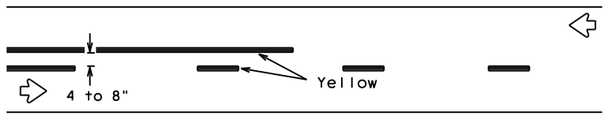
DATE: 12/10/2021 8:49:22 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\STINDTCP\bc-21.dgn

PAVEMENT MARKING PATTERNS

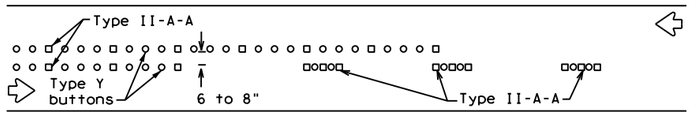
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



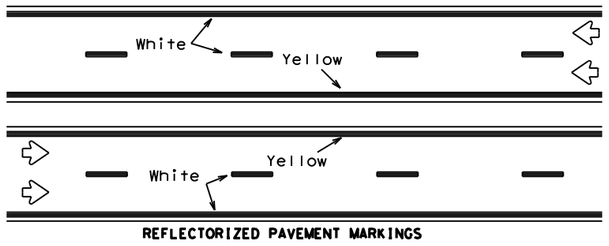
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



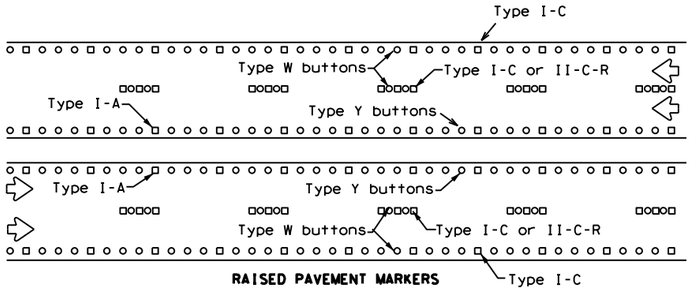
RAISED PAVEMENT MARKERS - PATTERN B

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



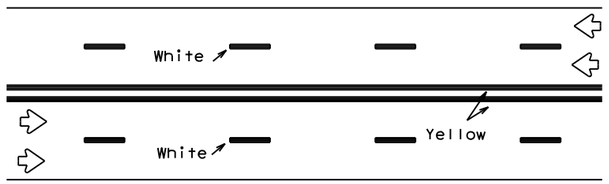
REFLECTORIZED PAVEMENT MARKINGS



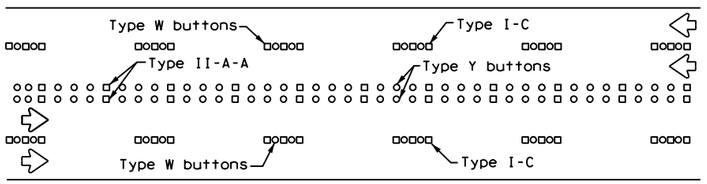
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



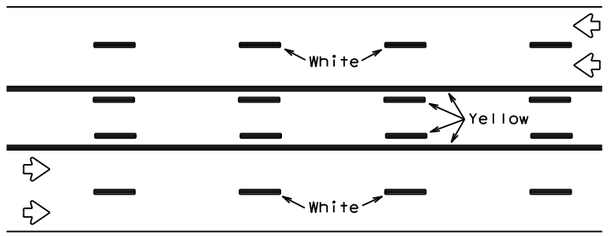
REFLECTORIZED PAVEMENT MARKINGS



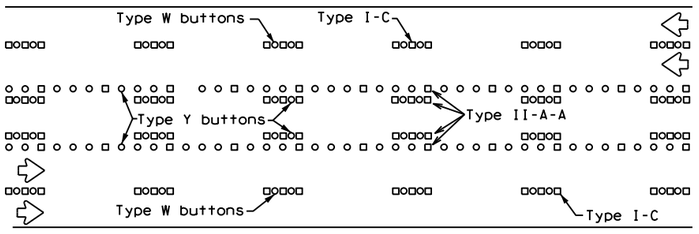
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

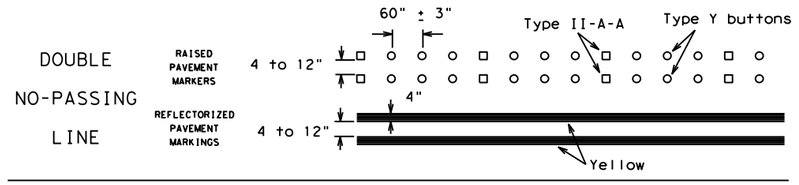
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

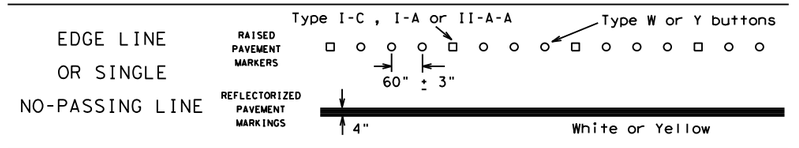
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

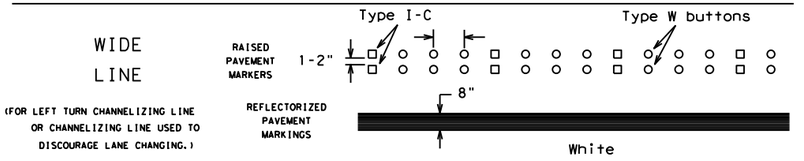


EDGE LINE OR SINGLE NO-PASSING LINE



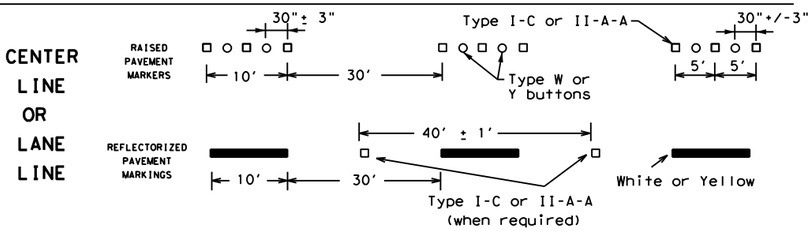
WIDE LINE

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

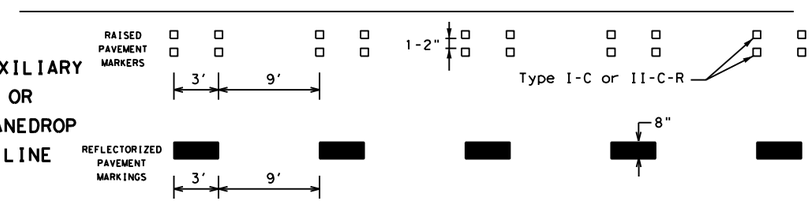


BROKEN LINES

CENTER LINE OR LANE LINE

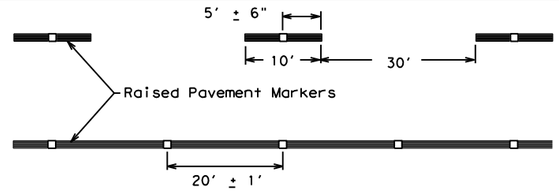


AUXILIARY OR LANEDROP LINE



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

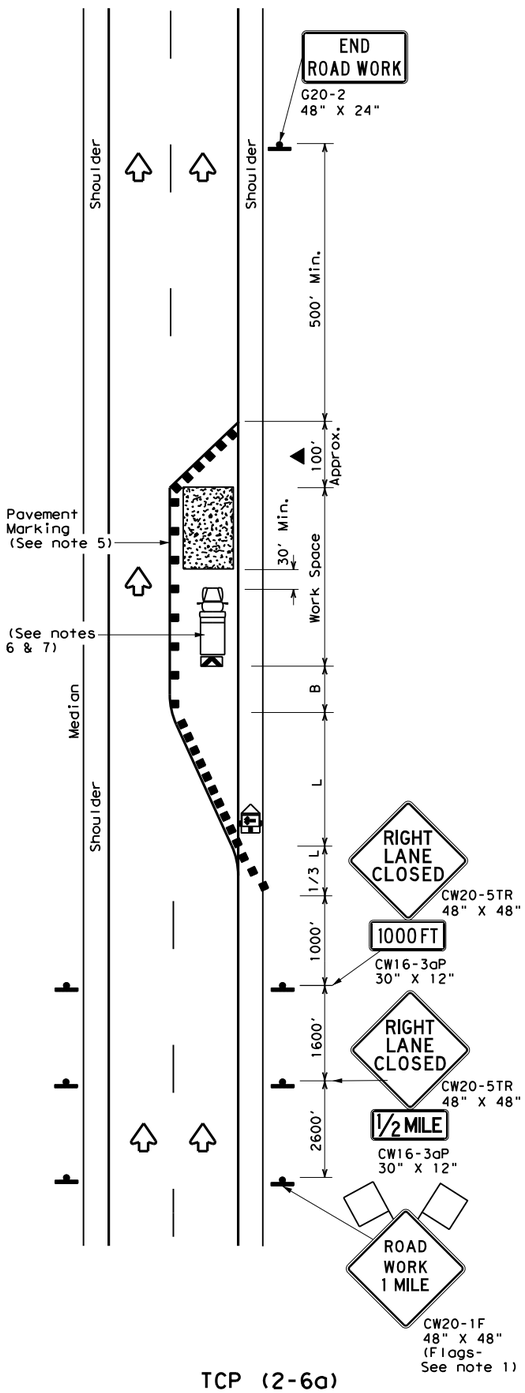
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

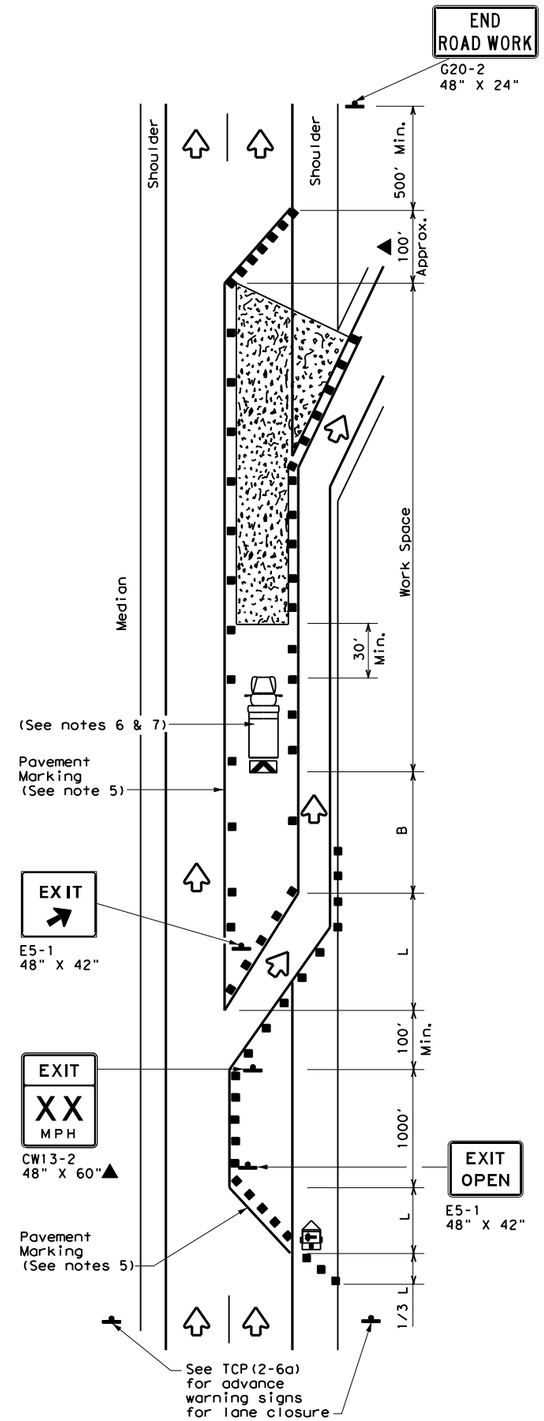
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
1-97 9-07 5-21	DIST	COUNTY		SHEET NO.
2-98 7-13	DALLAS	DALLAS		27
11-02 8-14				

DATE: 12/10/2021 8:49:23 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\23740309\Sheets\tcp2-6-18.dgn



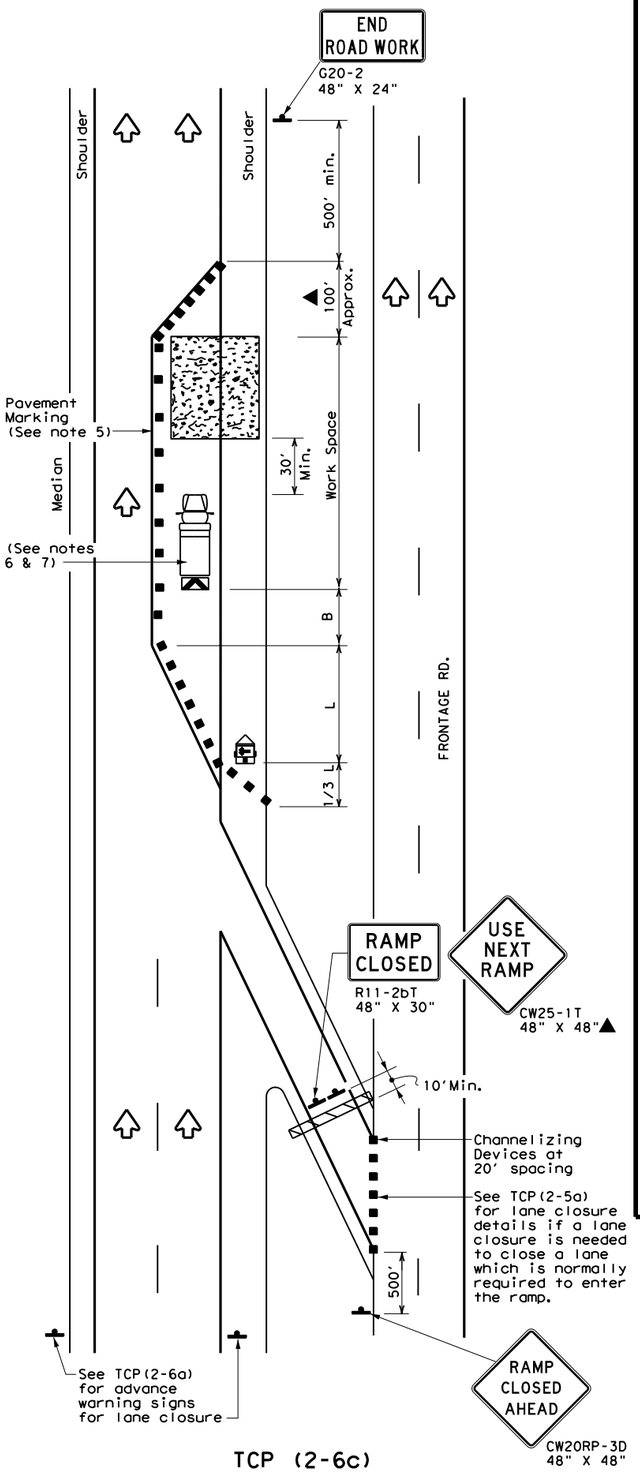
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

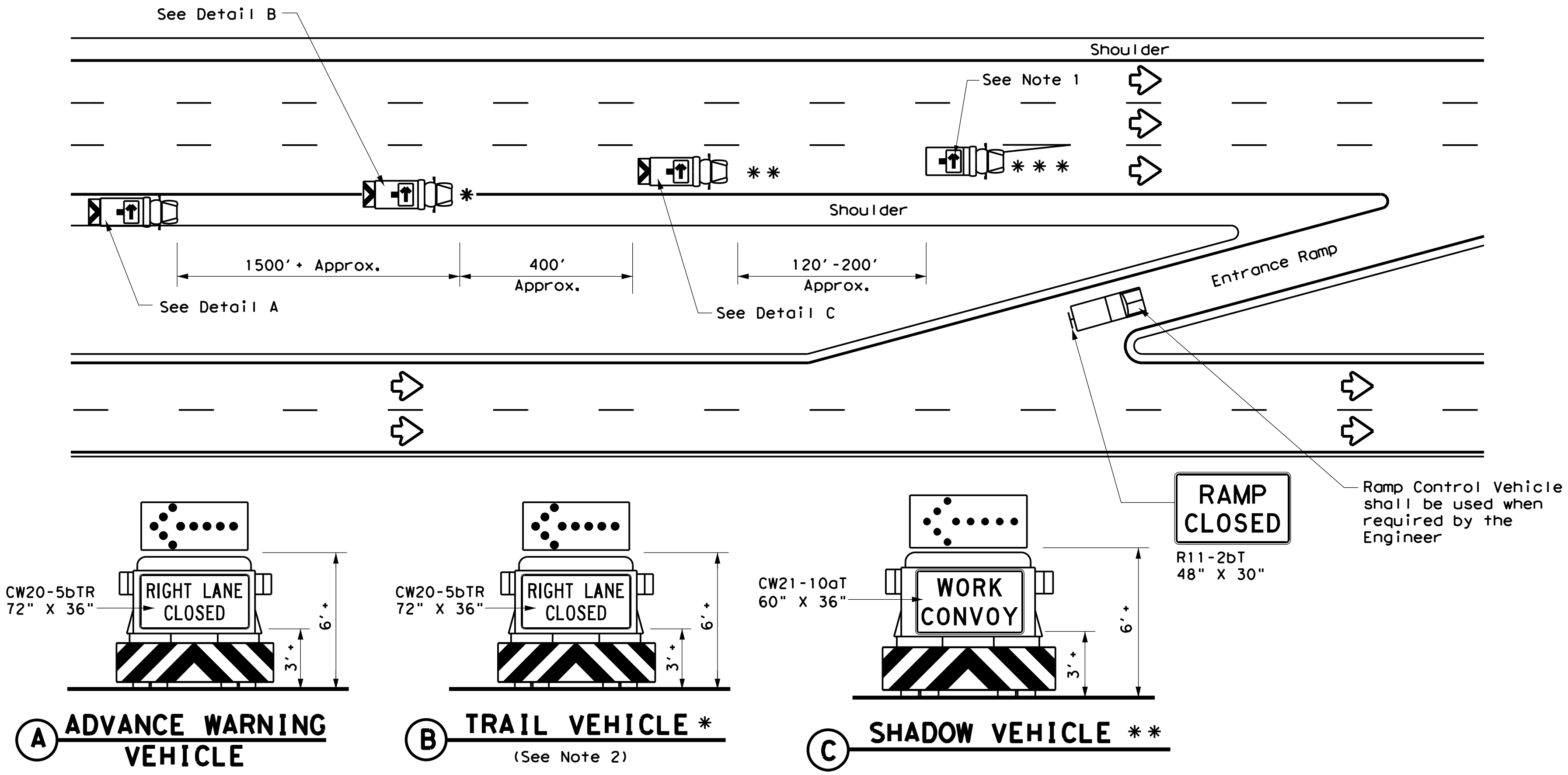
Texas Department of Transportation

Traffic Operations Division Standard

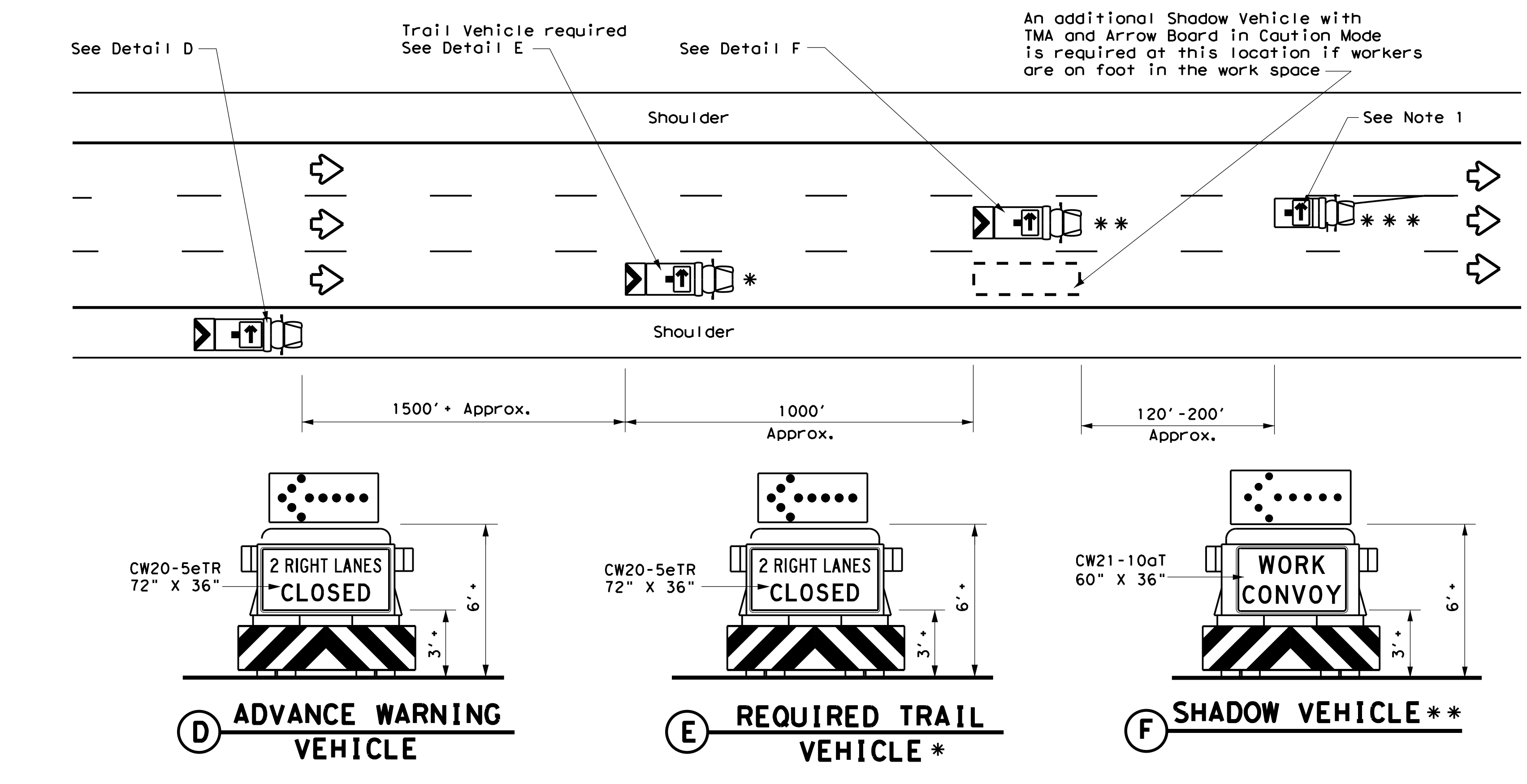
TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP(2-6)-18

FILE: tcp2-6-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		28



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



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

LEGEND

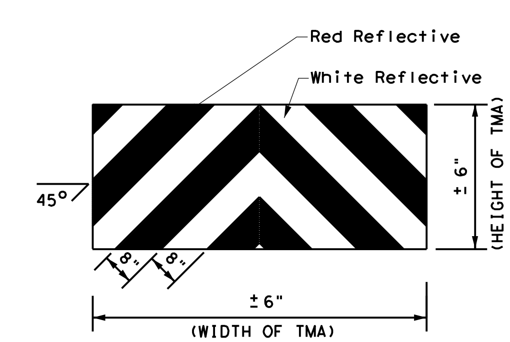
*	Trail Vehicle	ARROW BOARD DISPLAY	
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

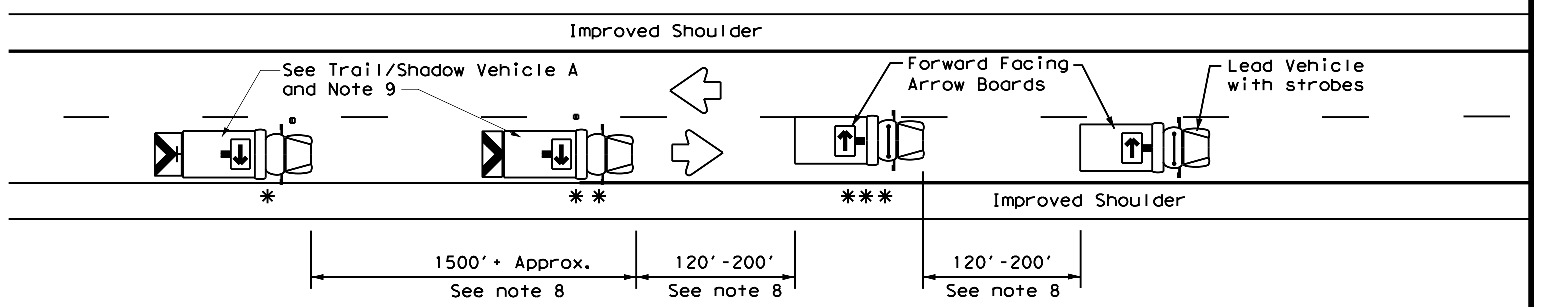
TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

FILE: tcp3-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT December 1985	CONT 2374	SECT 03	JOB 091	HIGHWAY IH 20
REVISIONS 2-94 4-98 8-95 7-13 1-97	DIST DALLAS		COUNTY DALLAS	SHEET NO. 29

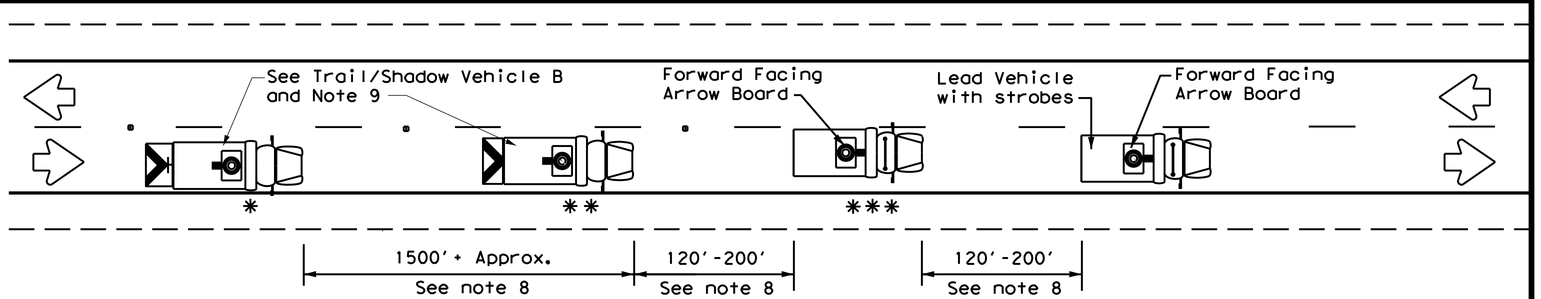
176

DATE: 12/10/2021 8:49:24 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\2374030...



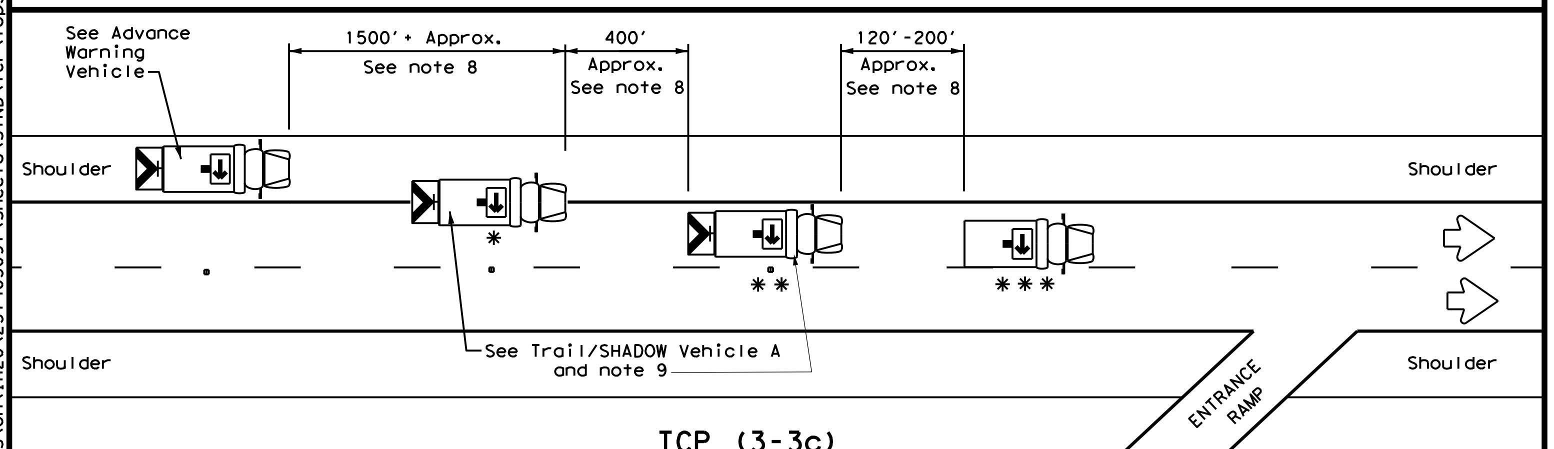
TCP (3-3a)

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



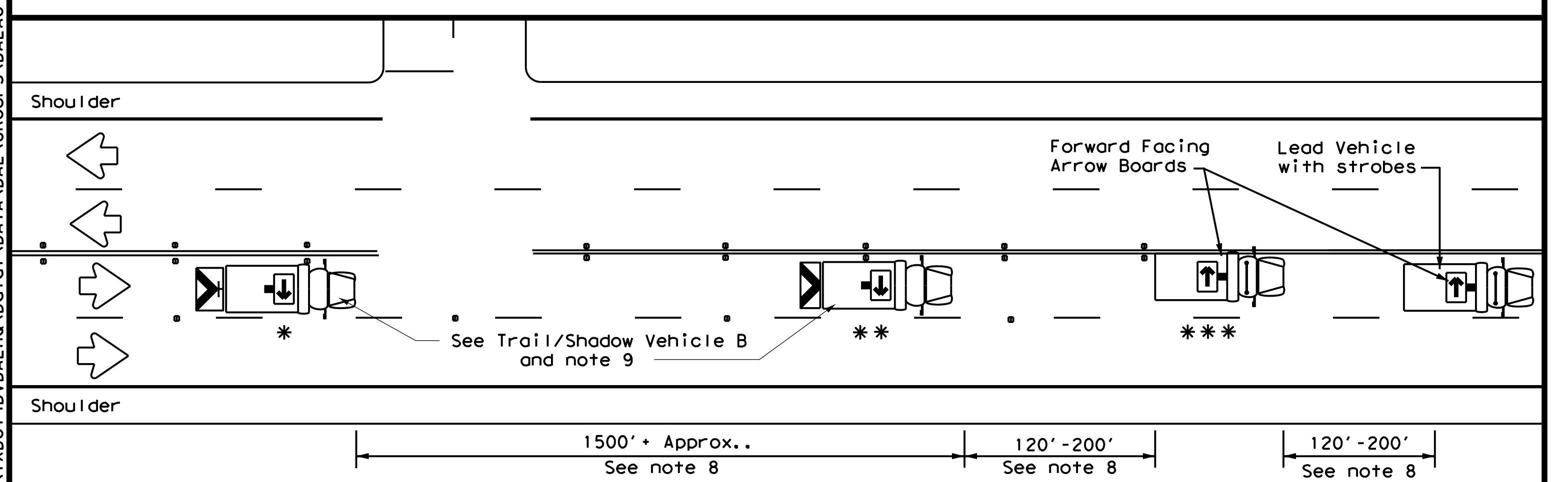
TCP (3-3b)

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



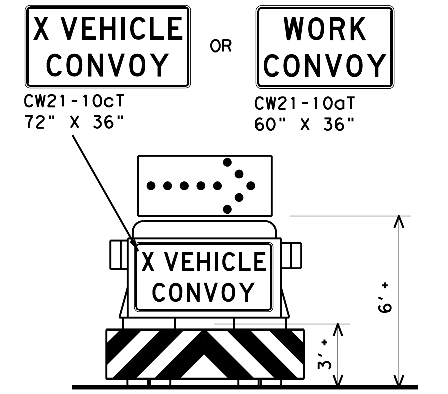
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



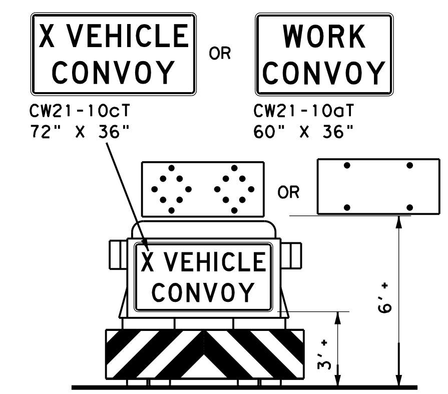
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



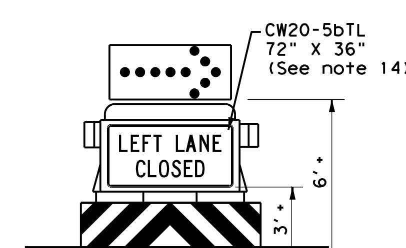
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

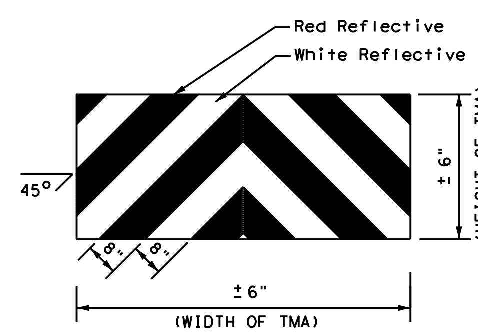


TRAIL/SHADOW VEHICLE B

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

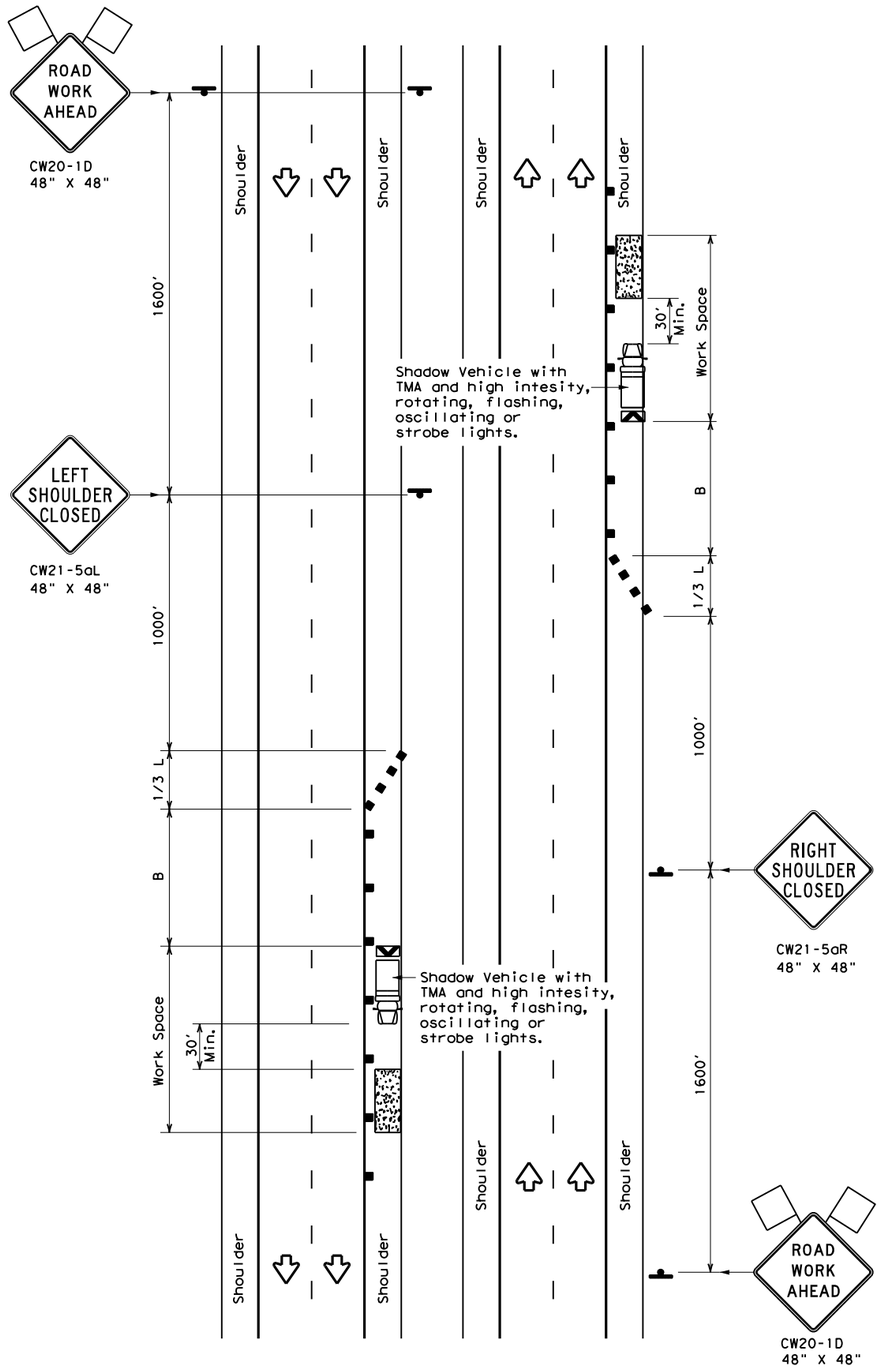
TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

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	091	IH 20
2-94 4-98	DIST		COUNTY	SHEET NO.
8-95 7-13 / 1-97 7-14	DALLAS		DALLAS	30

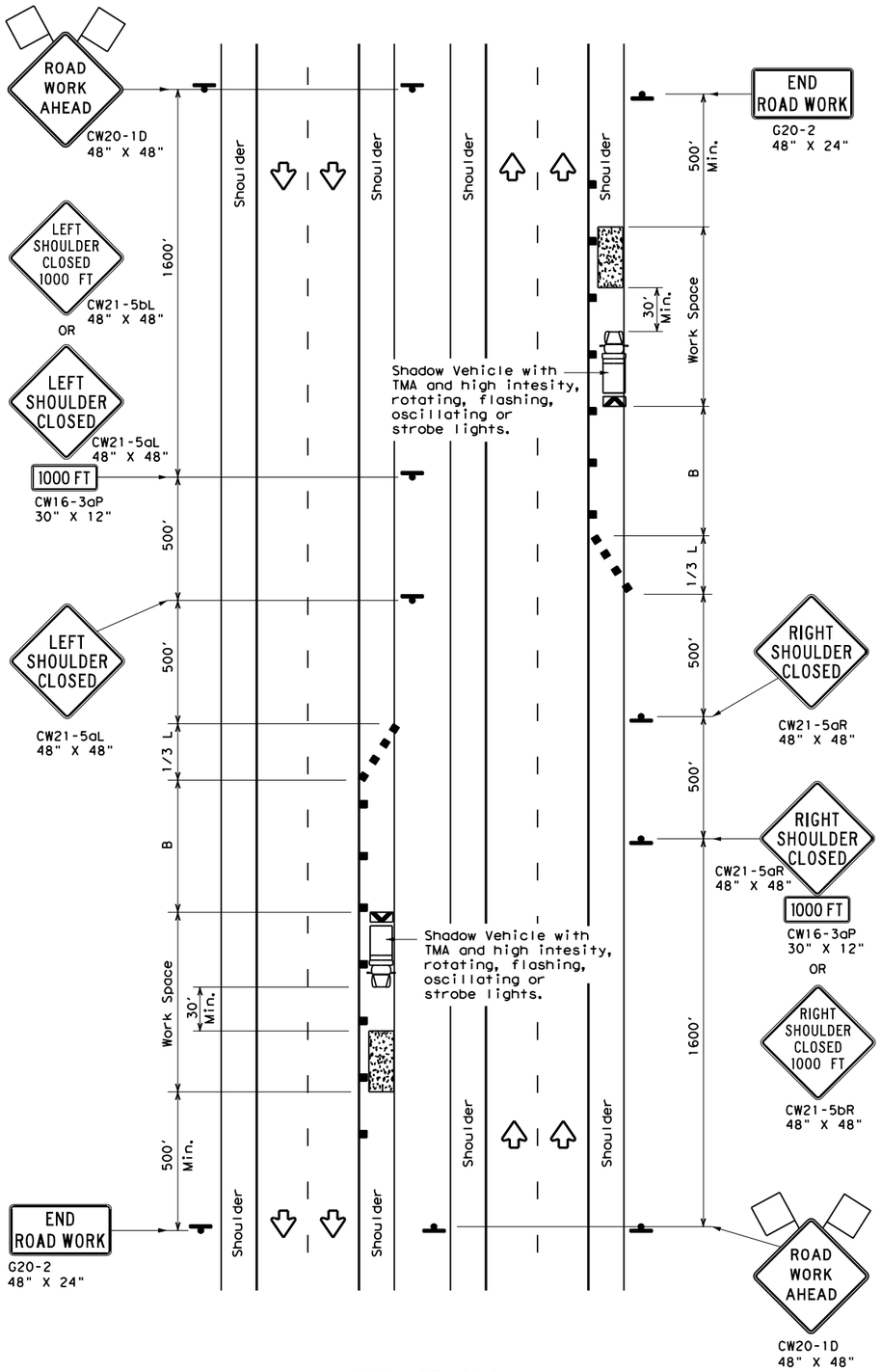
DATE: 12/10/2021 8:49:25 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\STANDARDS\tcp3-3.dgn

DATE: 12/10/2021 8:49:25 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\ON\IH20\237403091\Sheets\TCP5-1-18.dgn



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

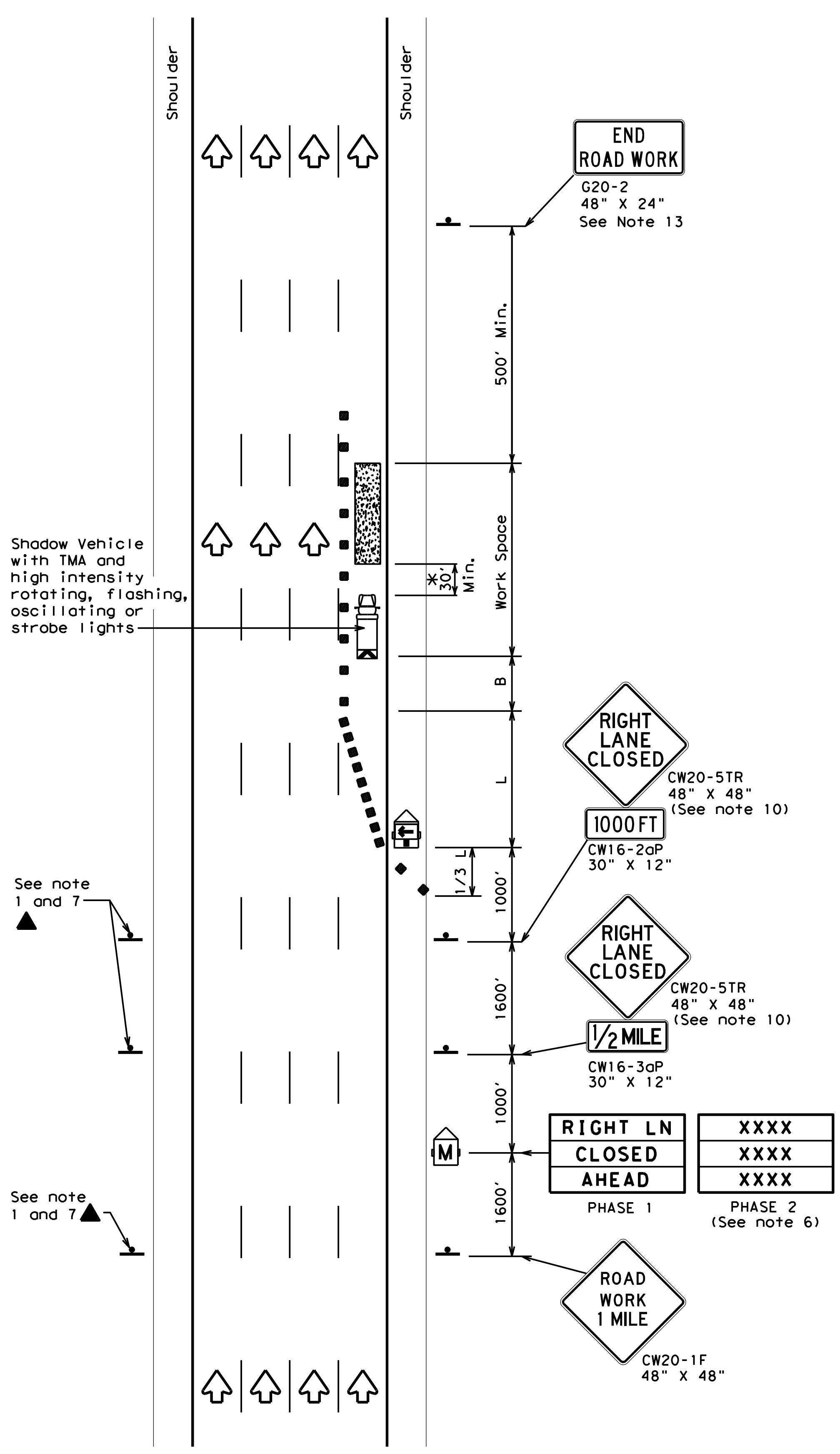
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

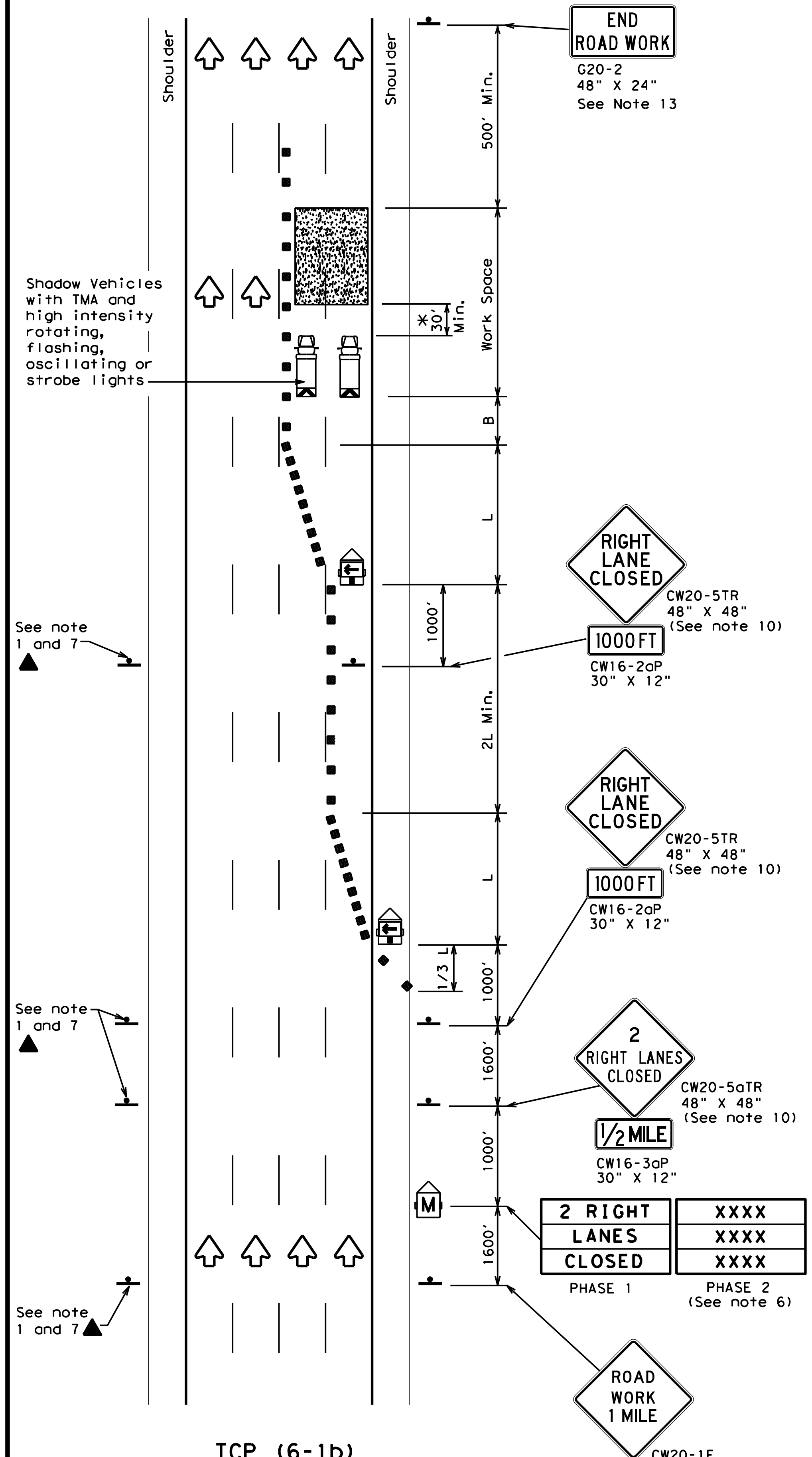
FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
2-18	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		31

DATE: 12/10/2021 8:49:26 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\2374030...



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		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. 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.

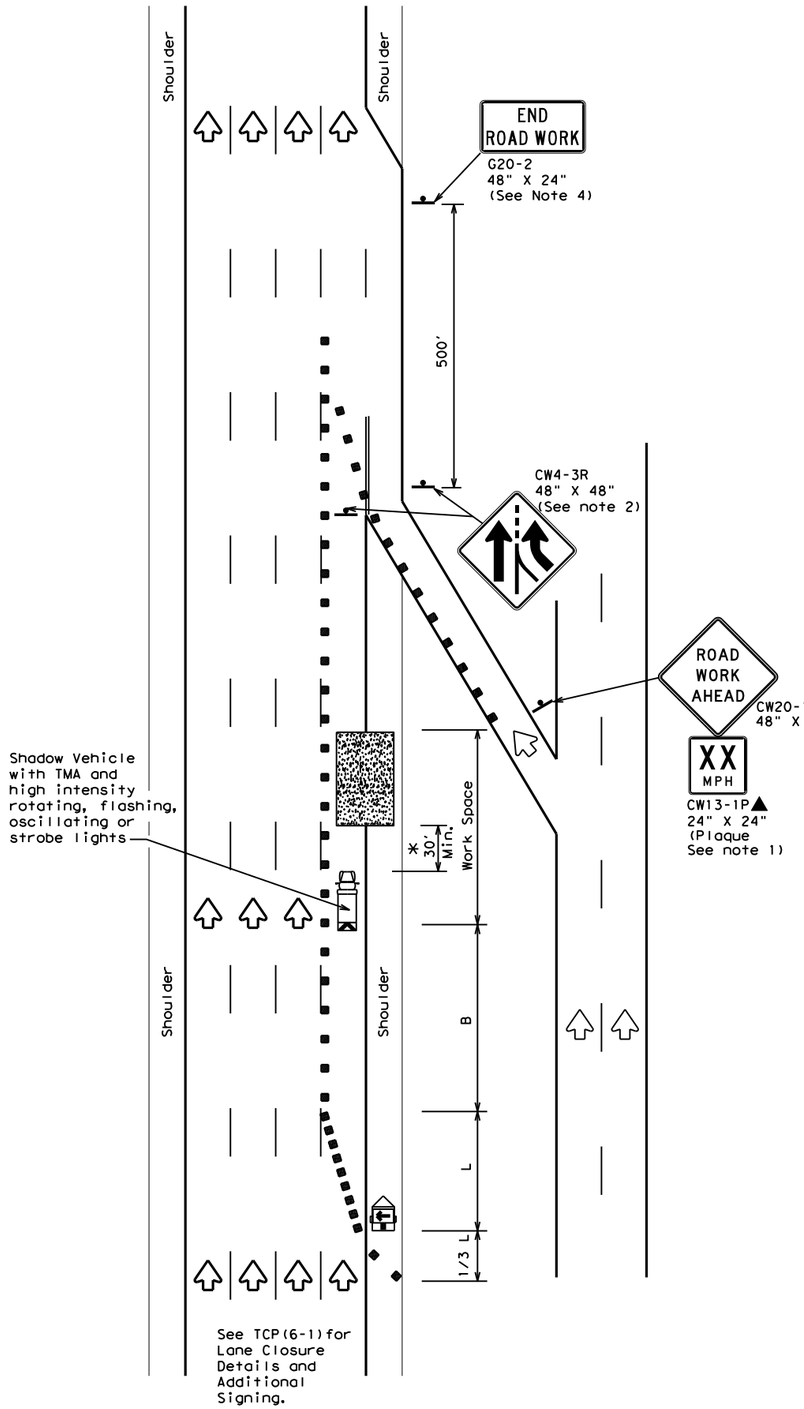
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
FREEWAY LANE CLOSURES

TCP(6-1)-12

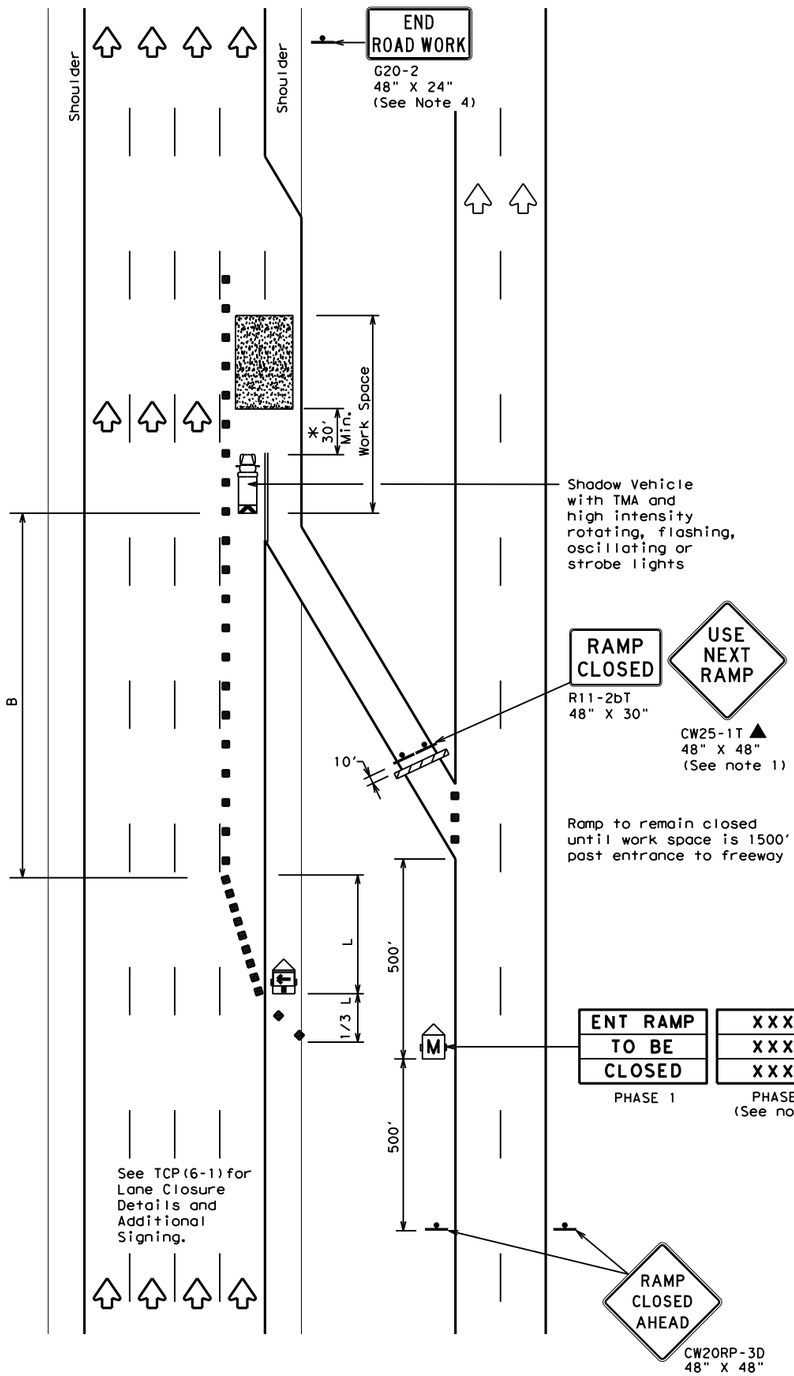
FILE: tcp6-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT 2374	SECT 03	JOB 091	HIGHWAY IH 20
REVISIONS 8-12	DIST DALLAS	COUNTY DALLAS		SHEET NO. 32

DATE: 12/10/2021 8:49:27 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\1H20\2374030\Sheets\tcp6-2.dgn



TCP (6-2a)

ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)

ENTRANCE RAMP CLOSED

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

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

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

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

Texas Department of Transportation
Traffic Operations Division Standard

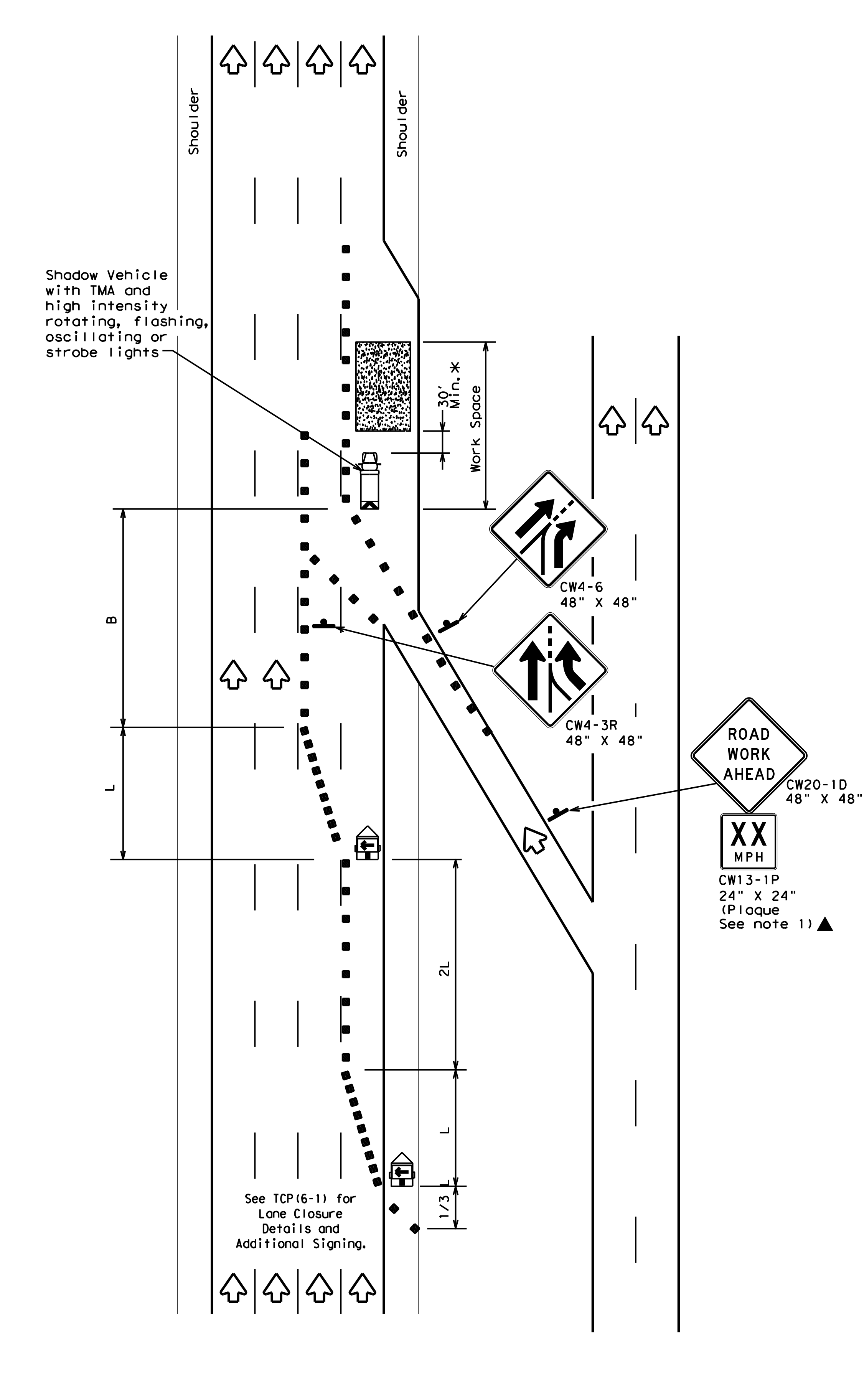
TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP(6-2)-12

FILE: tcp6-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	DALLAS	DALLAS		33

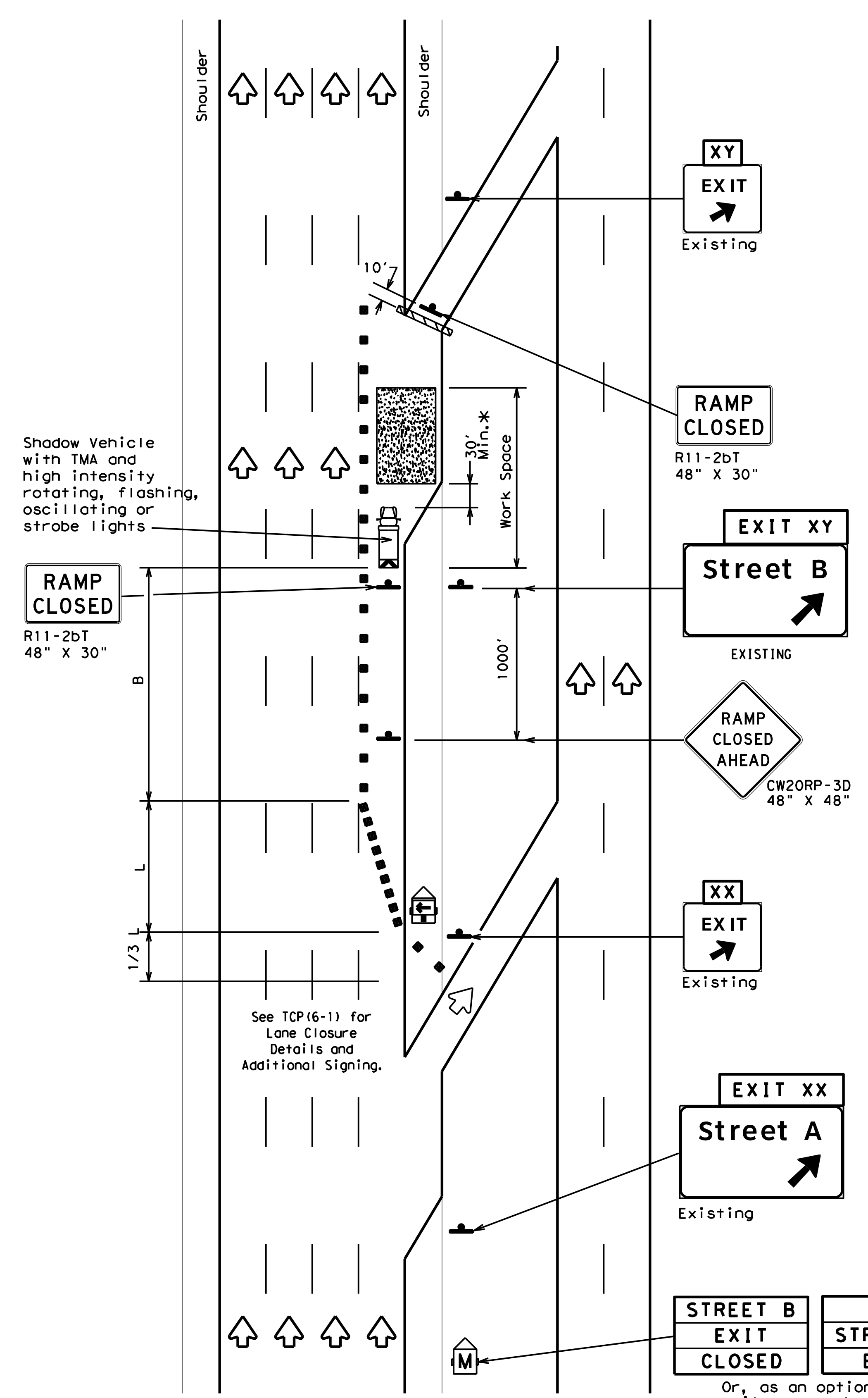
202

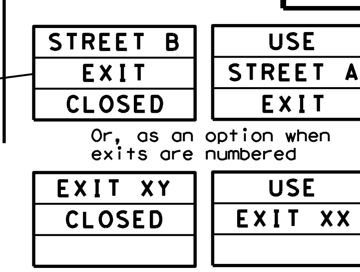
DATE: 12/10/2021 8:49:27 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\STND\TCP(6-3)



TCP (6-3a)

ENTRANCE RAMP OPEN





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

TCP (6-3b)

EXIT RAMP CLOSED

TRAFFIC EXITS PRIOR TO CLOSED RAMP

LEGEND

▨	Type 3 Barricade	▪ ▪	Channelizing Devices
▭	Heavy Work Vehicle	▲	Truck Mounted Attenuator (TMA)
⇦	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
┻	Sign	⇦	Traffic Flow
◇	Flag	⊔○	Flagger

Posted Speed	Formula	Minimum Desirable Taper Lengths "L" **			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.

*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

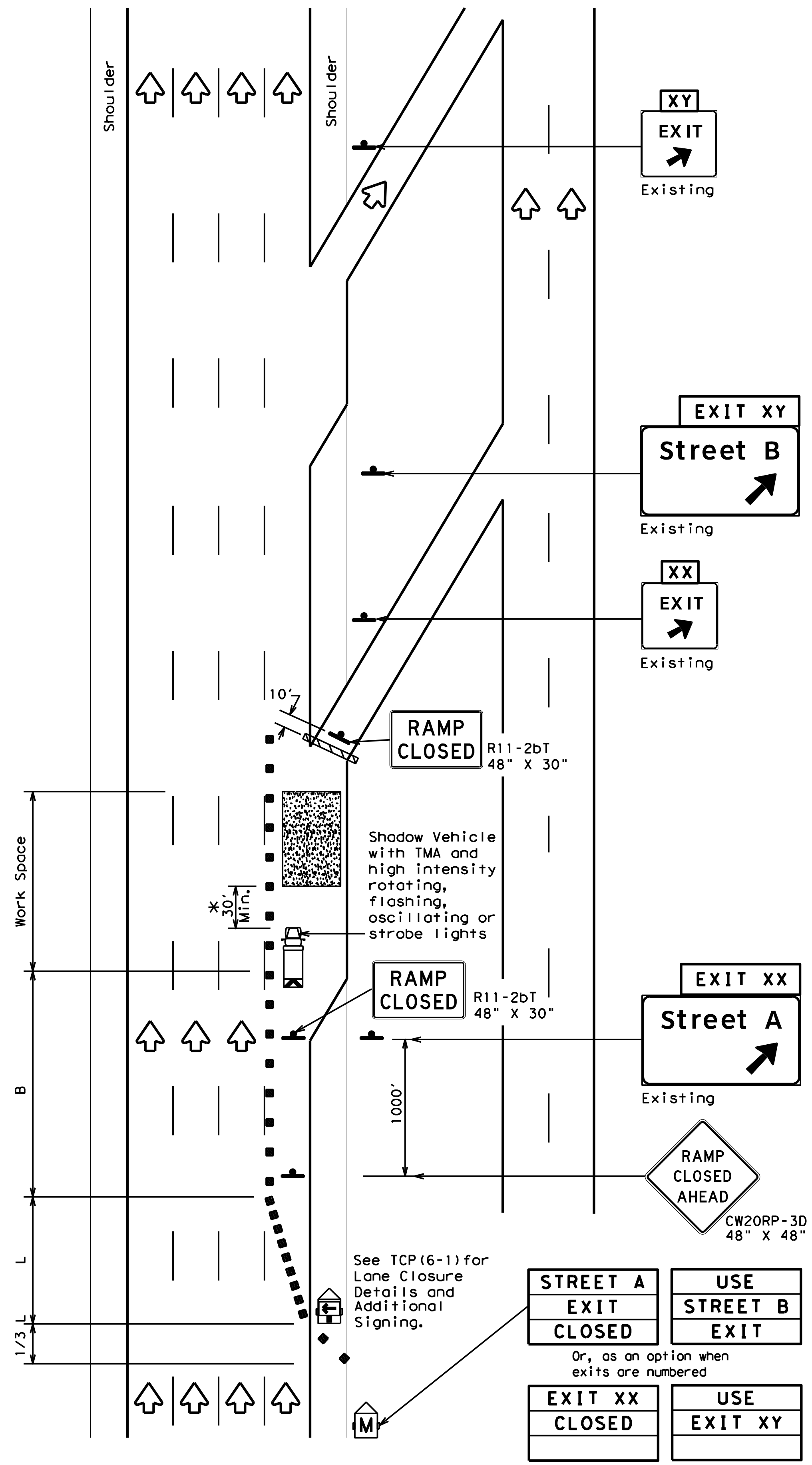
TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

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	091	IH 20
1-97 8-98	DIST		COUNTY	SHEET NO.
4-98 8-12	DALLAS		DALLAS	34

203

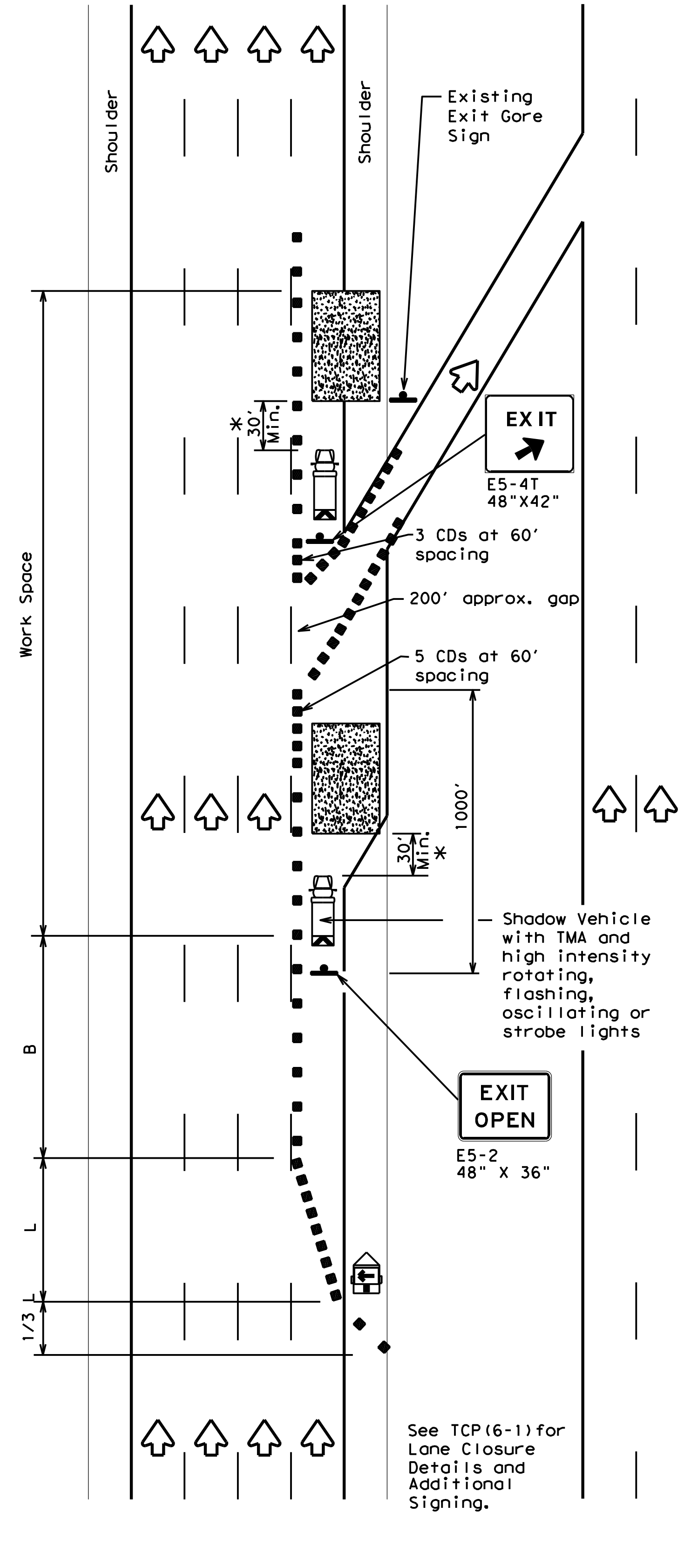
DATE: 12/10/2021 8:49:28 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\2374030911\Sheets\STND\TCP\tcp6-4.dgn



TCP (6-4a)

EXIT RAMP CLOSED

TRAFFIC EXITS PAST CLOSED RAMP



TCP (6-4b)

EXIT RAMP OPEN

LEGEND

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

Posted Speed	Formula	Minimum Desirable Taper Lengths "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. 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

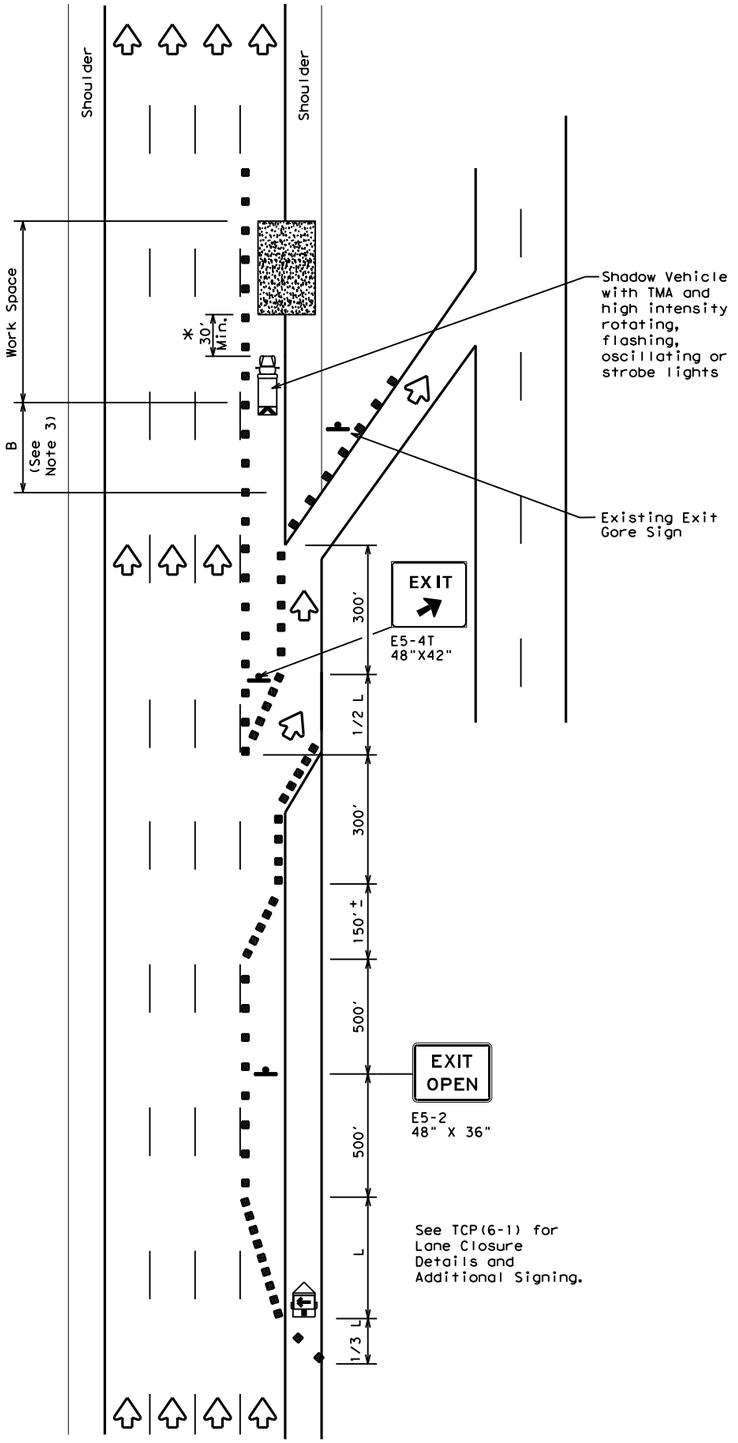
TRAFFIC CONTROL PLAN WORK AREA AT EXIT RAMP

TCP(6-4)-12

FILE: tcp6-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT Feburary 1994	CONT 2374	SECT 03	JOB 091	HIGHWAY IH 20
REVISIONS 1-97 8-98 4-98 8-12	DIST DALLAS		COUNTY DALLAS	SHEET NO. 35

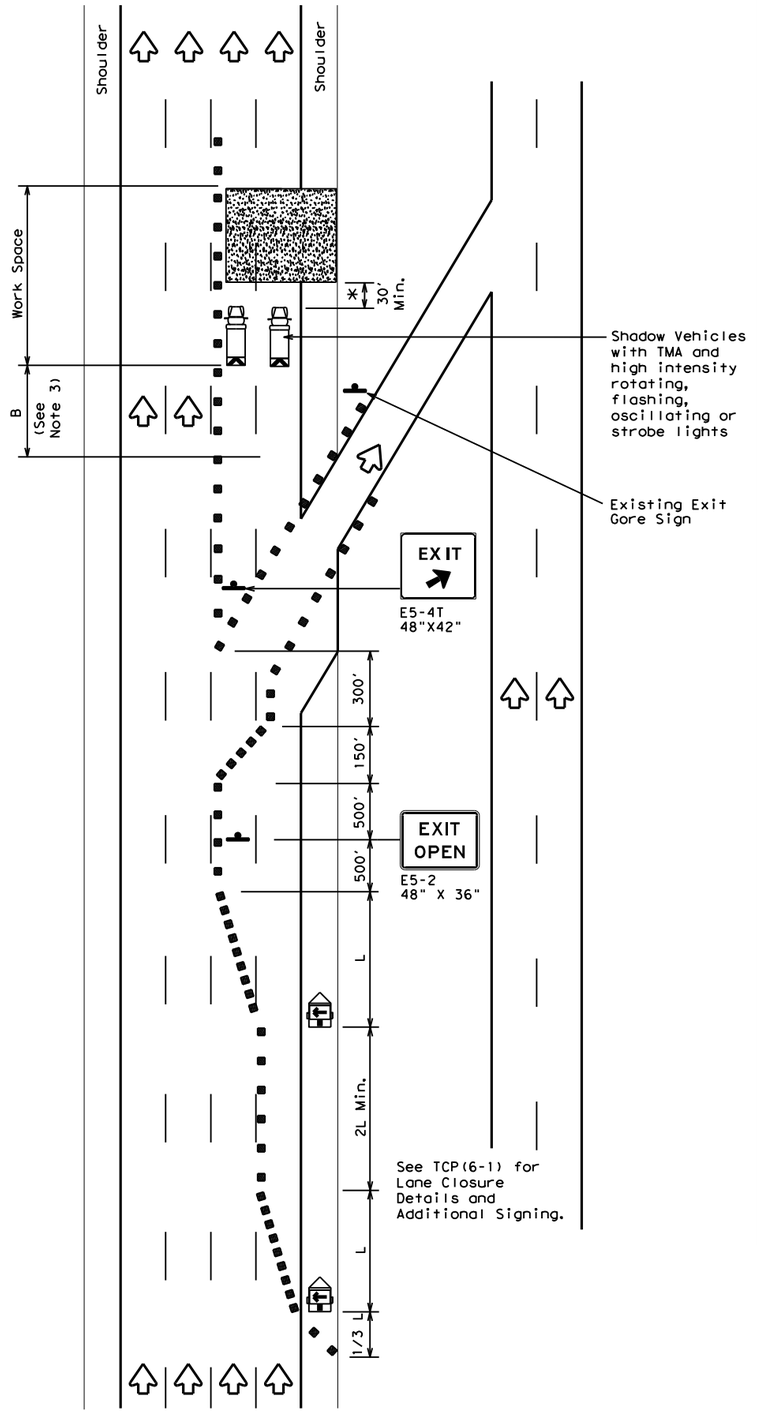
204

DATE: 12/10/2021 8:49:29 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\1H20\2374030\[illegible]\STANDARDS\tcp6-5.dgn



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

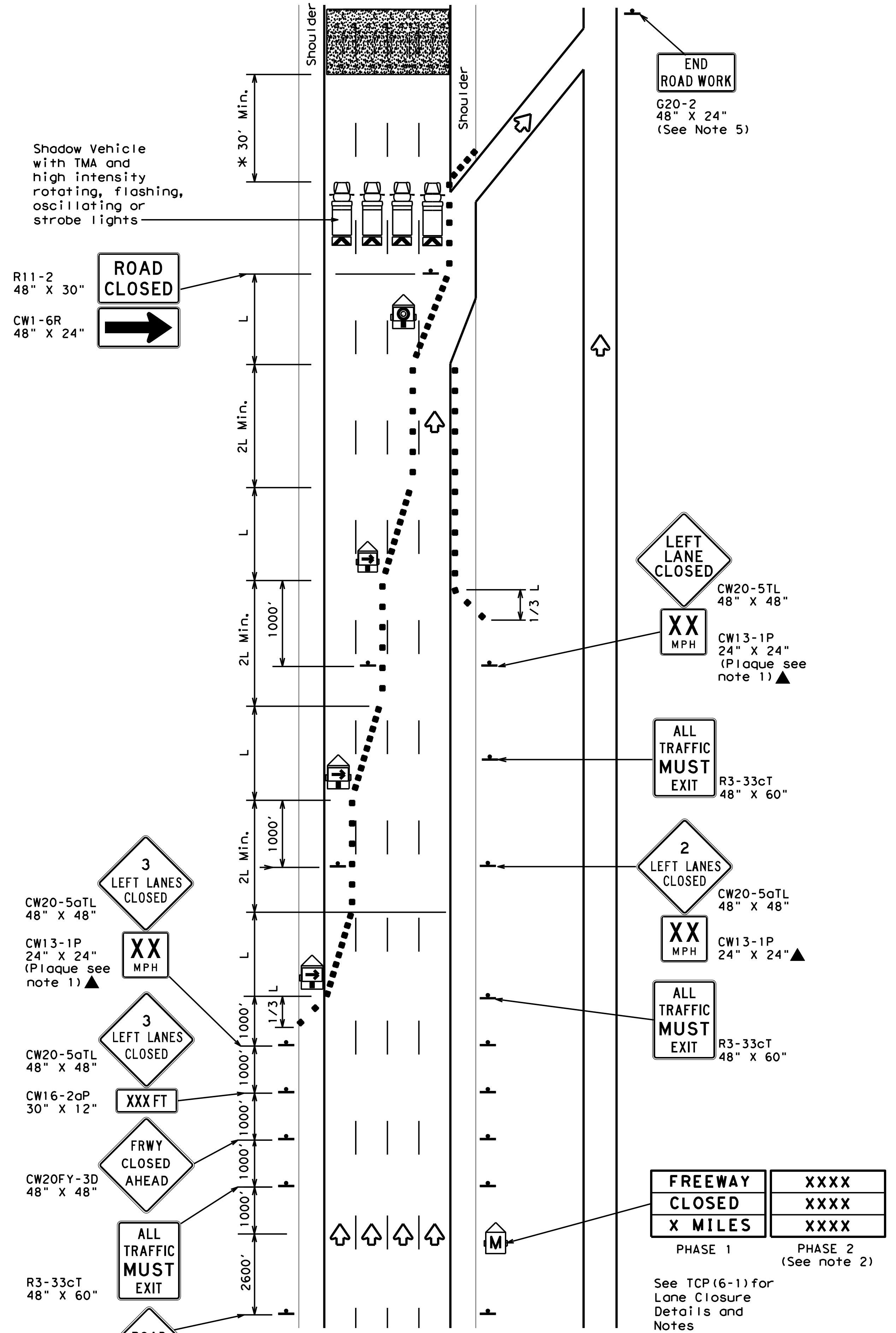
TRAFFIC CONTROL PLAN
WORK AREA BEYOND EXIT RAMP

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	091	IH 20
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	DALLAS	DALLAS		36

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

DATE: 12/10/2021 8:49:29 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\23740309\Sheets\STND\TCP(6-6)



TCP (6-6)

COMPLETE FREEWAY CLOSURE

LEGEND

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

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

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

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

GENERAL NOTES

1. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. Phase 2 of the PCMS message should include appropriate information formatted as shown on BC(6), such as "MERGE RIGHT," recommended speed, delay, exit information, or other specific warnings.
3. Where queuing is anticipated beyond signing shown, additional PCMS signs, other warning signs, devices or Law Enforcement Officers should be available to warn approaching high speed traffic of the end of the queue, as directed by the Engineer.
4. Entrance ramps located from the advance warning area to the exit ramp should be closed whenever possible.
5. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

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

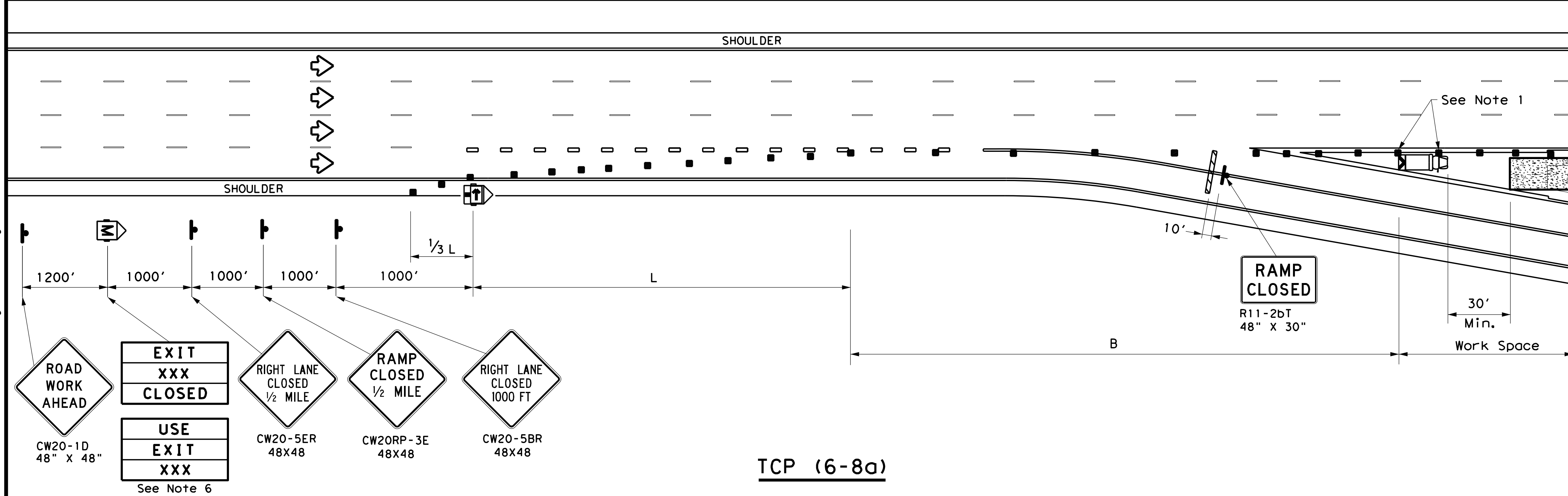
Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

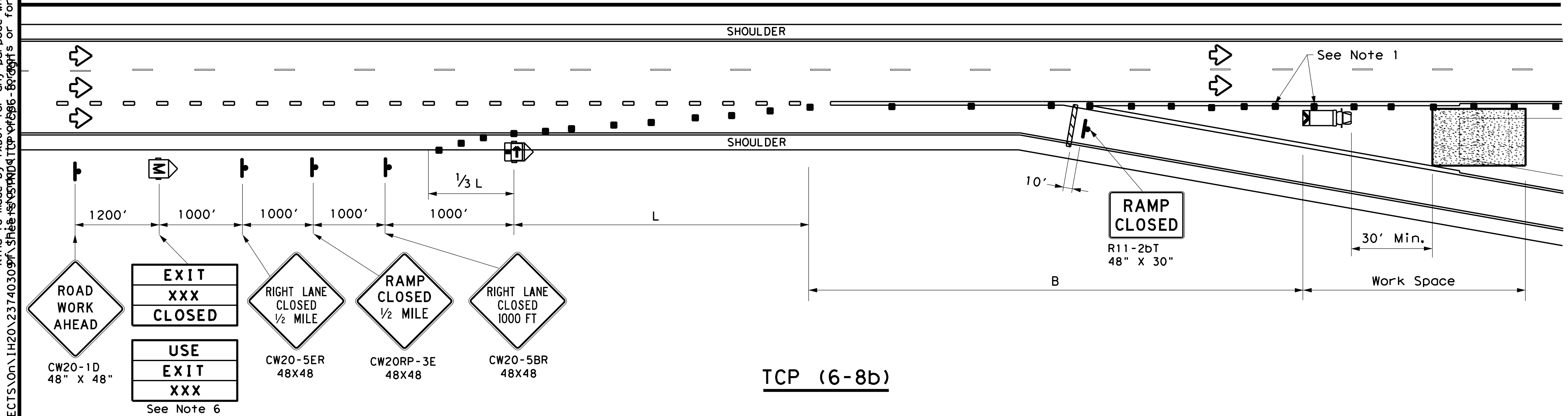
TRAFFIC CONTROL PLAN FREEWAY CLOSURE

TCP(6-6)-12

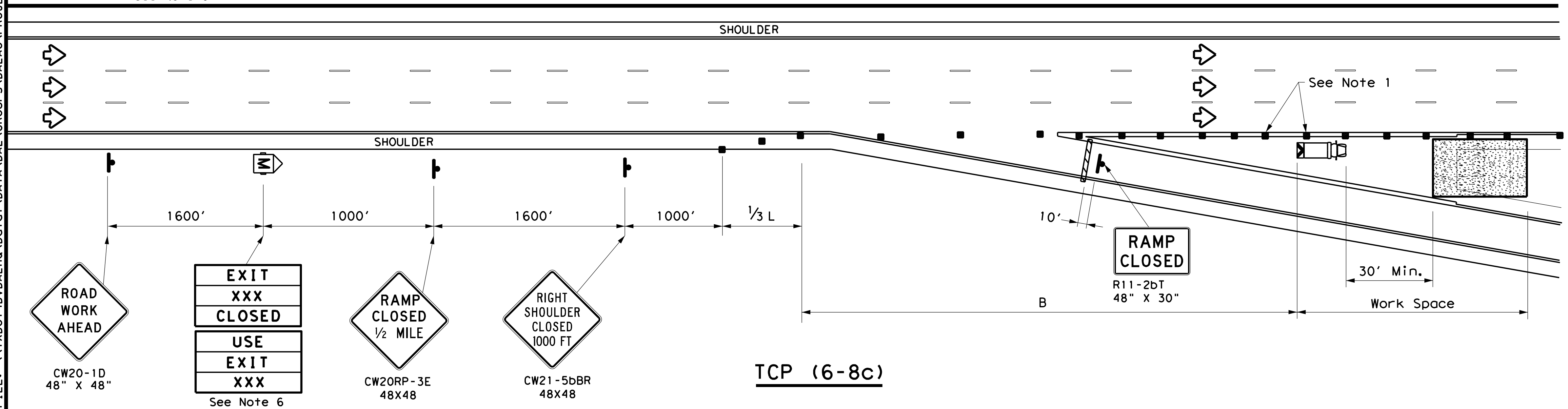
FILE: tcp6-6.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT			
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY			
REVISIONS	2374	03	091	IH 20			
1-97 8-98 4-98 8-12	DIST		COUNTY	SHEET NO.			
	DALLAS		DALLAS	37			



TCP (6-8a)



TCP (6-8b)



TCP (6-8c)

LEGEND

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

Posted Speed	Formula	Minimum Desirable Taper Lengths "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. 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	091	IH 20
	DIST		COUNTY	SHEET NO.
	DALLAS		DALLAS	38

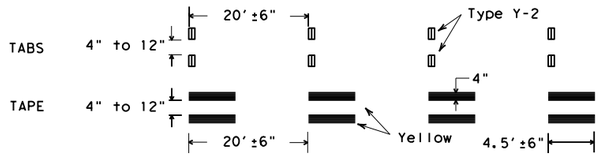
208

DATE: 12/10/2021 8:49:31 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\2374030\PK\sheet\wzstpm-13.dgn

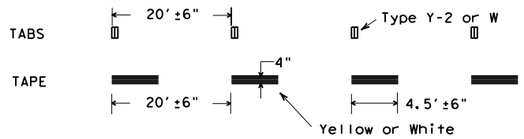
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

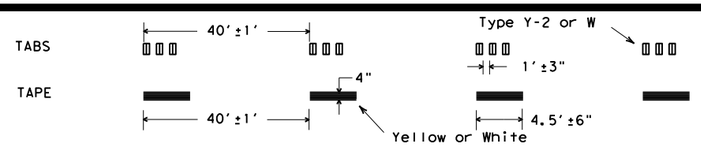


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



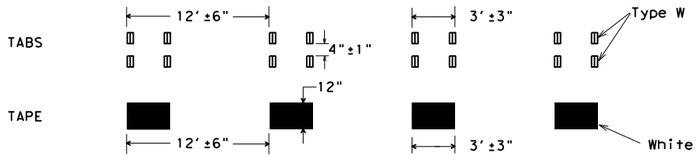
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

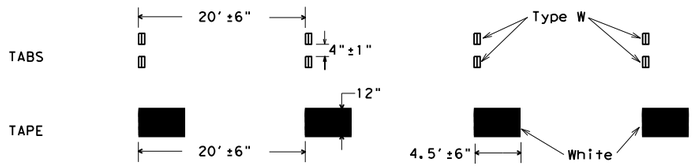


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



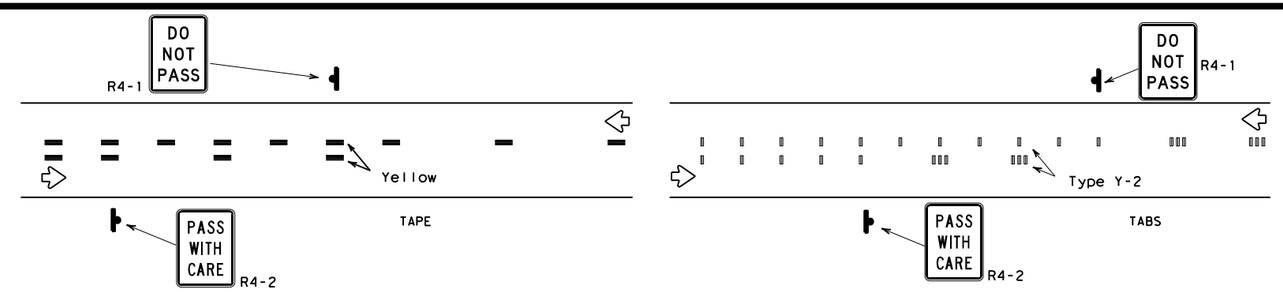
NOTES:

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

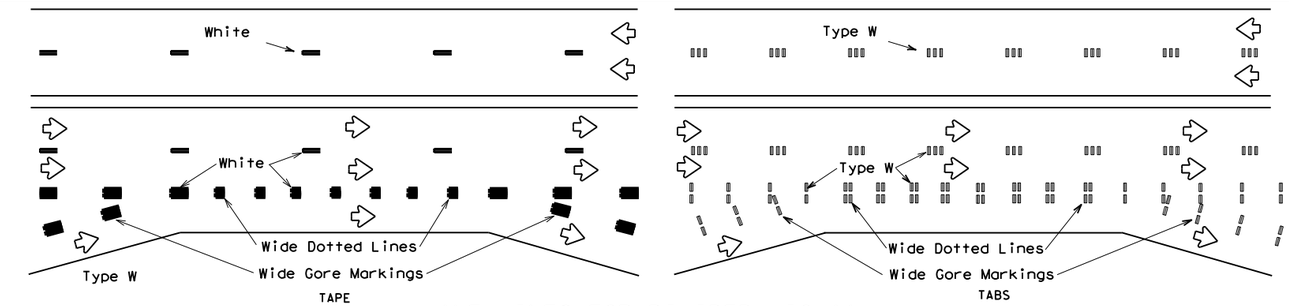
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

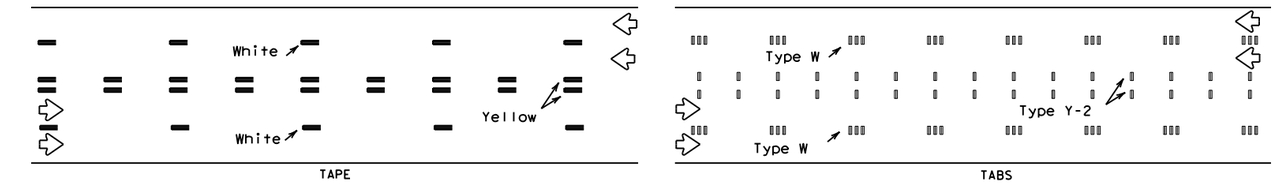
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



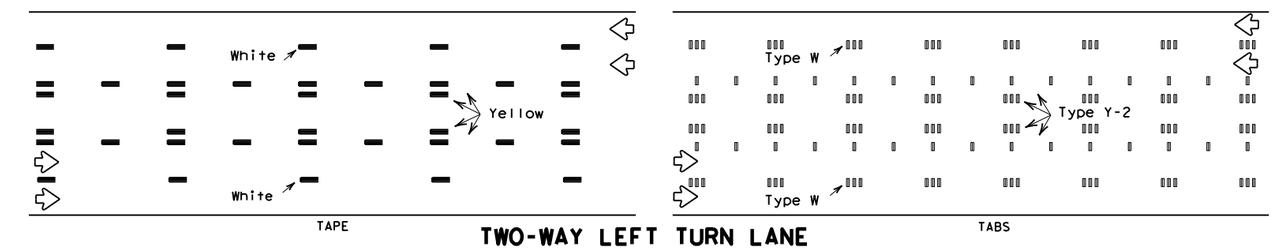
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



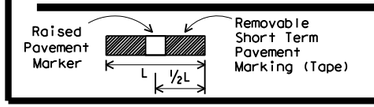
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

Texas Department of Transportation

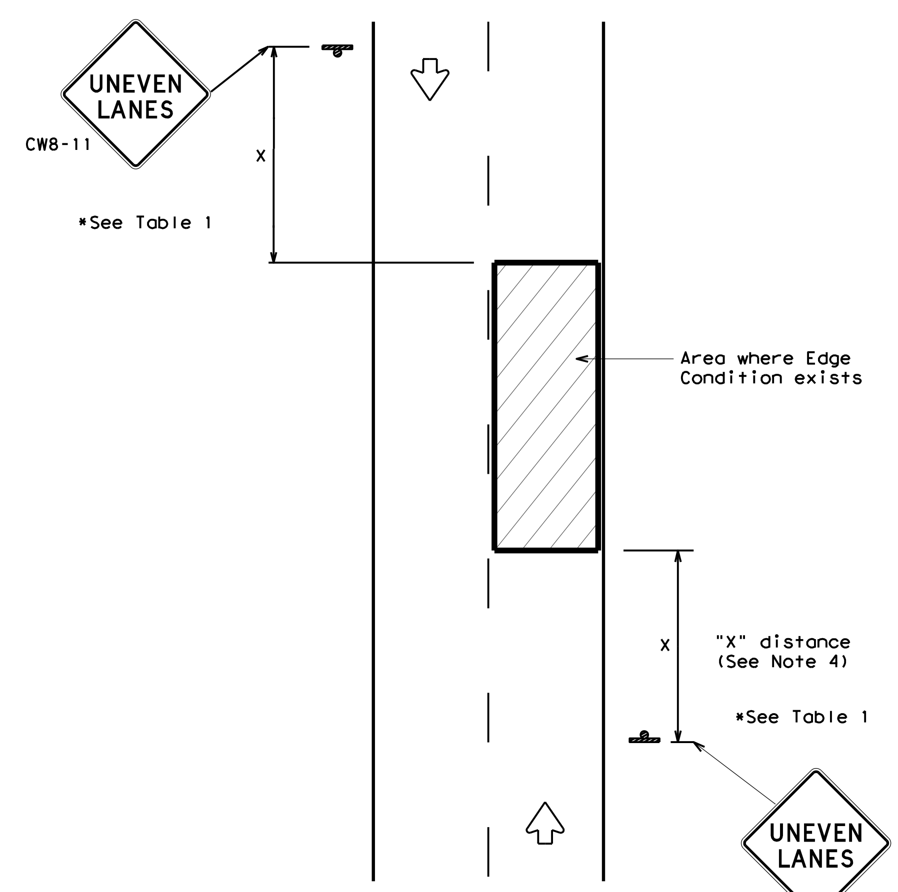
Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

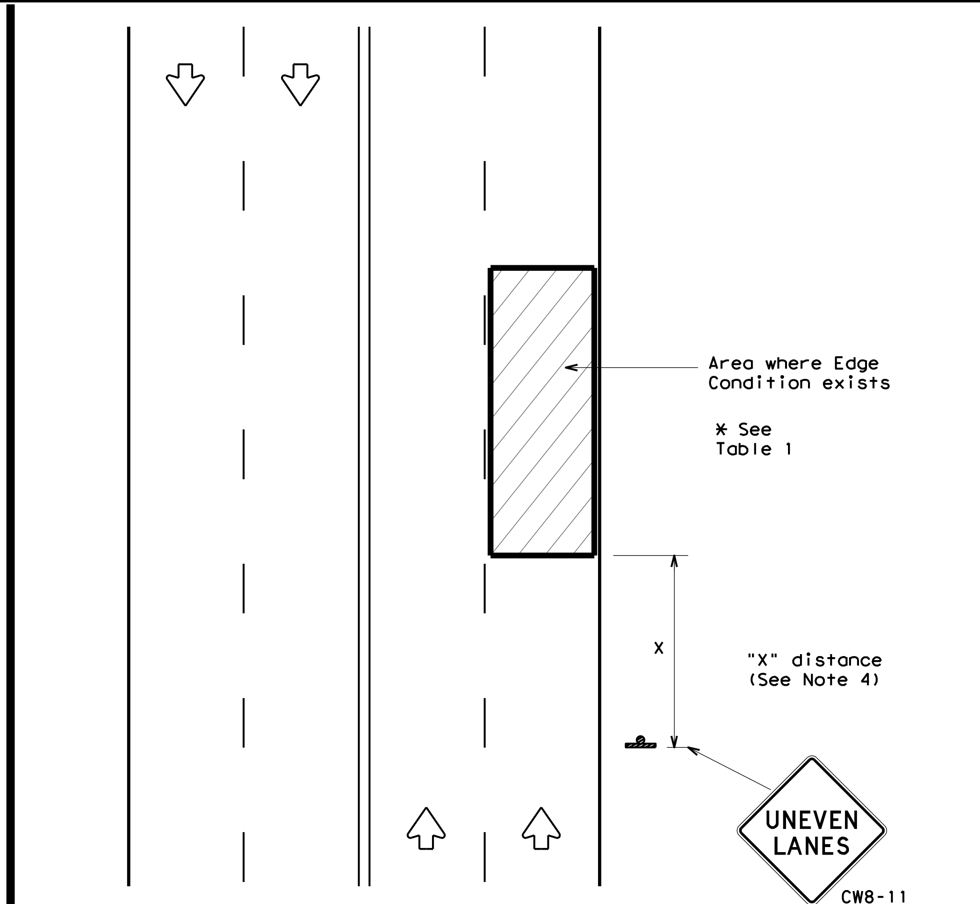
WZ(STPM)-13

FILE:	wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS		2374	03	091	IH 20
1-97		DIST	COUNTY		SHEET NO.
3-03		DALLAS	DALLAS		39
7-13					

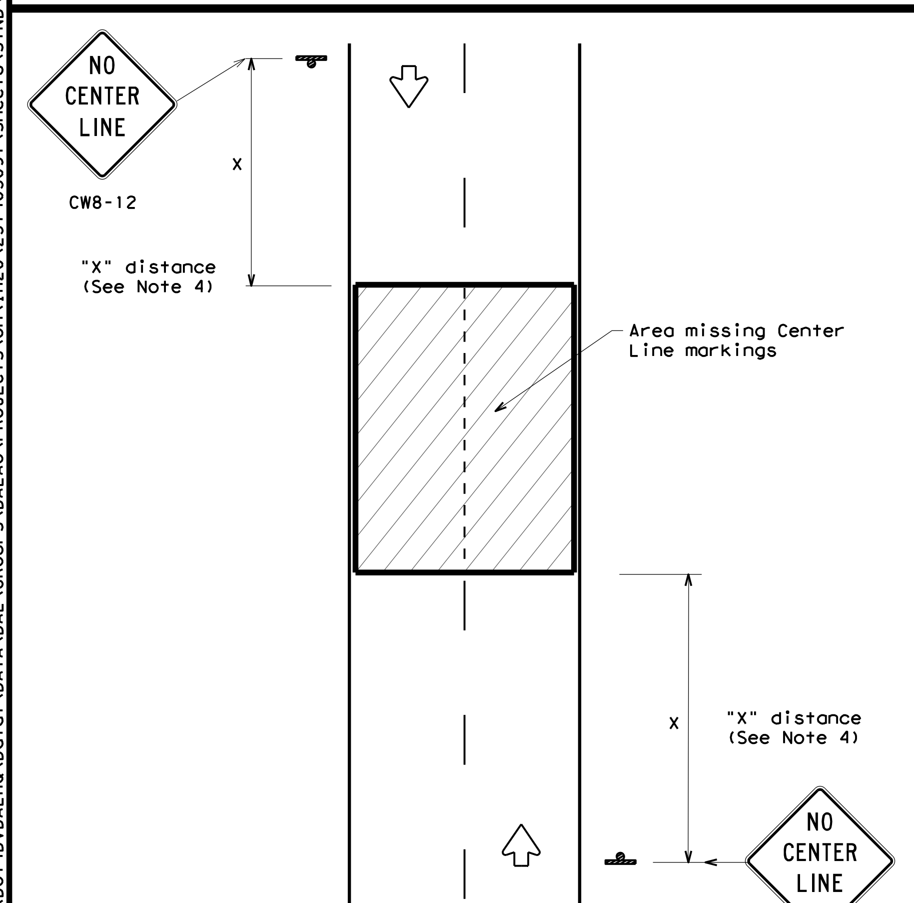
DATE: 12/10/2021 8:49:31 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\2374030917\Sheets\STND\TCP\wzul-13.dgn



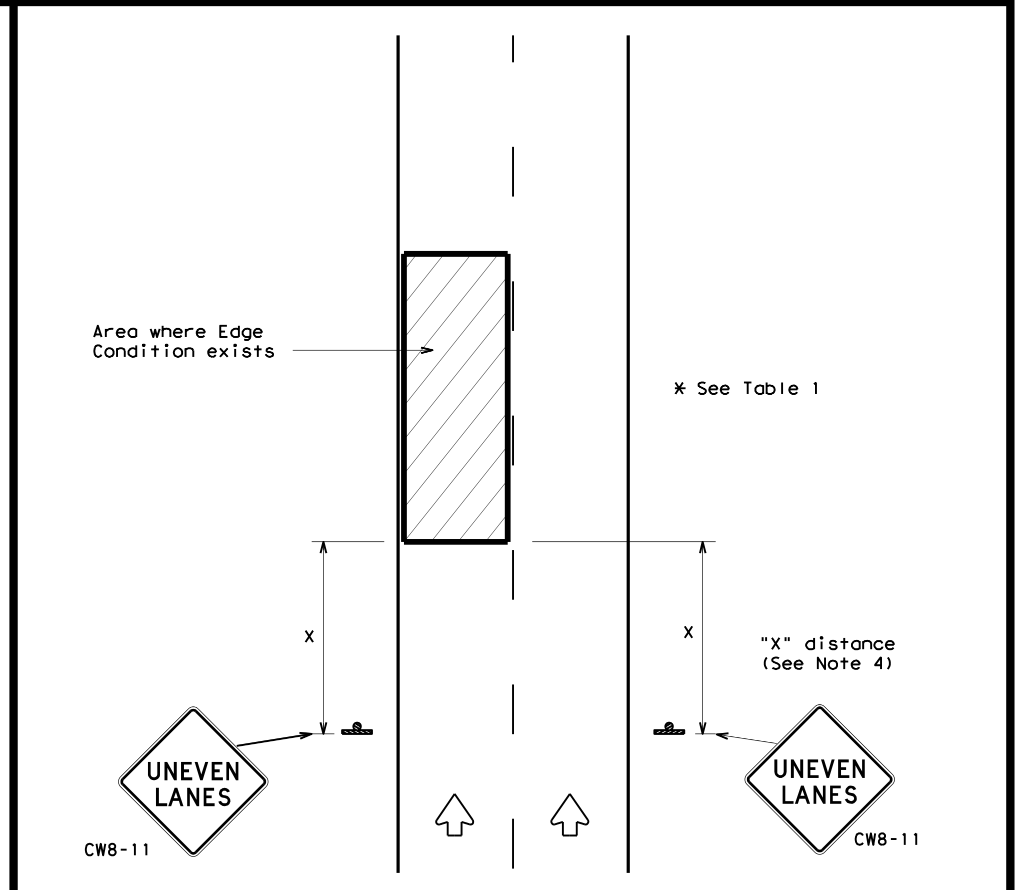
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



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 (D)	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 (>3, 1, D)	Less than or equal to 3"	Sign: CW8-11
③ (0" to 3/4", D, 12") 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

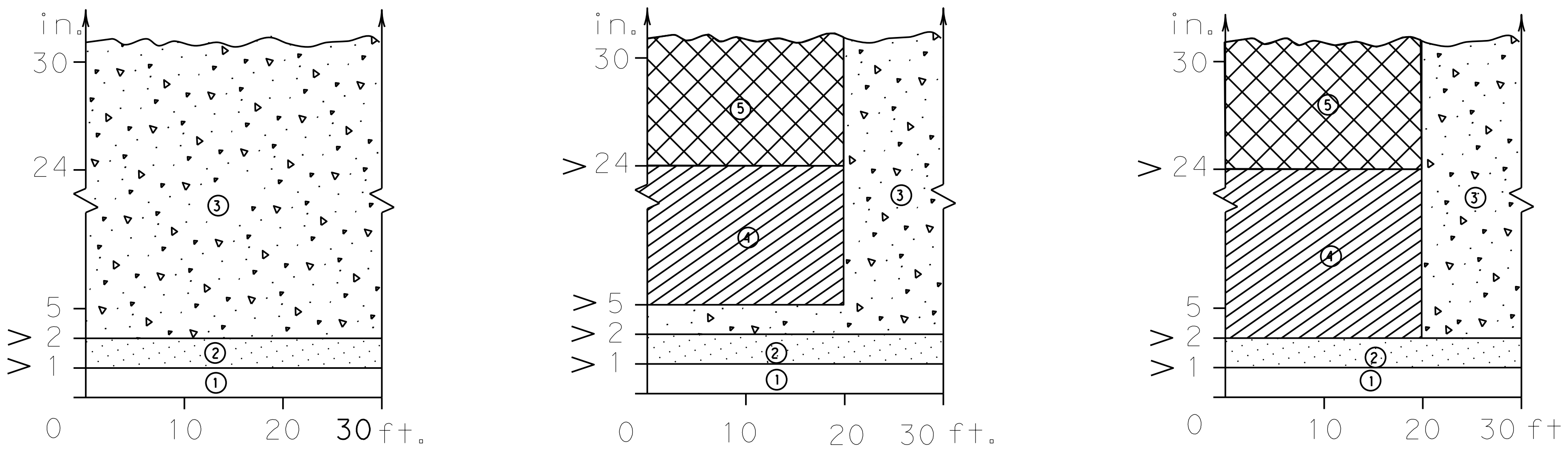
WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
8-95 2-98 7-13 1-97 3-03	DIST		COUNTY	SHEET NO.
	DALLAS		DALLAS	40

112

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)

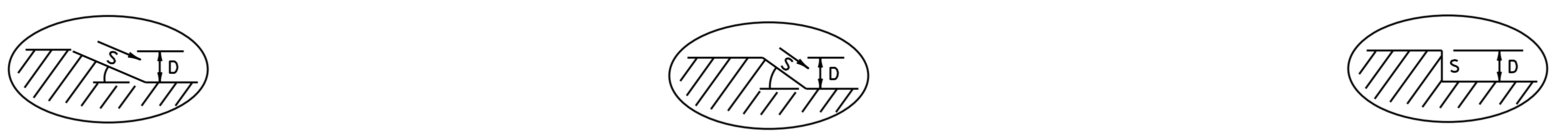
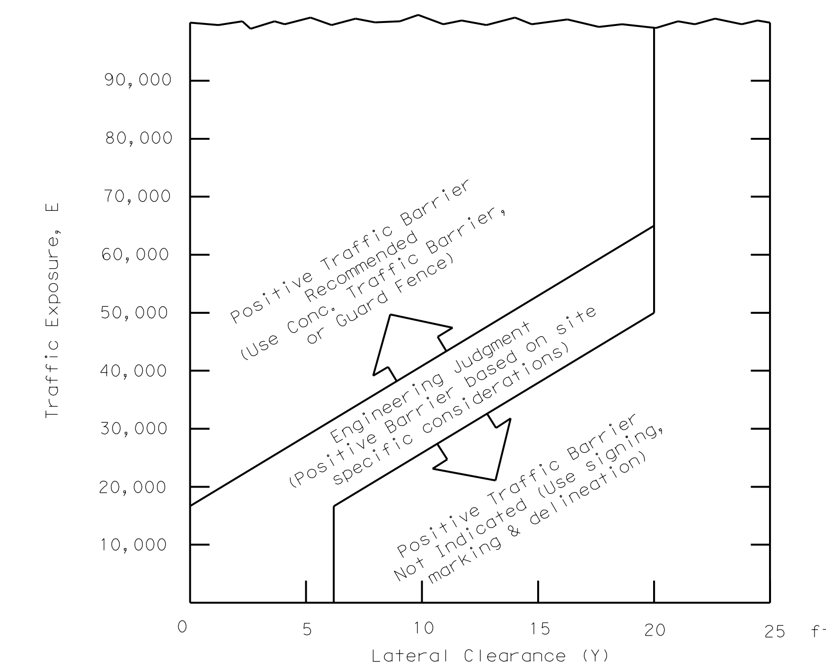
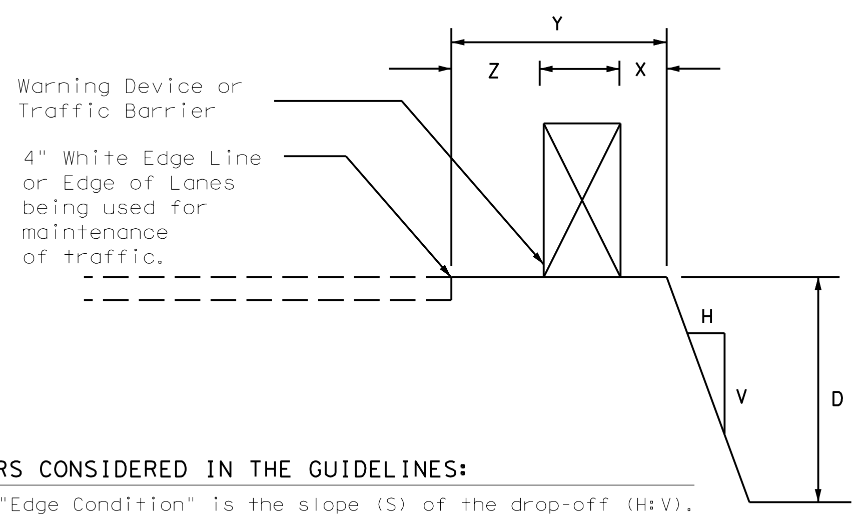


FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5



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.



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.

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.

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.

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.

Engineer's Seal
STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

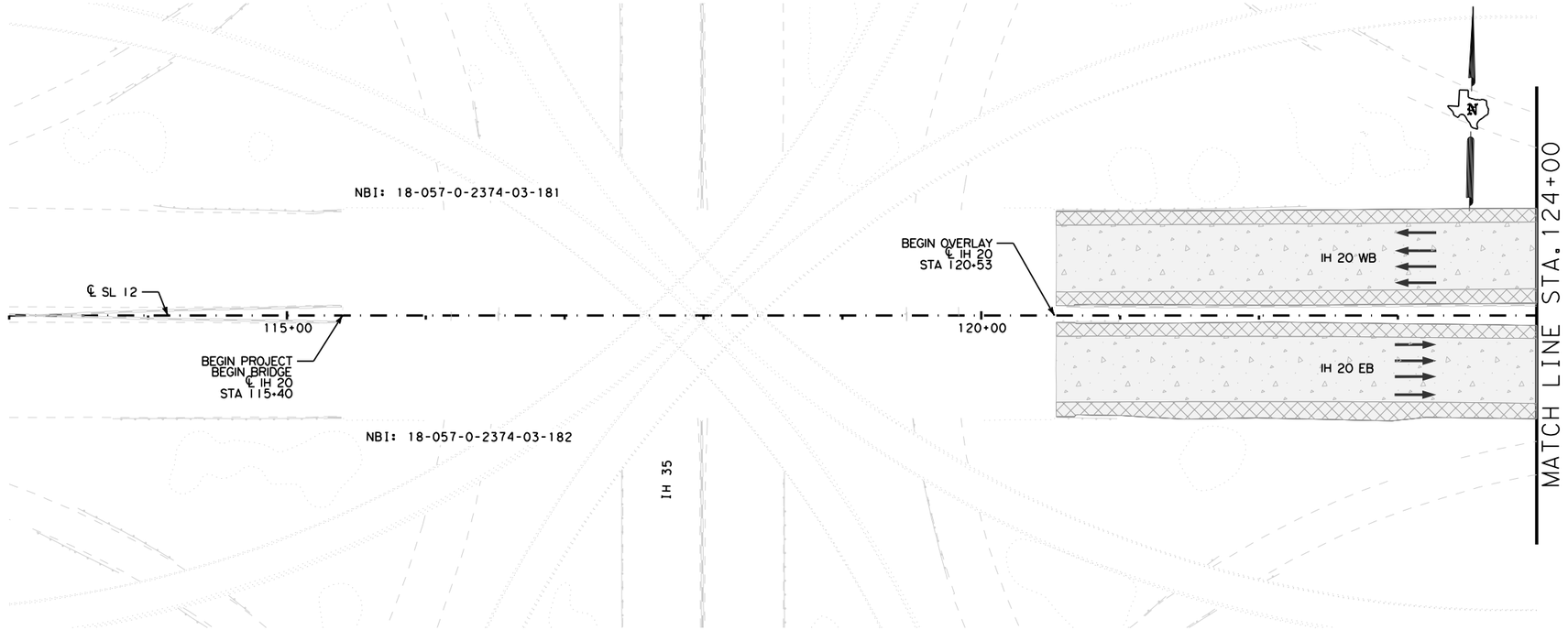
Date 12/21/2021

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn		DN:	CK:	DW:	CK:
© TxDOT August 2000	CONT	SECT	JOB		HIGHWAY
REVISIONS 03-01 08-01 9-21	2374	03	091		IH 20
	DIST		COUNTY		SHEET NO.
	DALLAS		DALLAS		41



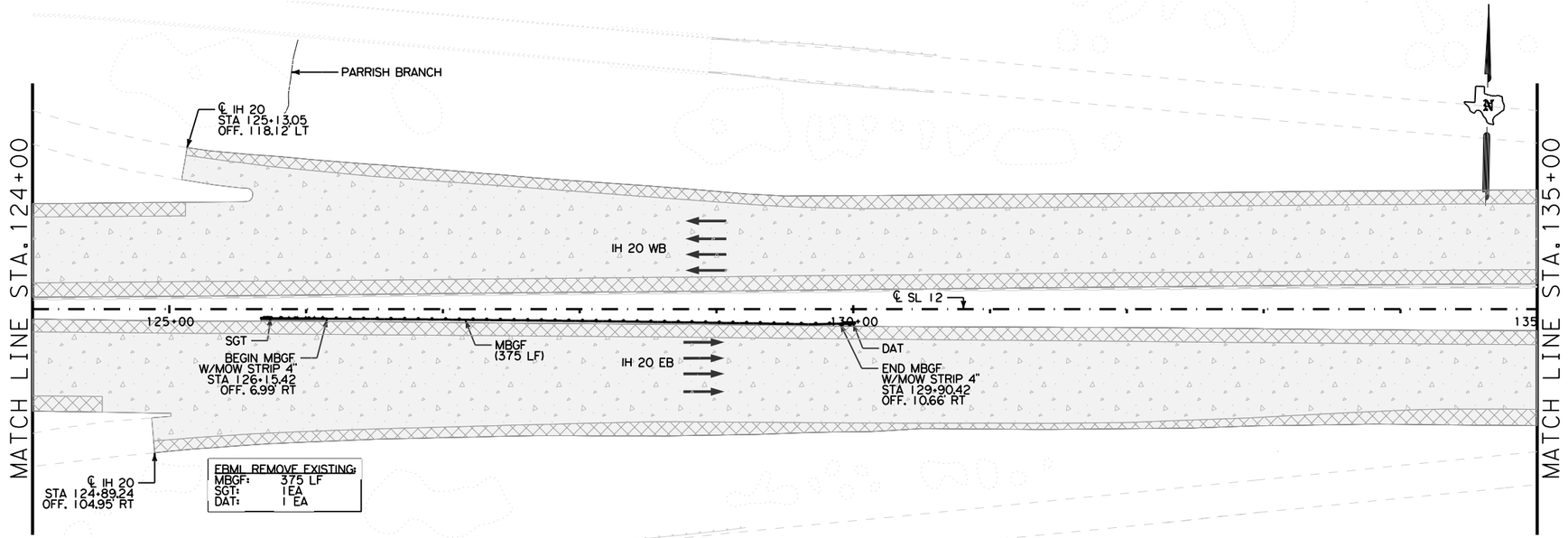
0 50 100

LEGEND

- MILL & OVERLAY AREA
- CONCRETE FDR AREA
- FLEX PAVEMENT REPAIR AREA
- DIRECTION OF TRAFFIC
- METAL BEAM GUARD FENCE (MBGF)
- EXISTING MBGF TO REMAIN IN PLACE
- SEDIMENT CONTROL FENCE
- DELINEATOR

NOTES:

1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. PROTECT CREEK AND DRAINAGE STREAM DURING WORK IN RELATED AREA.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO D&OM STANDARD SHEETS FOR MORE DETAIL.



STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

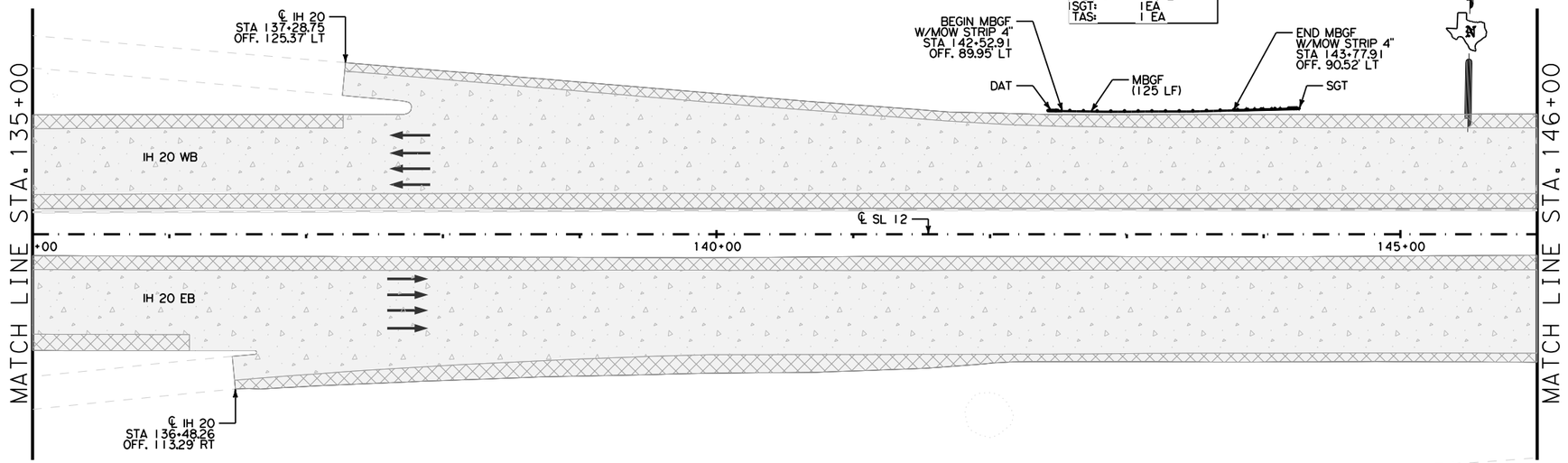
Signature of Registrant & Date — P.E. 12/20/2021

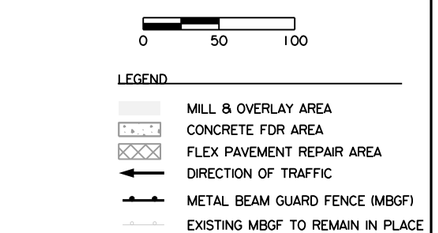
Texas Department of Transportation

IH 20
PLAN LAYOUT

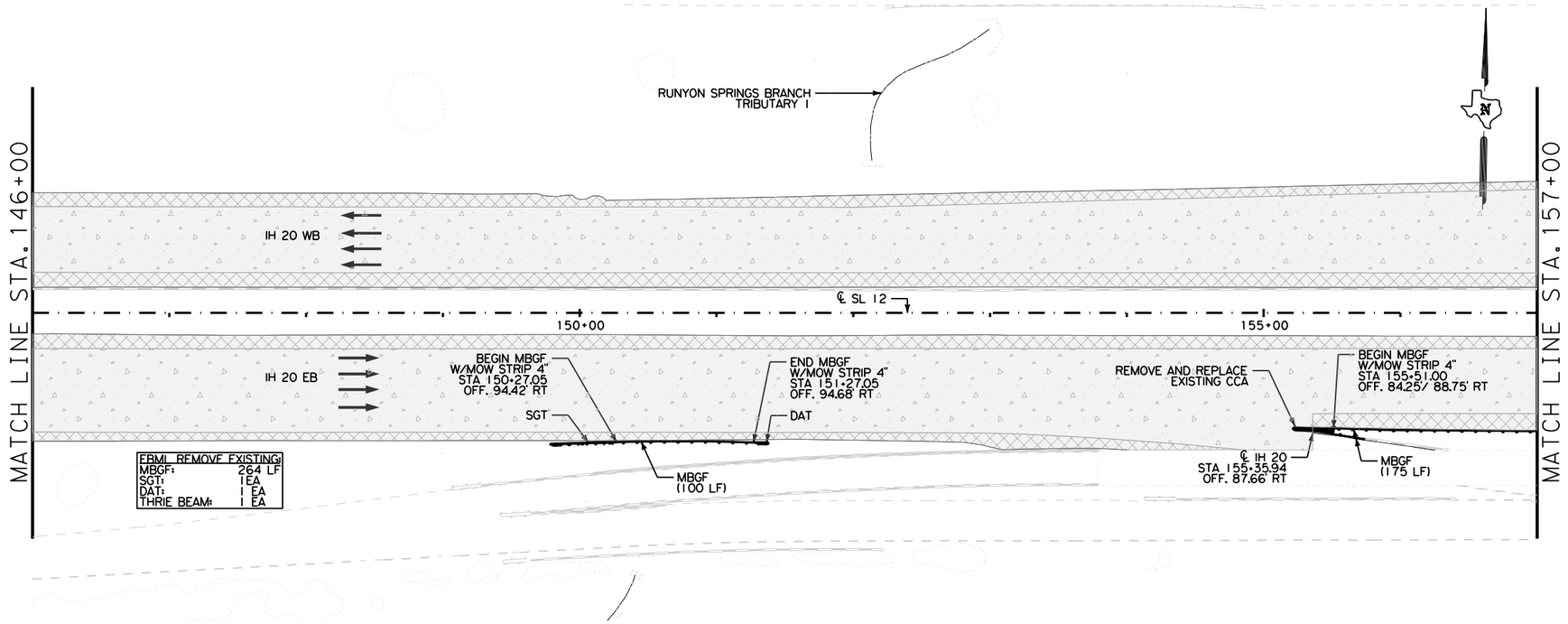
SCALE: 1"=100' SHEET 1 OF 15

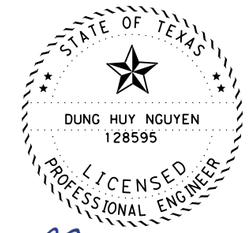
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	42
	2374	03	091	





NOTES:
1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. PROTECT CREEK AND DRAINAGE STREAM DURING WORK IN RELATED AREA.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO D&OM STANDARD SHEETS FOR MORE DETAIL.





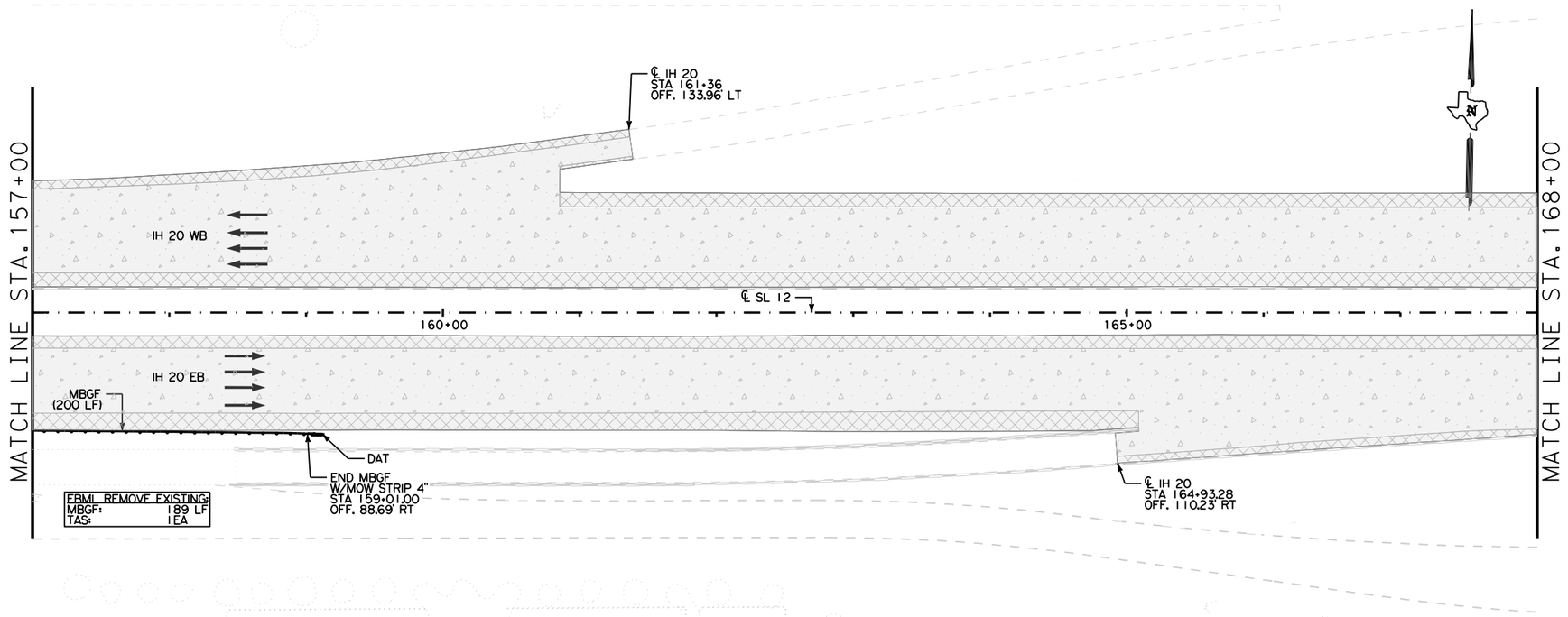
Dung Nguyen P.E. 12/10/2021
Signature of Registrant & Date

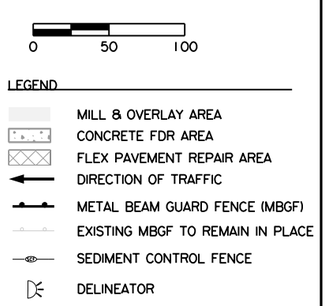
Texas Department of Transportation

IH 20
PLAN LAYOUT

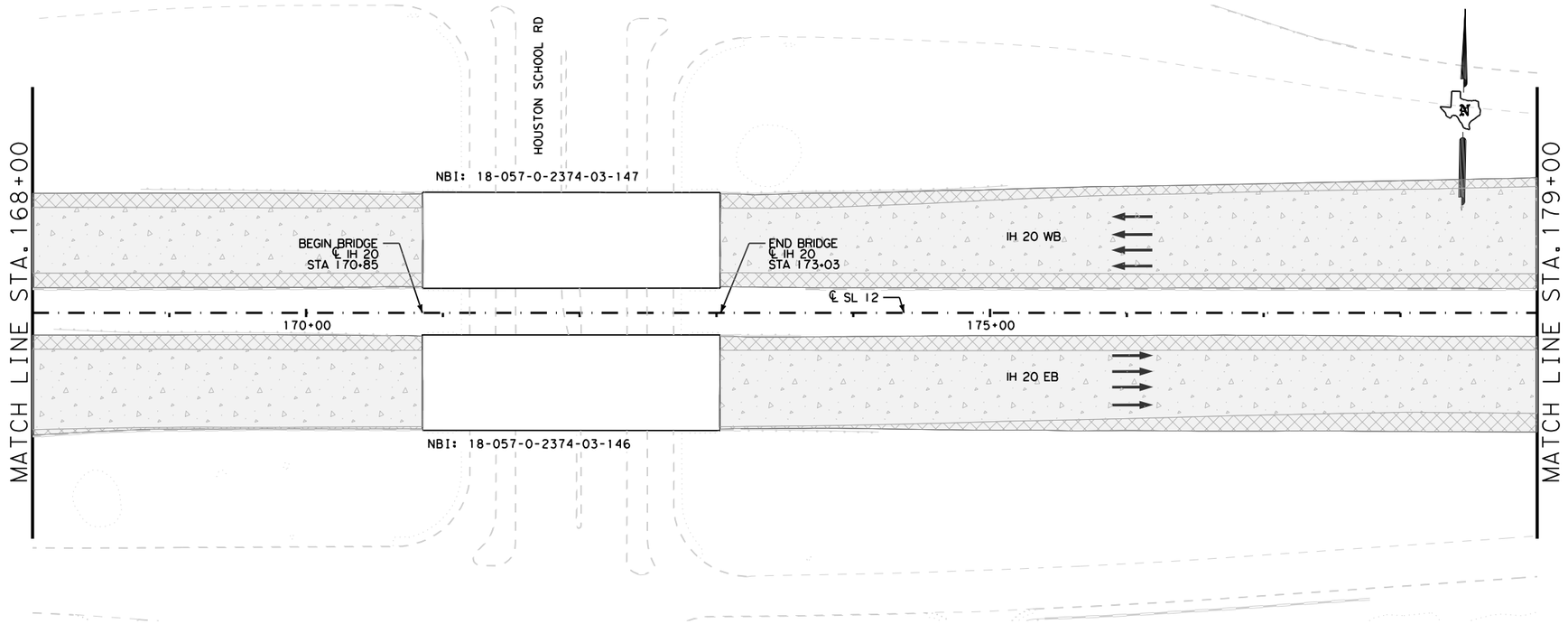
SCALE: 1"=100' SHEET 2 OF 15

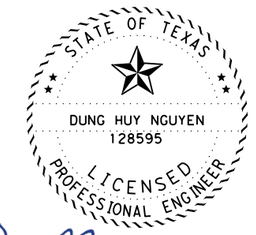
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	43
	2374	03	091	





NOTES:
1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. PROTECT CREEK AND DRAINAGE STREAM DURING WORK IN RELATED AREA.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO D&OM STANDARD SHEETS FOR MORE DETAIL.





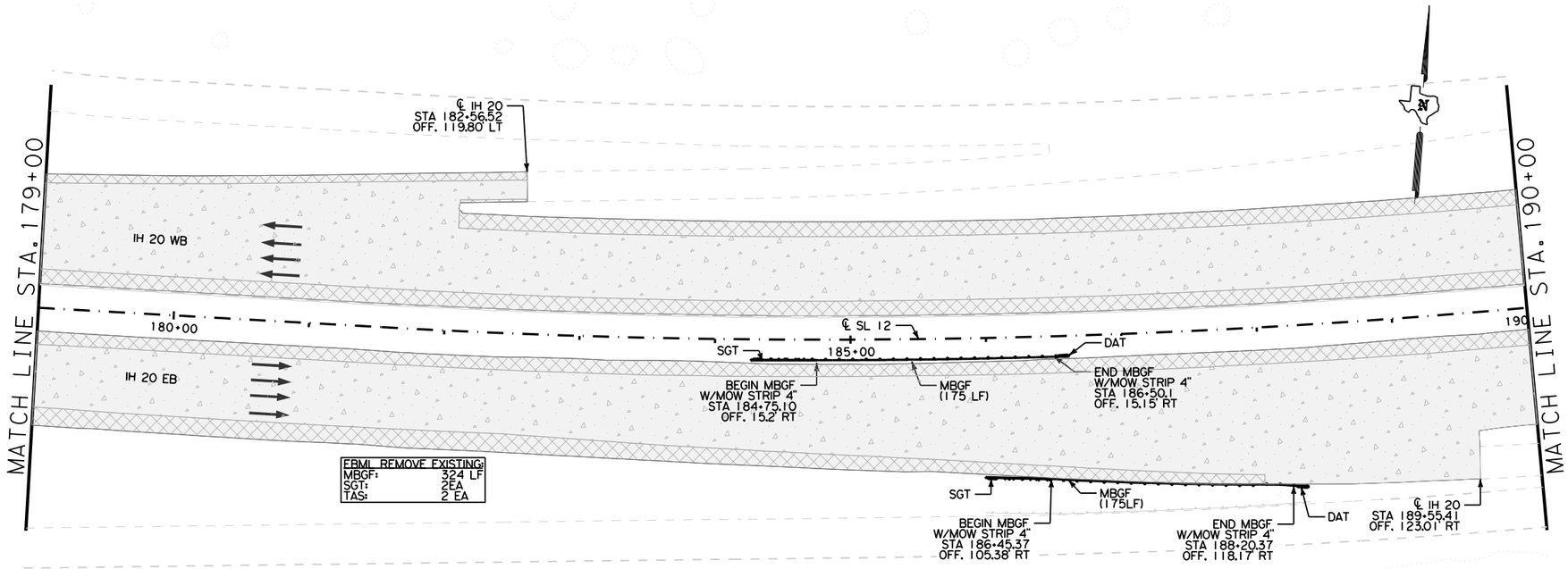
P.E. 12/10/2021
Signature of Registrant & Date

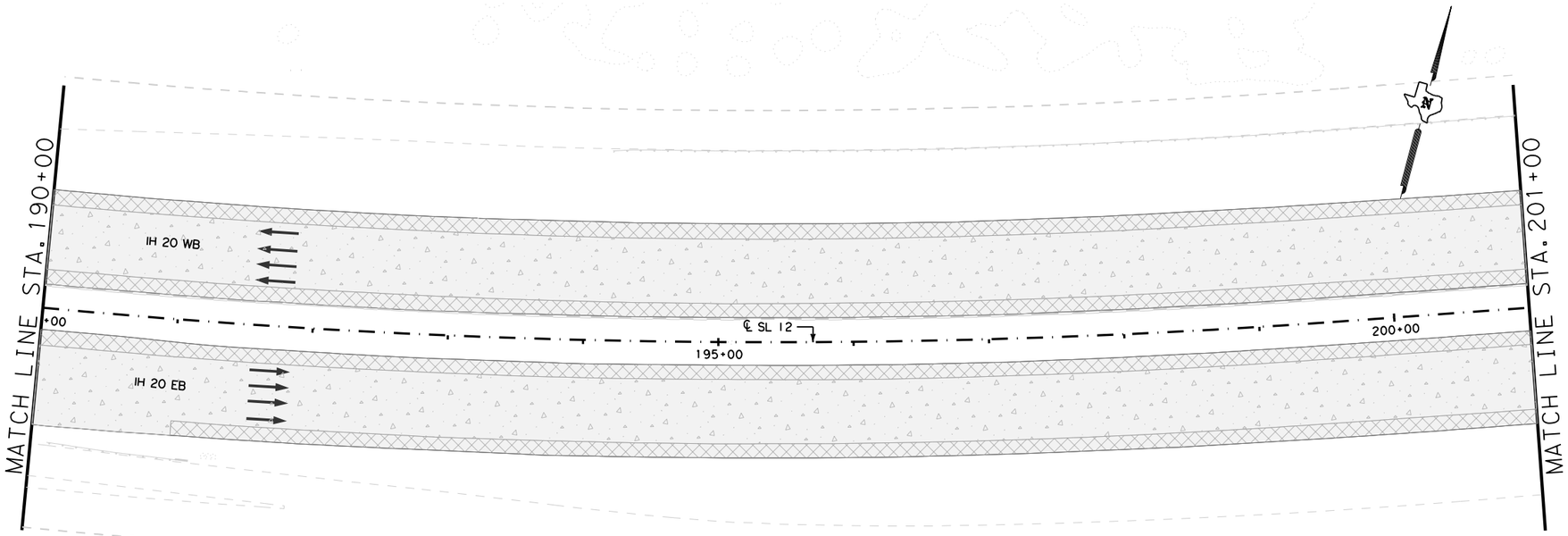
Texas Department of Transportation

IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 3 OF 15

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	44
	2374	03	091	





0 50 100

LEGEND

- MILL & OVERLAY AREA
- CONCRETE FDR AREA
- FLEX PAVEMENT REPAIR AREA
- DIRECTION OF TRAFFIC
- METAL BEAM GUARD FENCE (MBGF)
- EXISTING MBGF TO REMAIN IN PLACE
- SEDIMENT CONTROL FENCE
- DELINEATOR

NOTES:

1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. PROTECT CREEK AND DRAINAGE STREAM DURING WORK IN RELATED AREA.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO D&OM STANDARD SHEETS FOR MORE DETAIL.

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

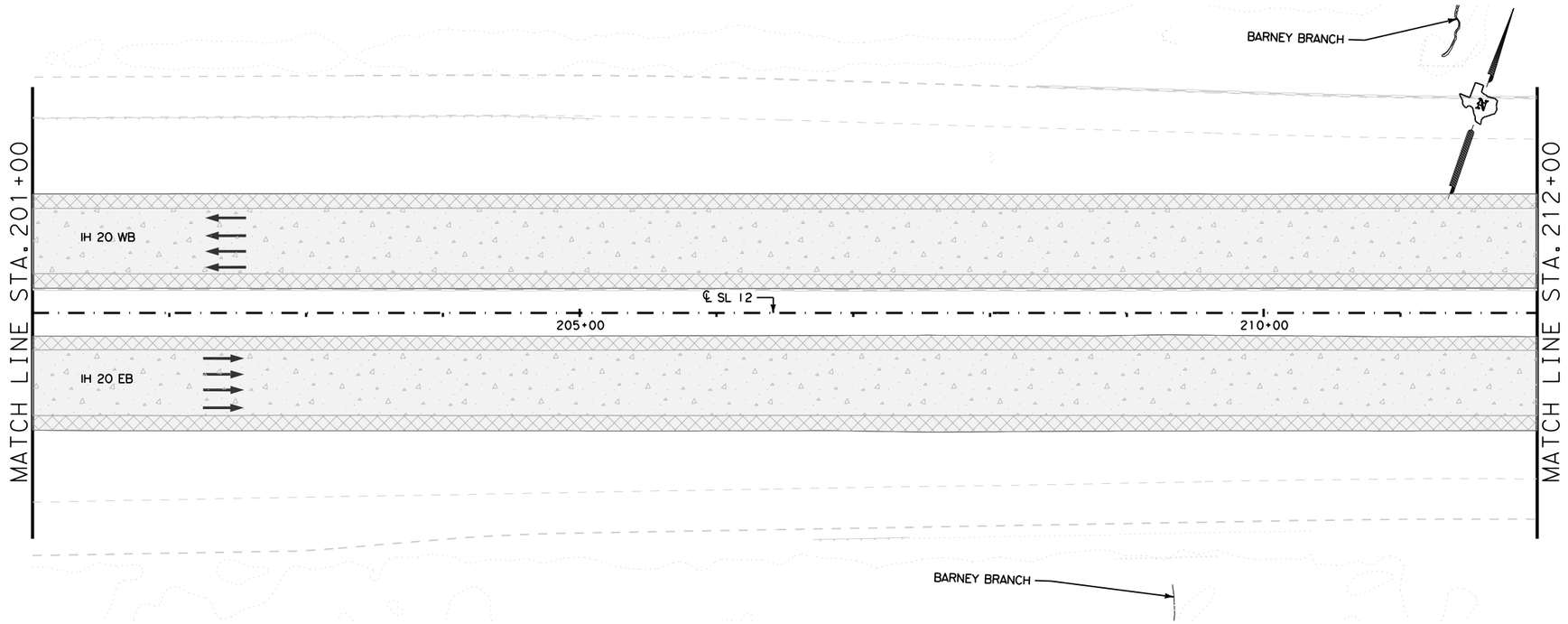
Dung Nguyen, P.E. 12/10/2021
Signature of Registrant & Date

Texas Department of Transportation

IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 4 OF 15

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	45
	2374	03	091	



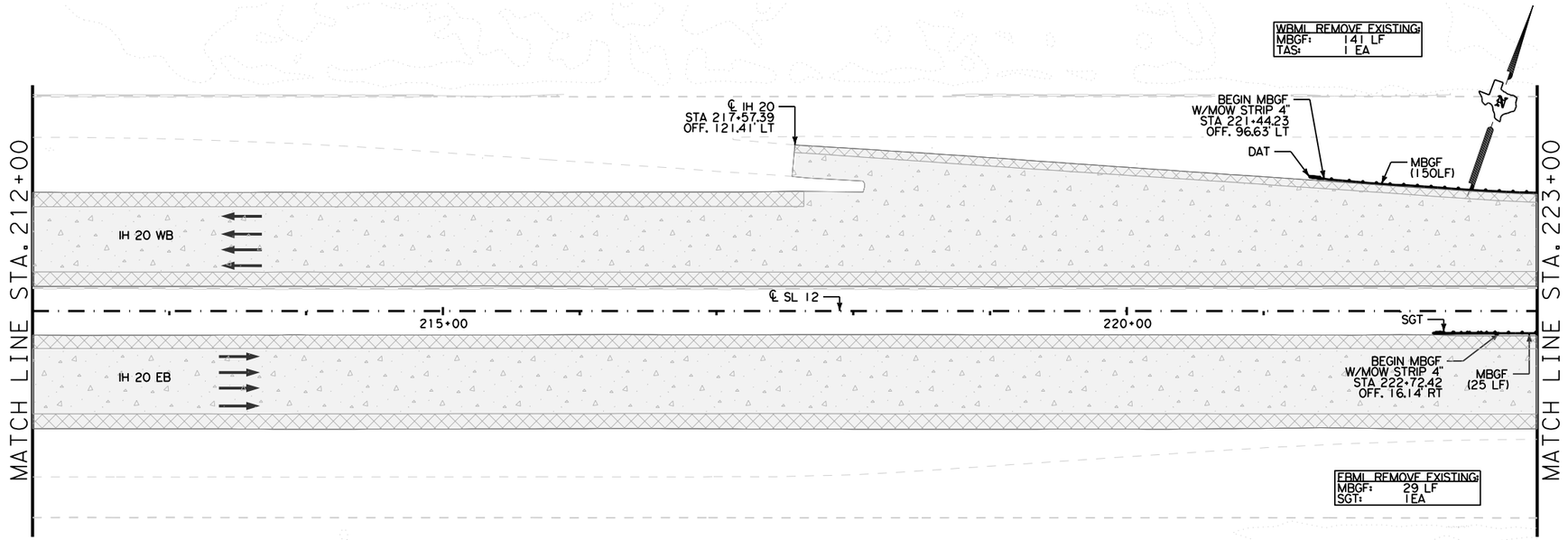
0 50 100

LEGEND

- MILL & OVERLAY AREA
- CONCRETE FDR AREA
- FLEX PAVEMENT REPAIR AREA
- DIRECTION OF TRAFFIC
- METAL BEAM GUARD FENCE (MBGF)
- EXISTING MBGF TO REMAIN IN PLACE
- SEDIMENT CONTROL FENCE
- DELINEATOR

NOTES:

1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. PROTECT CREEK AND DRAINAGE STREAM DURING WORK IN RELATED AREA.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO D&OM STANDARD SHEETS FOR MORE DETAIL.



STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

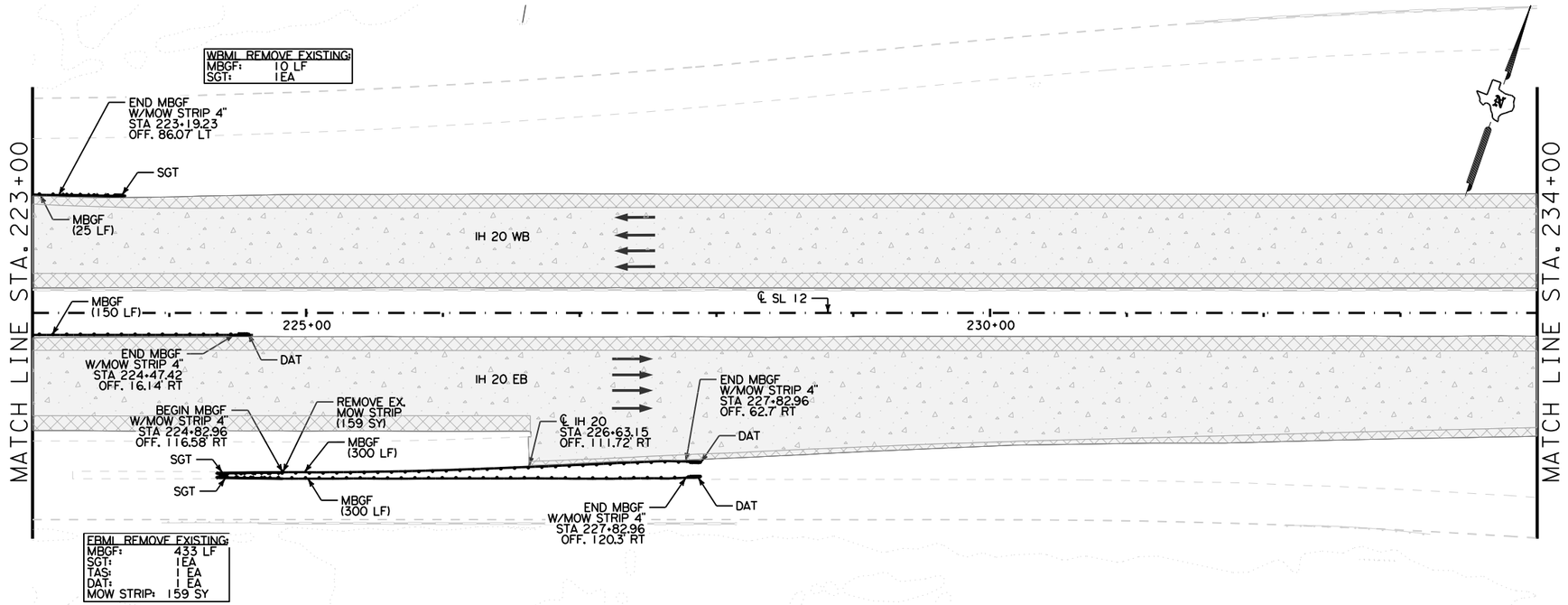
Dung Nguyen P.E. 12/10/2021
Signature of Registrant & Date

Texas Department of Transportation

IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 5 OF 15

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	46
	2374	03	091	



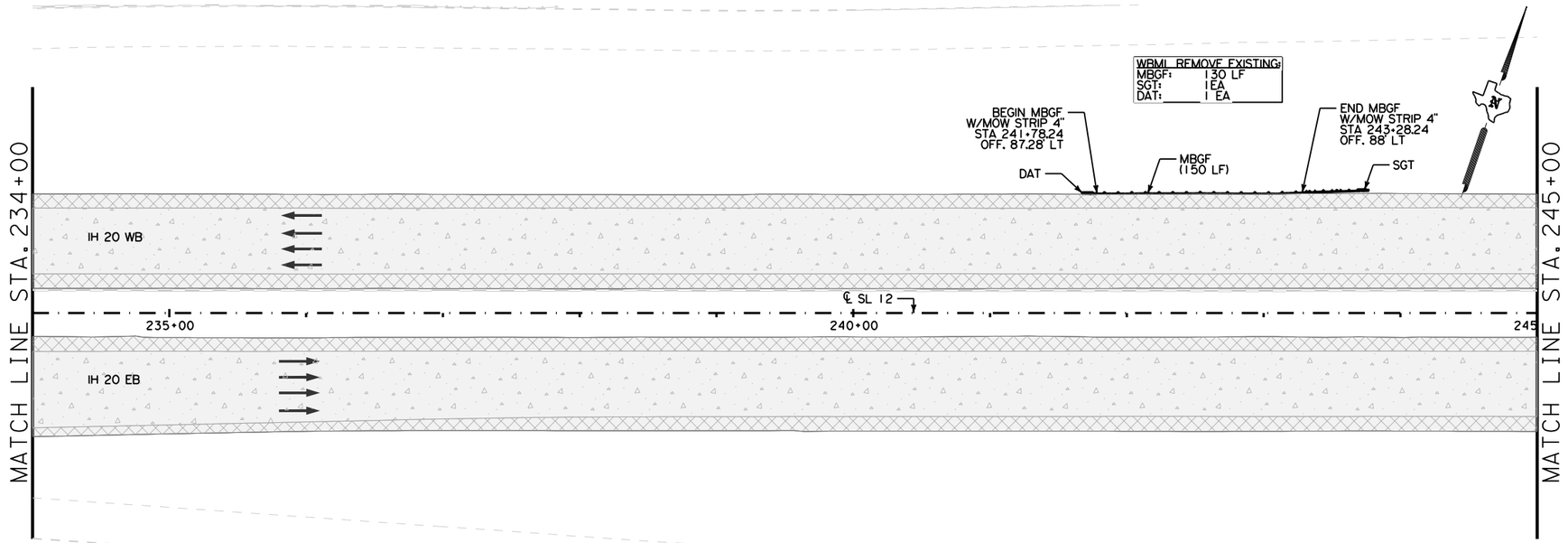
0 50 100

LEGEND

- MILL & OVERLAY AREA
- CONCRETE FDR AREA
- FLEX PAVEMENT REPAIR AREA
- DIRECTION OF TRAFFIC
- METAL BEAM GUARD FENCE (MBGF)
- EXISTING MBGF TO REMAIN IN PLACE
- SEDIMENT CONTROL FENCE
- DELINEATOR

NOTES:

1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. PROTECT CREEK AND DRAINAGE STREAM DURING WORK IN RELATED AREA.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO D&OM STANDARD SHEETS FOR MORE DETAIL.



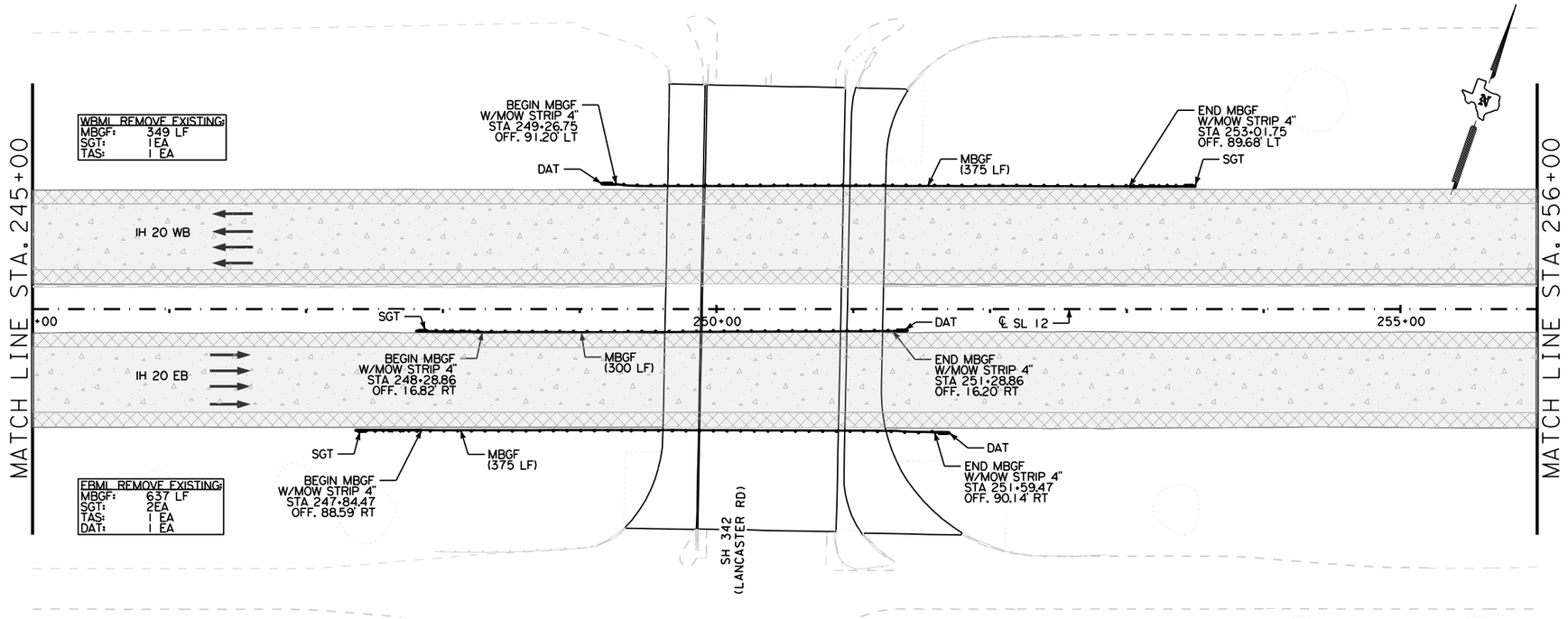
STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

Dung Nguyen P.E. 12/10/2021
Signature of Registrant & Date

IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 6 OF 15

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	47
	2374	03	091	



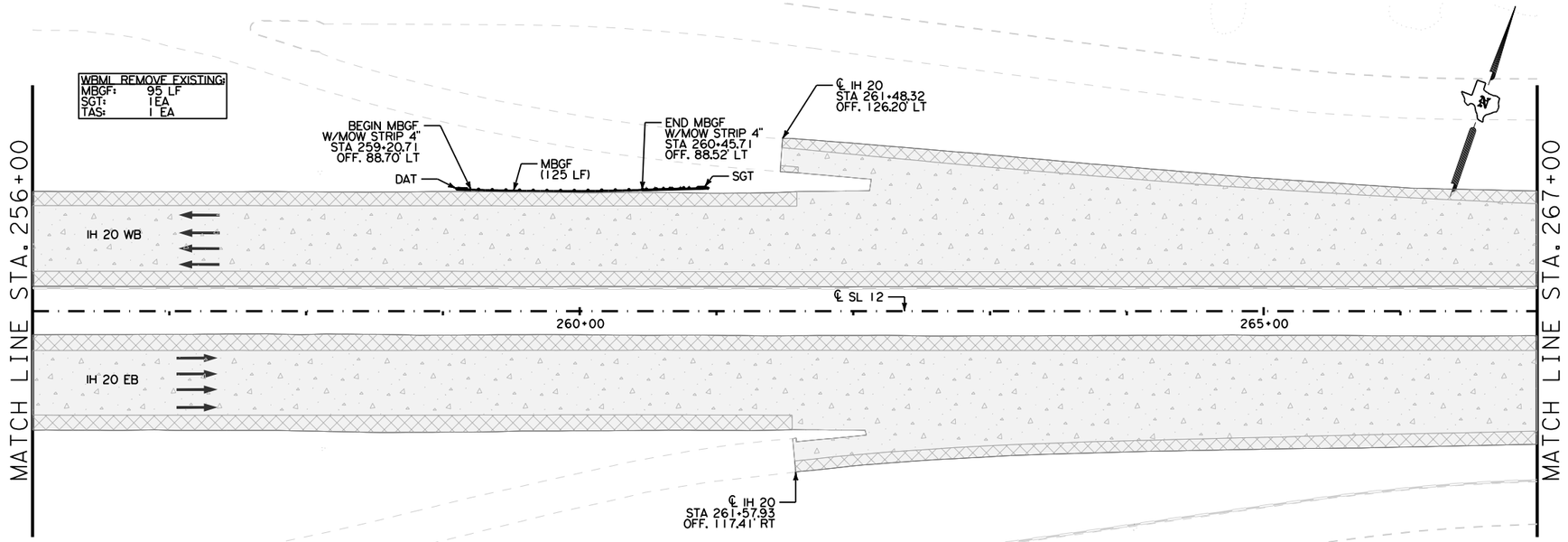
0 50 100

LEGEND

- MILL & OVERLAY AREA
- CONCRETE FDR AREA
- FLEX PAVEMENT REPAIR AREA
- DIRECTION OF TRAFFIC
- METAL BEAM GUARD FENCE (MBGF)
- EXISTING MBGF TO REMAIN IN PLACE
- SEDIMENT CONTROL FENCE
- DELINEATOR

NOTES:

1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. PROTECT CREEK AND DRAINAGE STREAM DURING WORK IN RELATED AREA.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO D&OM STANDARD SHEETS FOR MORE DETAIL.



STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

Dung Nguyen, P.E. 12/10/2021
Signature of Registrant & Date

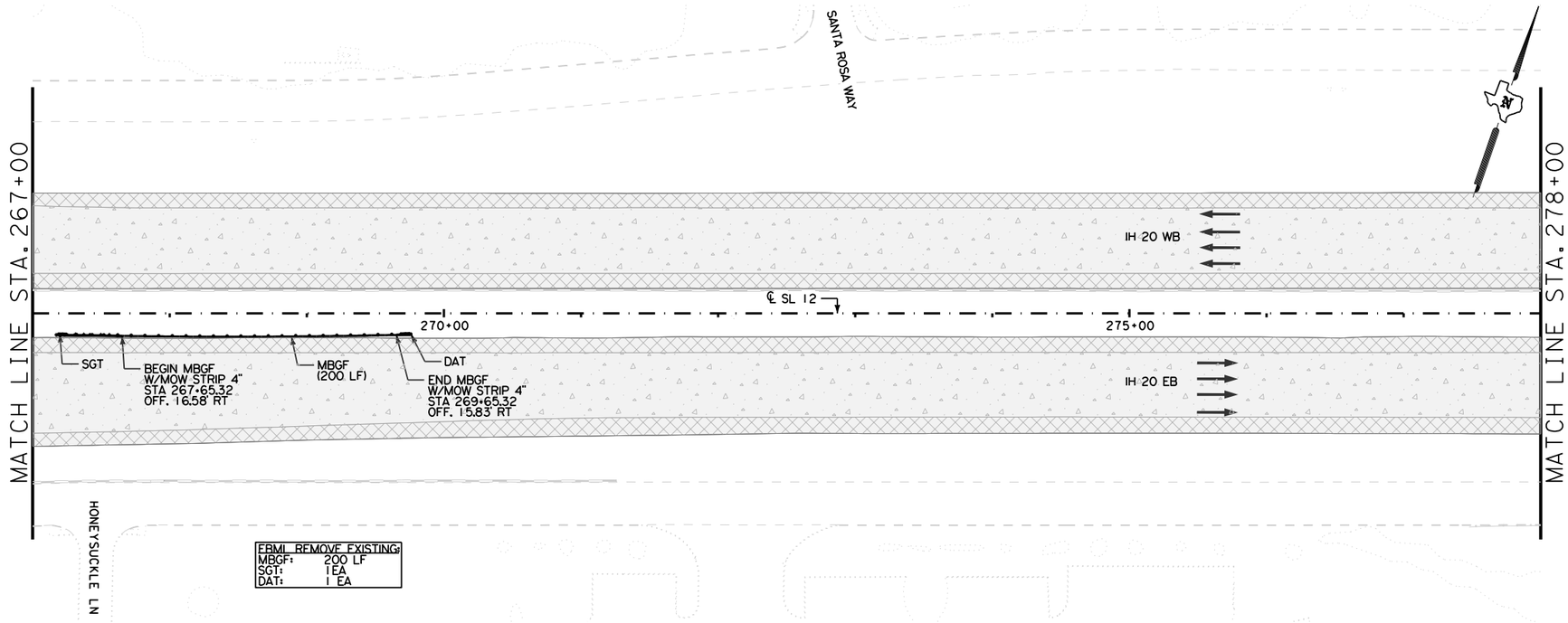
Texas Department of Transportation

IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 7 OF 15

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	48
	2374	03	091	

12/10/2021
8:50:09 AM
TxDOT



ERML REMOVE EXISTING:	
MBGF:	200 LF
SGT:	1 EA
DAT:	1 EA

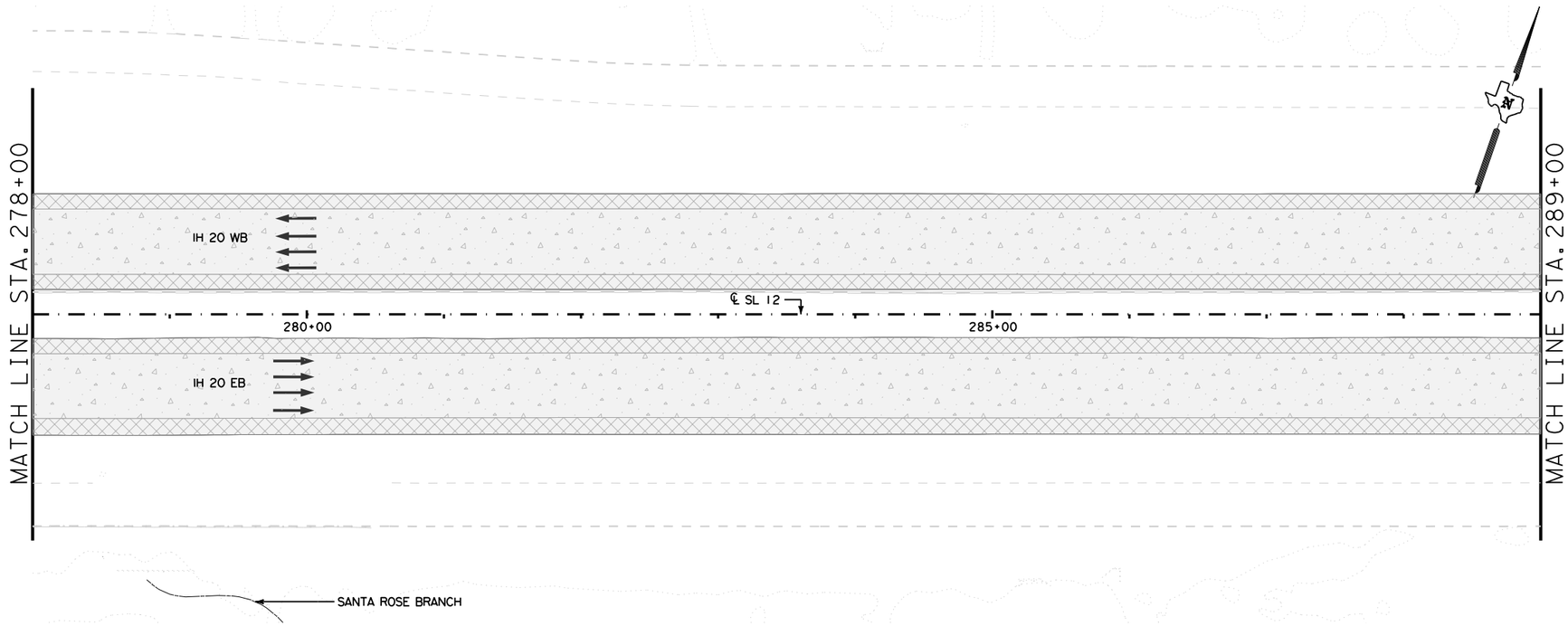
0 50 100

LEGEND

- MILL & OVERLAY AREA
- CONCRETE FDR AREA
- FLEX PAVEMENT REPAIR AREA
- DIRECTION OF TRAFFIC
- METAL BEAM GUARD FENCE (MBGF)
- EXISTING MBGF TO REMAIN IN PLACE
- SEDIMENT CONTROL FENCE
- DELINEATOR

NOTES:

1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. PROTECT CREEK AND DRAINAGE STREAM DURING WORK IN RELATED AREA.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO D&OM STANDARD SHEETS FOR MORE DETAIL.



STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

Dung Nguyen P.E. 12/10/2021
Signature of Registrant & Date

Texas Department of Transportation

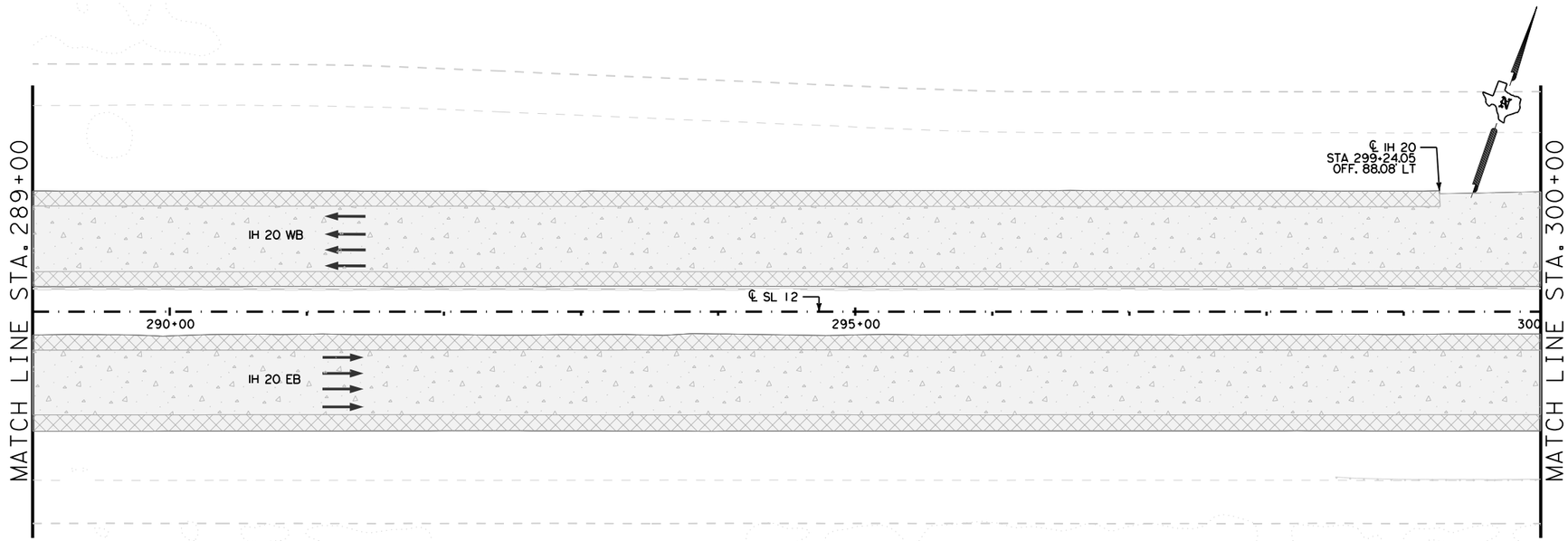
IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 8 OF 15

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	49
	2374	03	091	

T:\DALAO\PROJECTS\On\IH20\237403091\Sheets\RDWY\PLan Layout.dgn
pdf-bw.pltcfg Pen Table.tbl

12/10/2021
8:50:10 AM
TxDOT



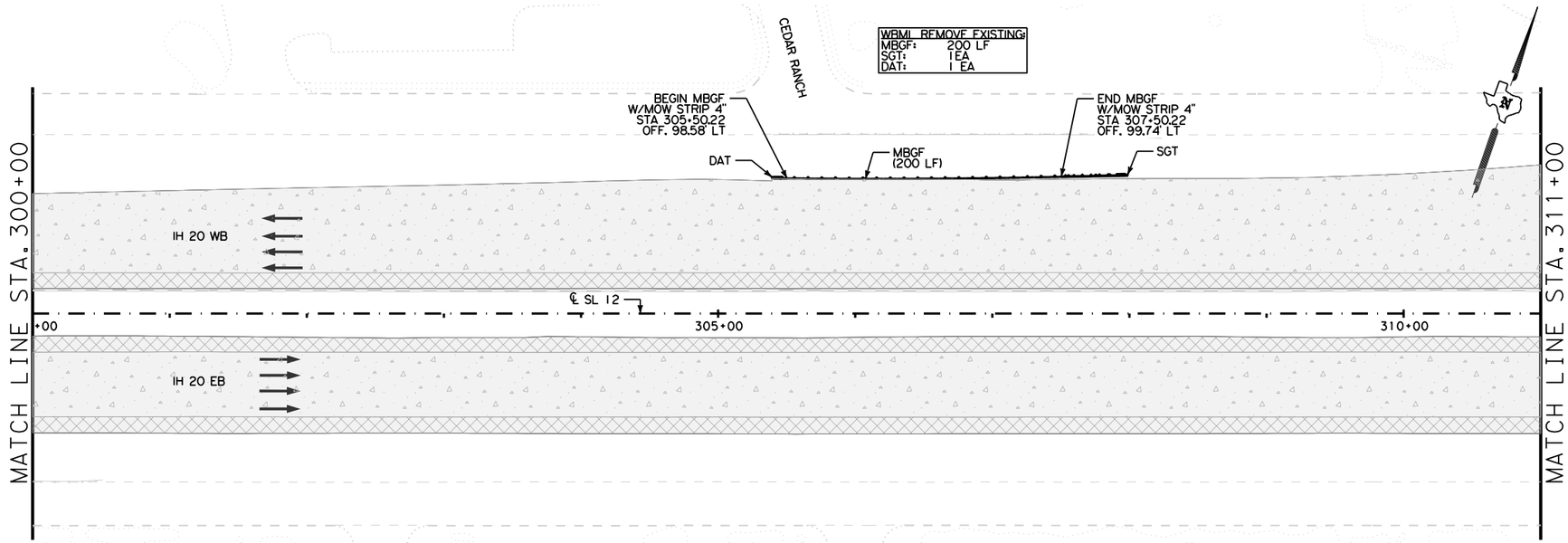
0 50 100

LEGEND

- MILL & OVERLAY AREA
- CONCRETE FDR AREA
- FLEX PAVEMENT REPAIR AREA
- DIRECTION OF TRAFFIC
- METAL BEAM GUARD FENCE (MBGF)
- EXISTING MBGF TO REMAIN IN PLACE
- SEDIMENT CONTROL FENCE
- DELINEATOR

NOTES:

1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. PROTECT CREEK AND DRAINAGE STREAM DURING WORK IN RELATED AREA.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO D&OM STANDARD SHEETS FOR MORE DETAIL.



STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

Dung Nguyen P.E. 12/10/2021
Signature of Registrant & Date

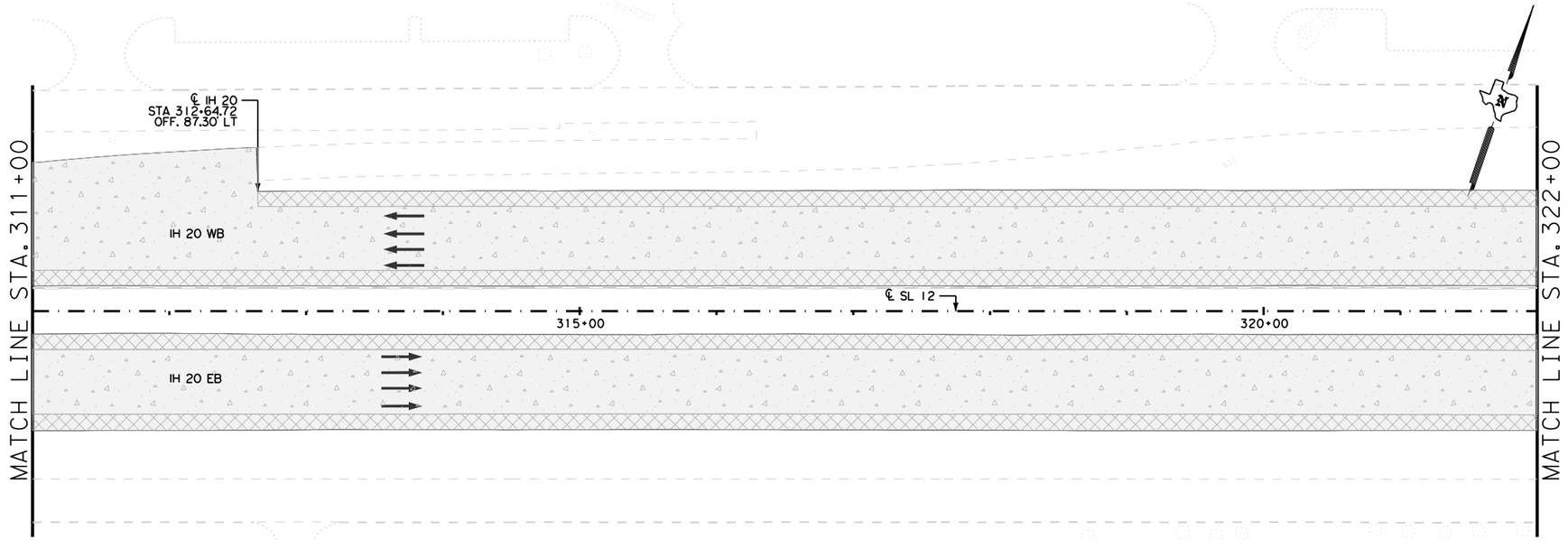
Texas Department of Transportation

IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 9 OF 15

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	50
	2374	03	091	

T:\DALAO\PROJECTS\On\IH20\2374030911\Sheets\RDWY\PLan Layout.dgn
pdf-bw.pltcfg Pen Table.tbl



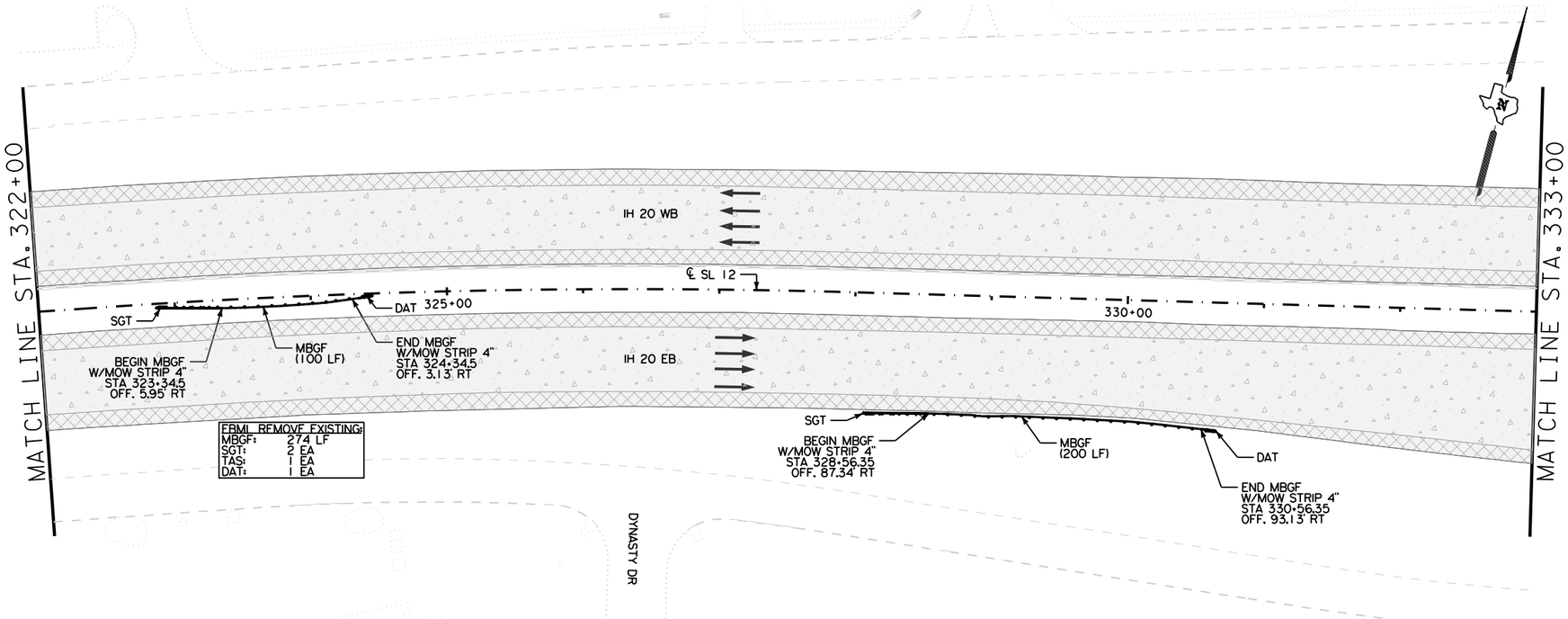
0 50 100

LEGEND

- MILL & OVERLAY AREA
- CONCRETE FDR AREA
- FLEX PAVEMENT REPAIR AREA
- DIRECTION OF TRAFFIC
- METAL BEAM GUARD FENCE (MBGF)
- EXISTING MBGF TO REMAIN IN PLACE
- SEDIMENT CONTROL FENCE
- DELINEATOR

NOTES:

1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. PROTECT CREEK AND DRAINAGE STREAM DURING WORK IN RELATED AREA.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO D&OM STANDARD SHEETS FOR MORE DETAIL.



FBMI REMOVE EXISTING:	
MBGF:	274 LF
SGT:	2 EA
TAS:	1 EA
DAT:	1 EA

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

Signature of Registrant & P.E. 12/10/2021

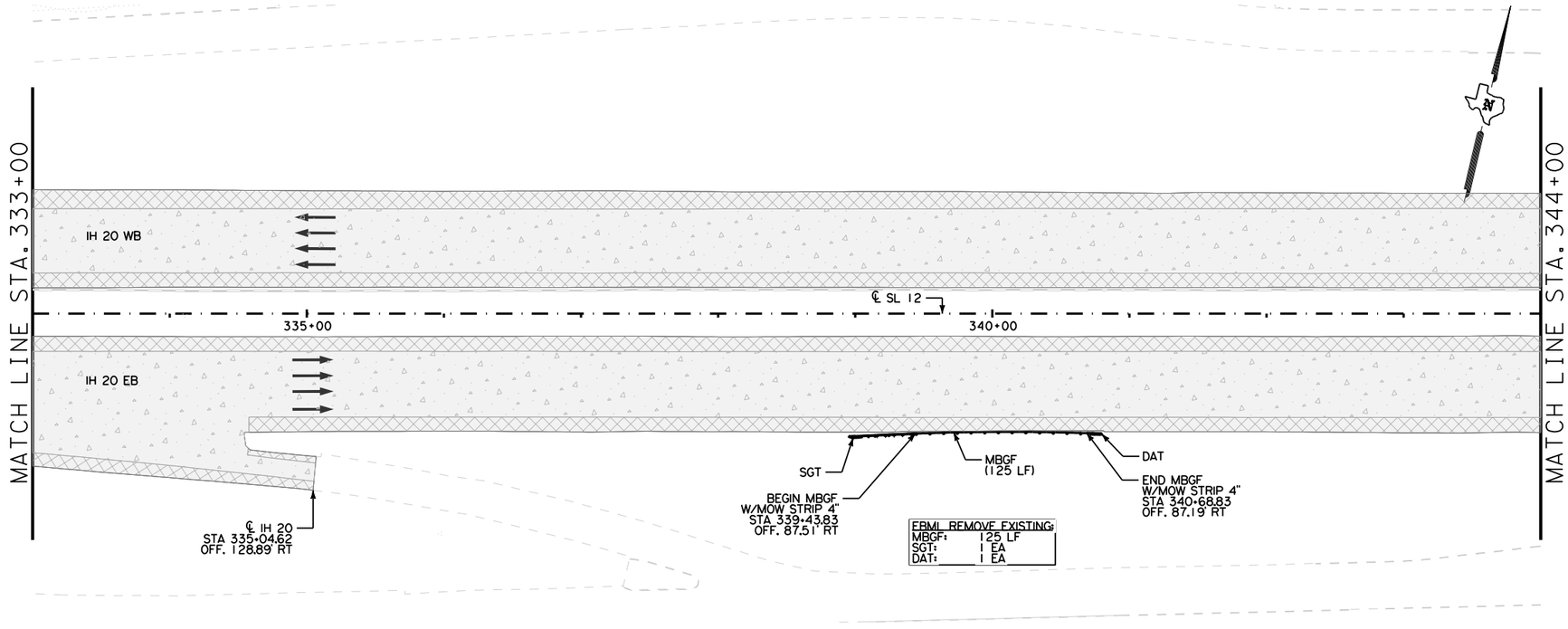
Texas Department of Transportation

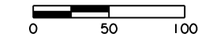
IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 10 OF 15

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	51
	2374	03	091	

12/10/2021
8:50:13 AM
TxDOT



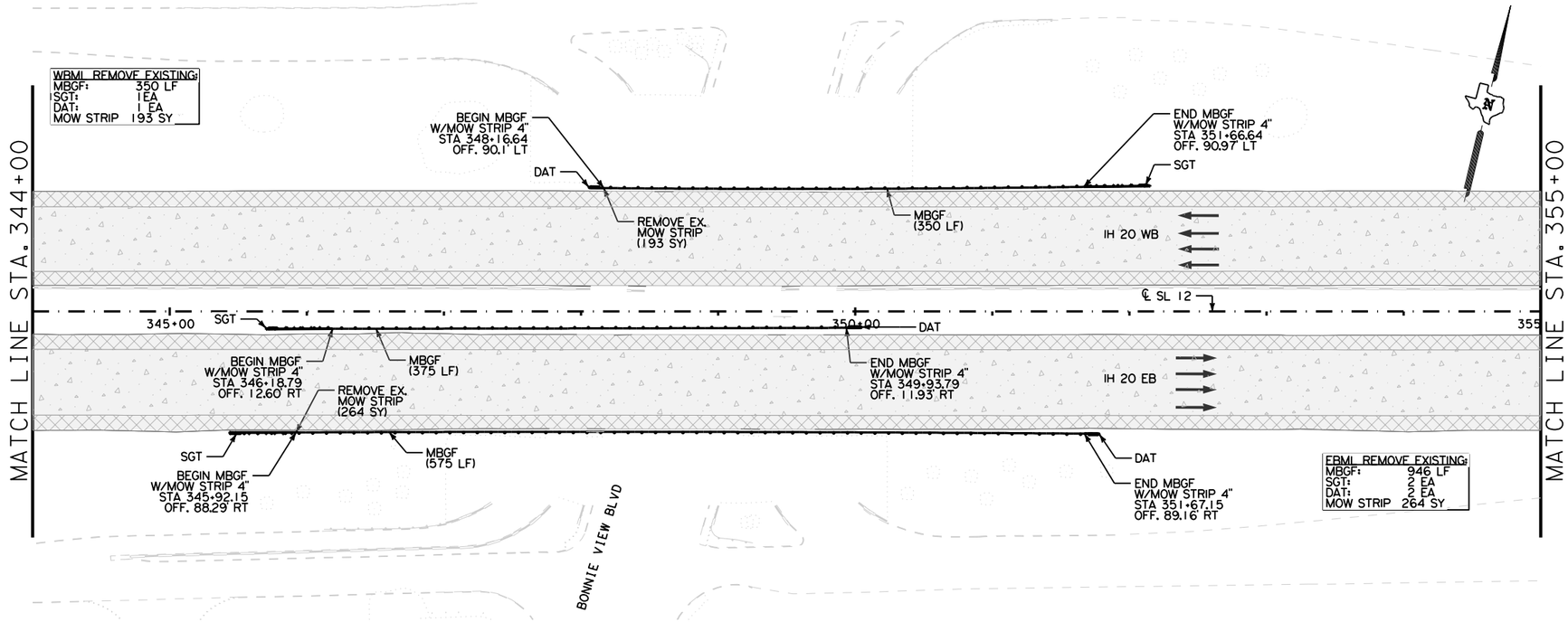


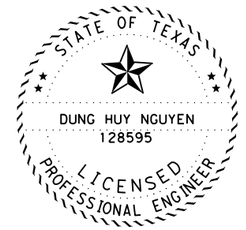
LEGEND

- MILL & OVERLAY AREA
- CONCRETE FDR AREA
- FLEX PAVEMENT REPAIR AREA
- DIRECTION OF TRAFFIC
- METAL BEAM GUARD FENCE (MBGF)
- EXISTING MBGF TO REMAIN IN PLACE
- SEDIMENT CONTROL FENCE
- DELINEATOR

NOTES:

1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. PROTECT CREEK AND DRAINAGE STREAM DURING WORK IN RELATED AREA.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO D&OM STANDARD SHEETS FOR MORE DETAIL.





P.E. 12/10/2021
Signature of Registrant & Date

Texas Department of Transportation

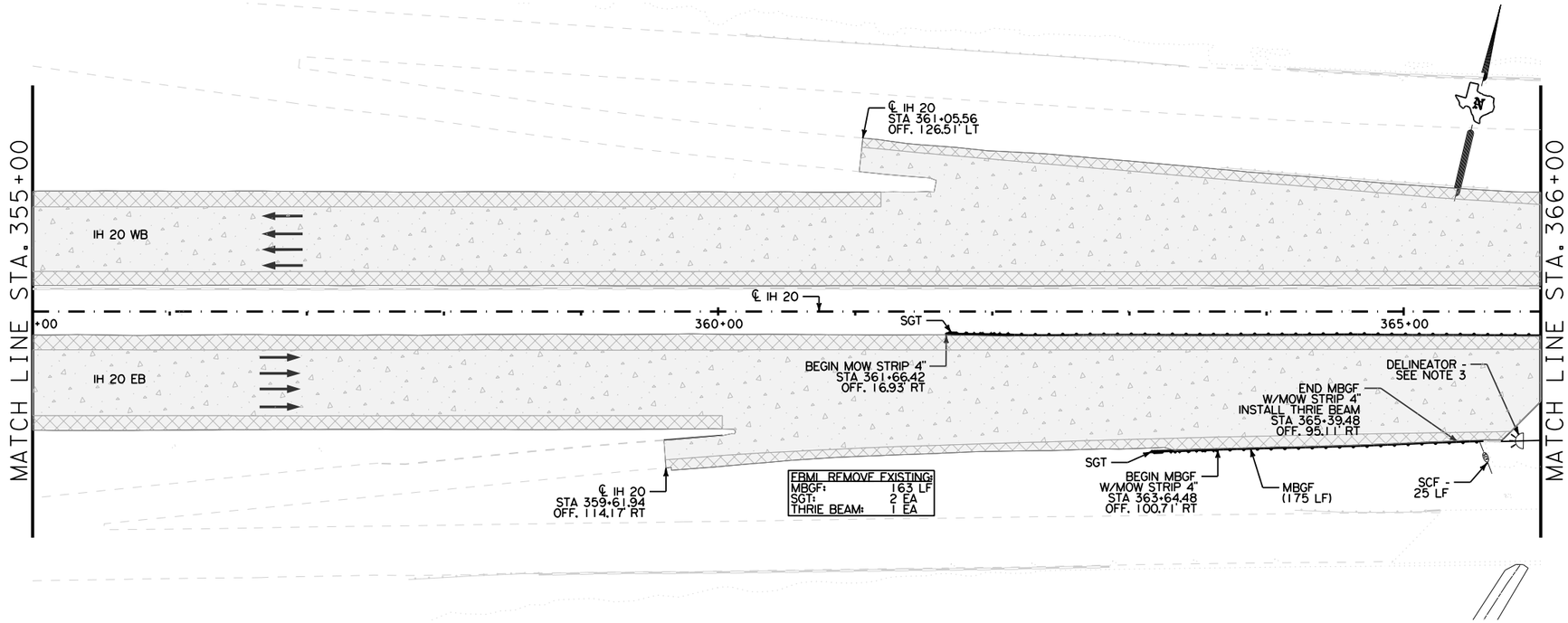
IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 11 OF 15

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	52
	2374	03	091	

T:\DALAO\PROJECTS\On\IH20\237403091\Sheets\RDWY\PLan Layout.dgn
pdf-bw.pltcfg Pen Table.tbl

12/10/2021
8:50:14 AM
TxDOT

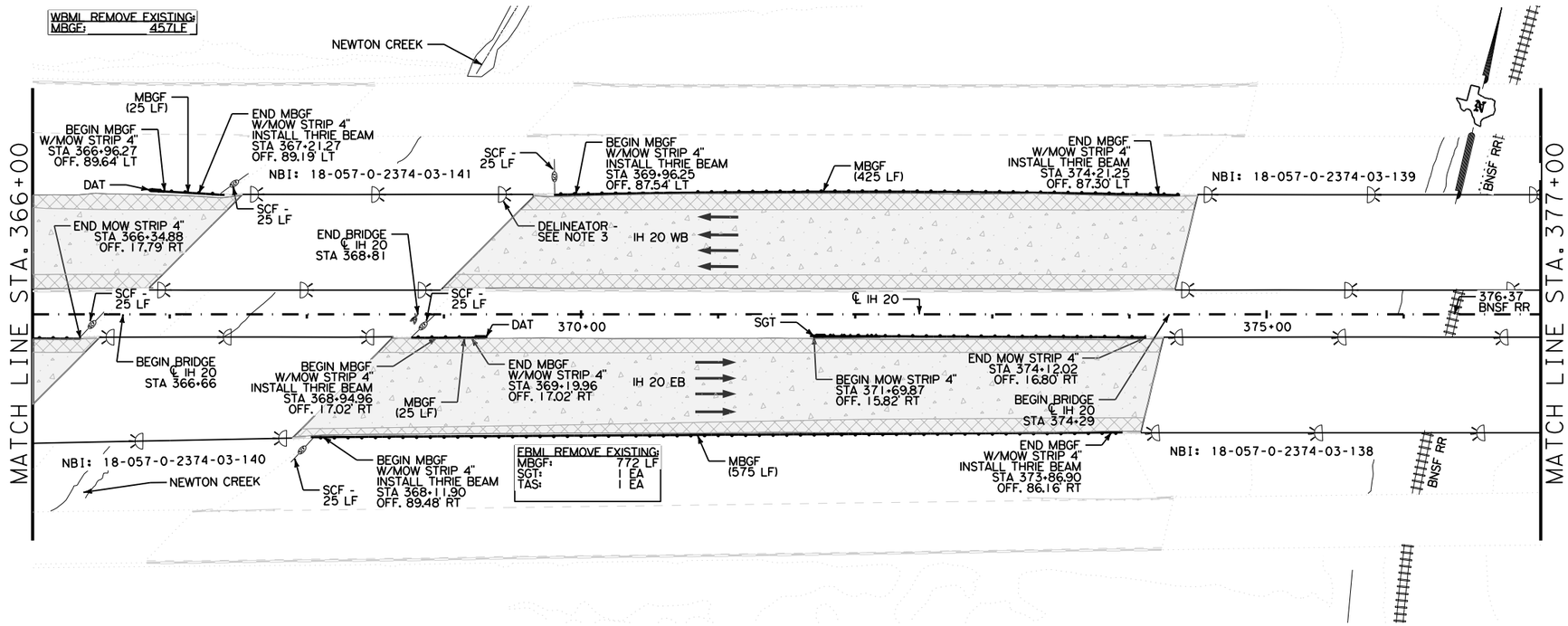


LEGEND

- MILL & OVERLAY AREA
- CONCRETE FDR AREA
- FLEX PAVEMENT REPAIR AREA
- DIRECTION OF TRAFFIC
- METAL BEAM GUARD FENCE (MBGF)
- EXISTING MBGF TO REMAIN IN PLACE
- SEDIMENT CONTROL FENCE
- DELINEATOR

NOTES:

1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. PROTECT CREEK AND DRAINAGE STREAM DURING WORK IN RELATED AREA.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO D&OM STANDARD SHEETS FOR MORE DETAIL.



STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

Dung Nguyen, P.E. 12/10/2021
Signature of Registrant & Date

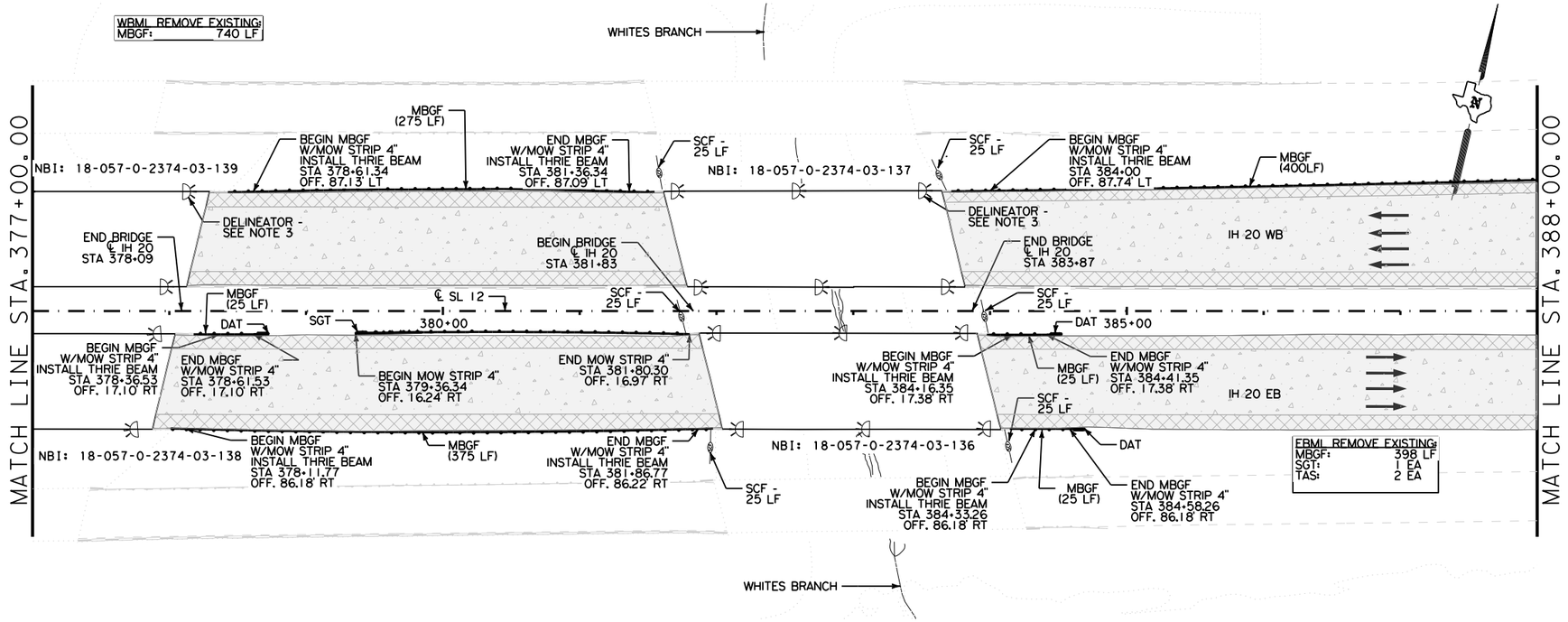
Texas Department of Transportation

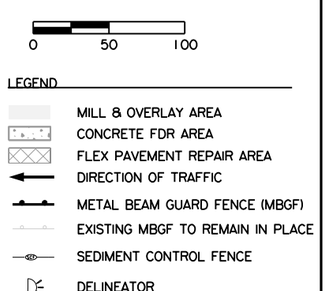
IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 12 OF 15

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	53
	2374	03	091	

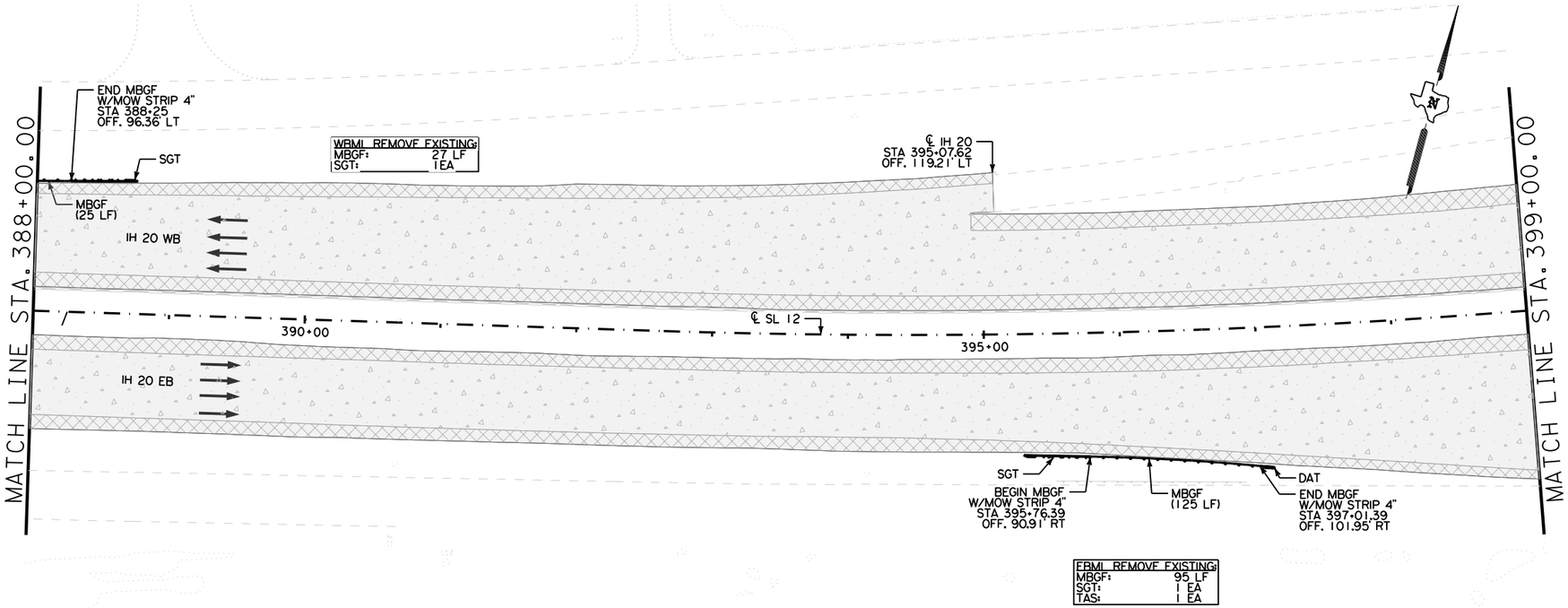
T:\DALAO\PROJECTS\On\IH20\237403091\Sheets\RDWY\PLan Layout.dgn
pdf-bw.pltcfg Pen Table.tbl

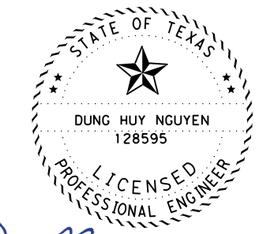




NOTES:

1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. PROTECT CREEK AND DRAINAGE STREAM DURING WORK IN RELATED AREA.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO D&OM STANDARD SHEETS FOR MORE DETAIL.





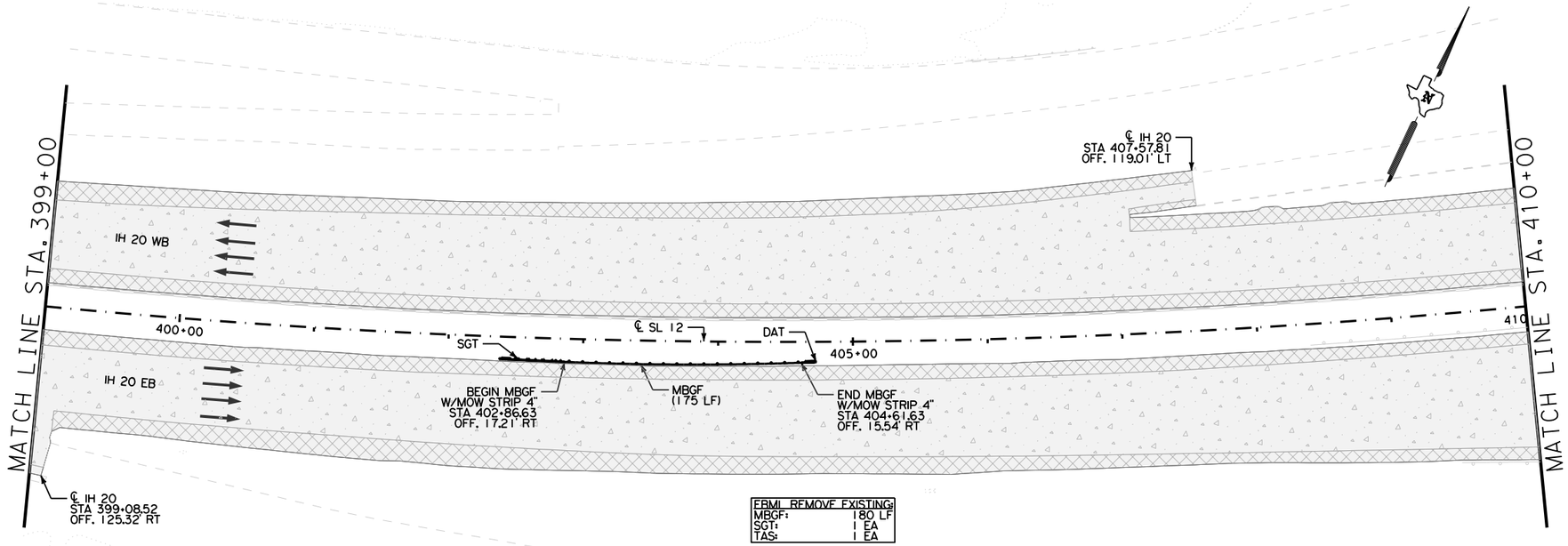
Dung Nguyen, P.E. 12/10/2021
Signature of Registrant & Date

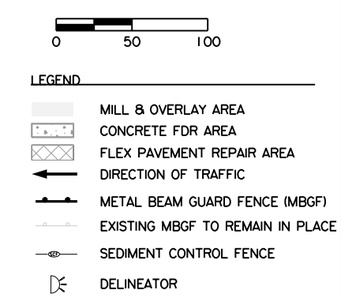
IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 13 OF 15

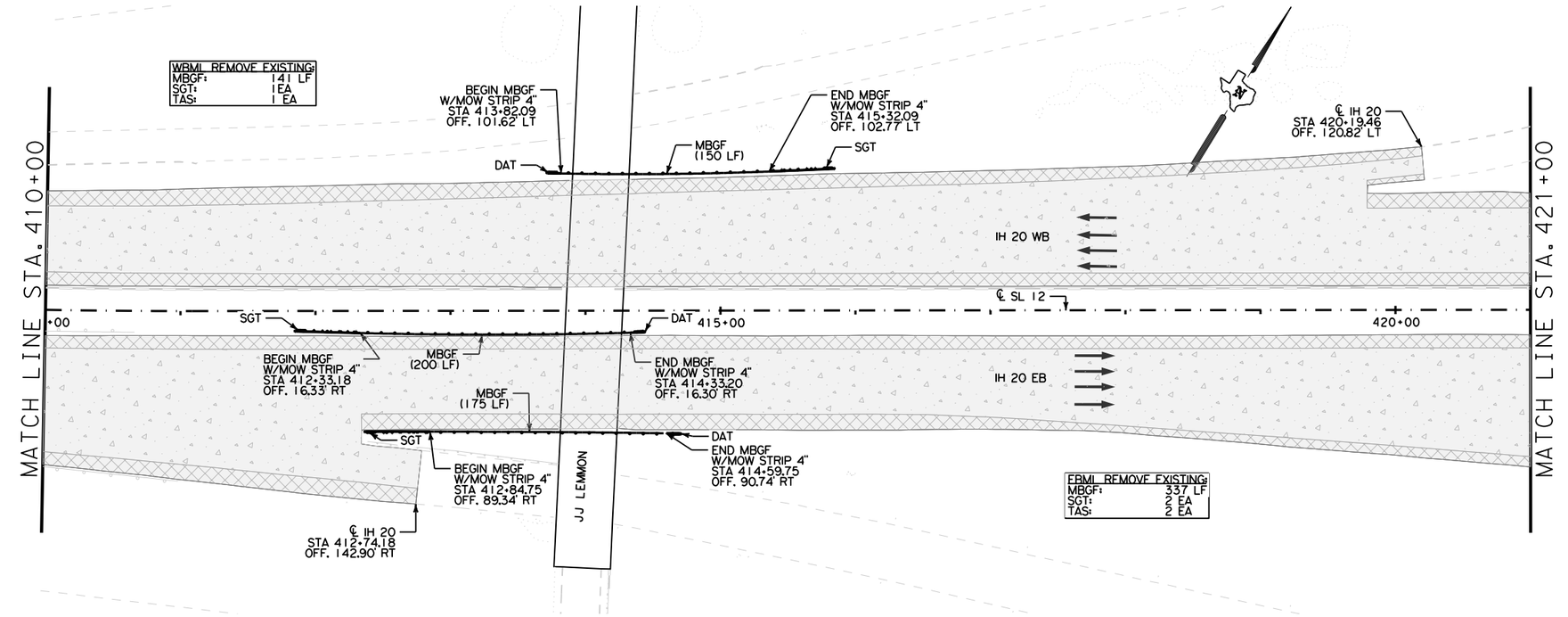
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	54
	2374	03	091	

12/10/2021
8:50:16 AM
TxDOT





NOTES:
1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. PROTECT CREEK AND DRAINAGE STREAM DURING WORK IN RELATED AREA.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO D&OM STANDARD SHEETS FOR MORE DETAIL.



STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

Signature of Registrant & Date, P.E. 12/10/2021

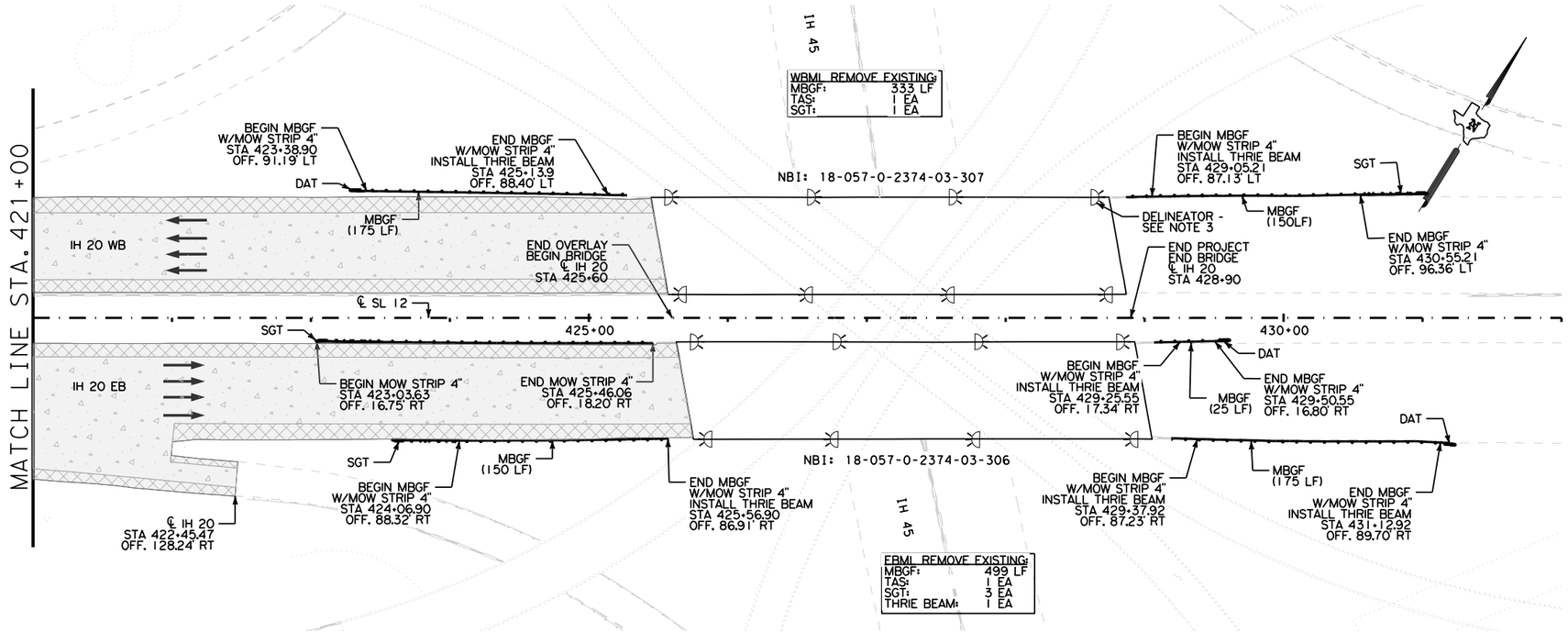
Texas Department of Transportation

IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 14 OF 15

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	55
	2374	03	091	

T:\DALAO\PROJECTS\On\IH20\237403091\Sheets\RDWY\PLan Layout.dgn
pdf-bw.pltcfg Pen Table.tbl



0 50 100

LEGEND

- MILL & OVERLAY AREA
- CONCRETE FDR AREA
- FLEX PAVEMENT REPAIR AREA
- DIRECTION OF TRAFFIC
- METAL BEAM GUARD FENCE (MBGF)
- EXISTING MBGF TO REMAIN IN PLACE
- SEDIMENT CONTROL FENCE
- DELINEATOR

NOTES:

1. FULL DEPTH REPAIR AND SHOULDER REPAIR ARE TO BE LOCATED AND VERIFIED BY THE ENGINEER PRIOR TO BEGINNING ANY OPERATION.
2. PROTECT CREEK AND DRAINAGE STREAM DURING WORK IN RELATED AREA.
3. FOR DELINEATOR INFORMATION NOT SHOWN HERE, REFER TO D&OM STANDARD SHEETS FOR MORE DETAIL.

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

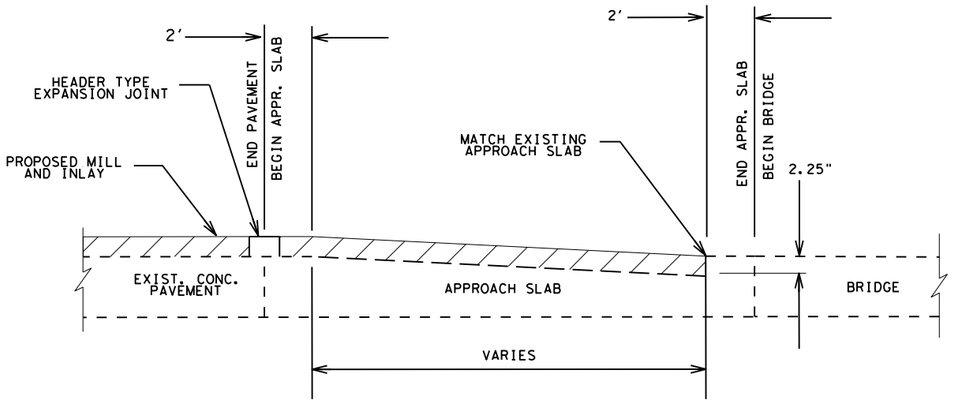
P.E. 12/10/2021
Signature of Registrant & Date

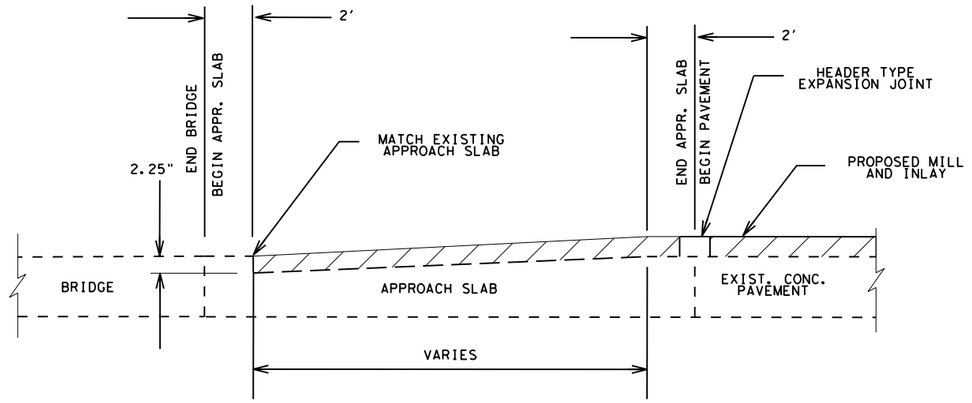
Texas Department of Transportation

IH 20
PLAN LAYOUT

SCALE: 1"=100' SHEET 15 OF 15

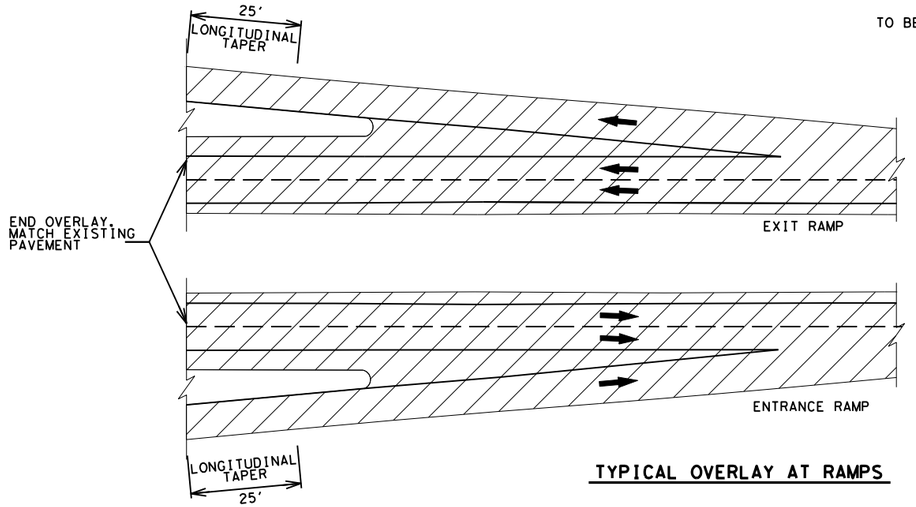
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	56
	2374	03	091	



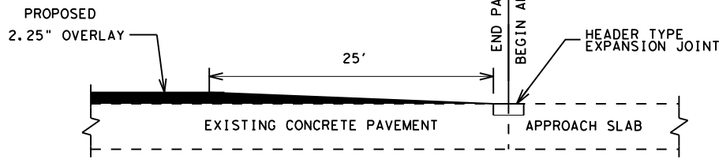


TRANSITION TAPER AT BRIDGE

TO BE USED ON ALL BRIDGES EXCEPT HOUSTON SCHOOL ROAD BRIDGE

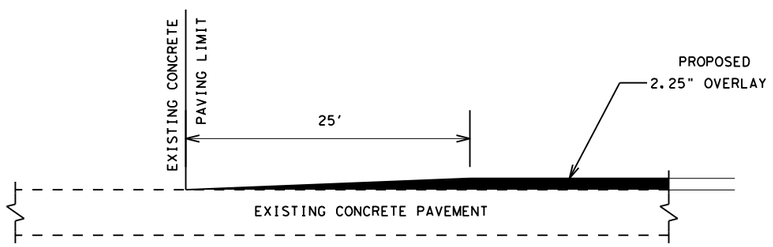


TYPICAL OVERLAY AT RAMPS



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

P.E. 12/10/2021
Signature of Registrant & Date

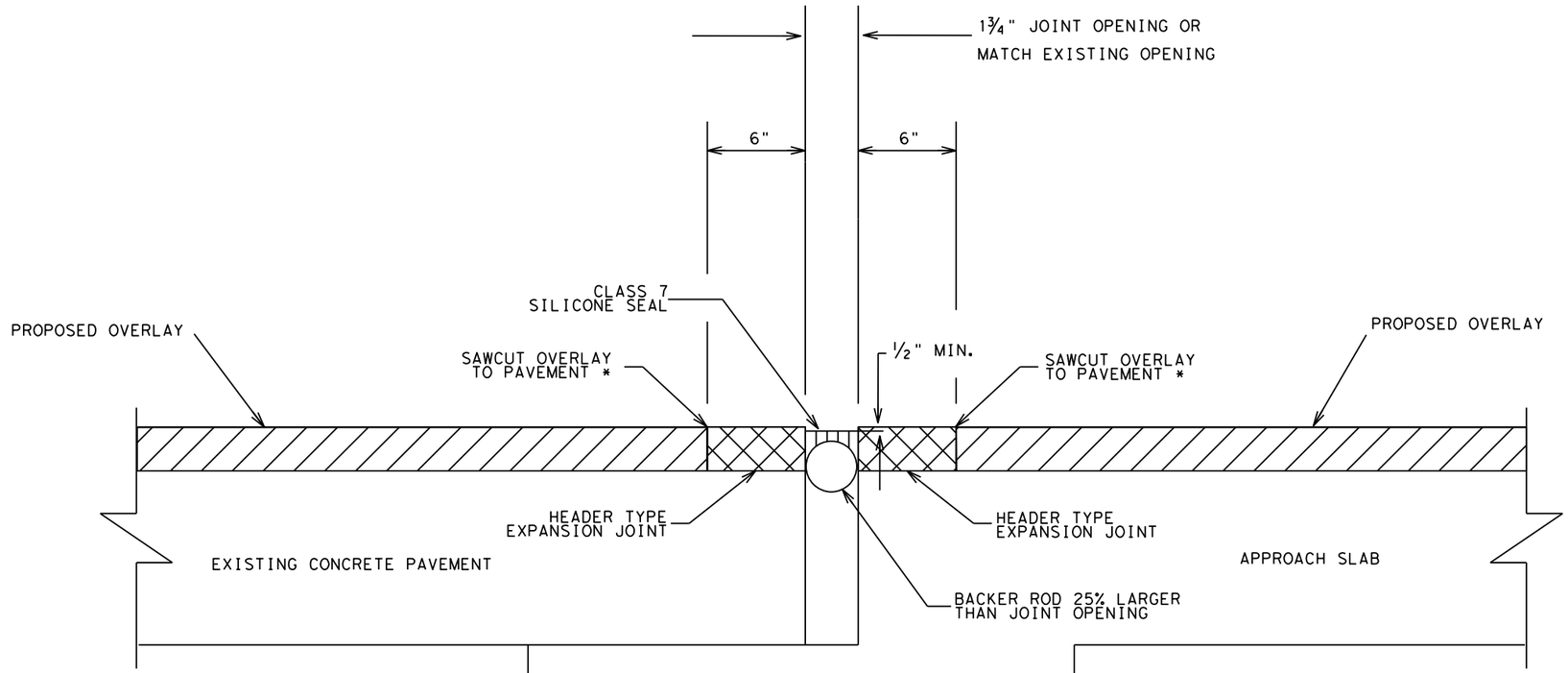
Texas Department of Transportation

IH 20

MISCELLANEOUS ROADWAY DETAILS

SHEET 1 OF 2

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	57
	2374	03	091	



STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED
PROFESSIONAL ENGINEER

Dung Nguyen, P.E. 12/10/2021
Signature of Registrant & Date

HEADER TYPE EXPANSION JOINT DETAILS

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

LEGEND

MILL AND INLAY AREA

EXPANSION JOINT

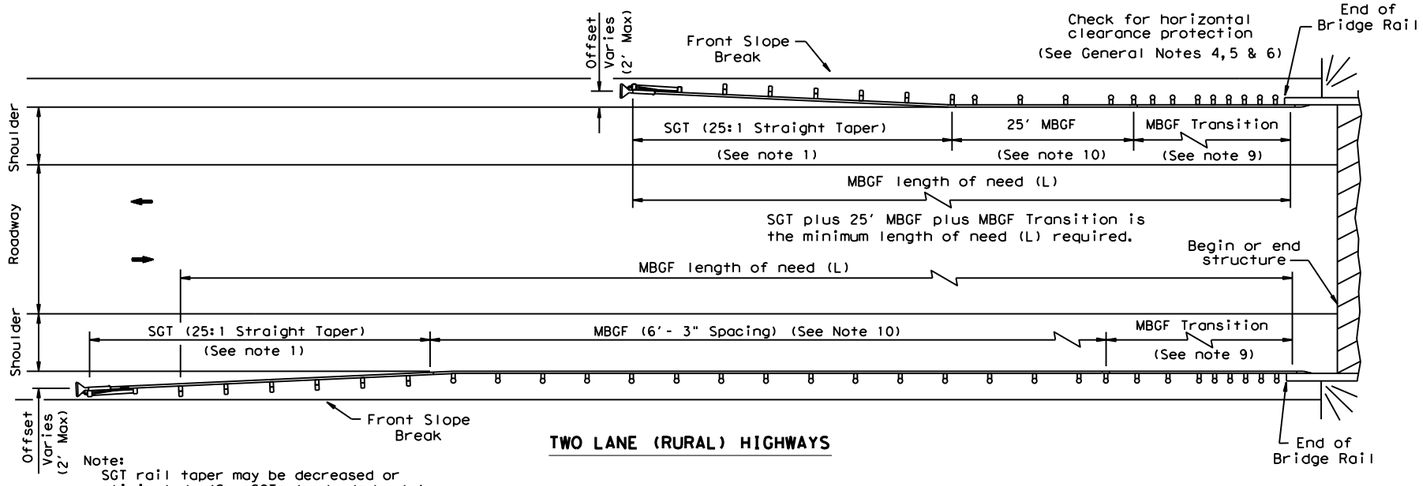
IH 20

MISCELLANEOUS ROADWAY DETAILS

SHEET 2 OF 2

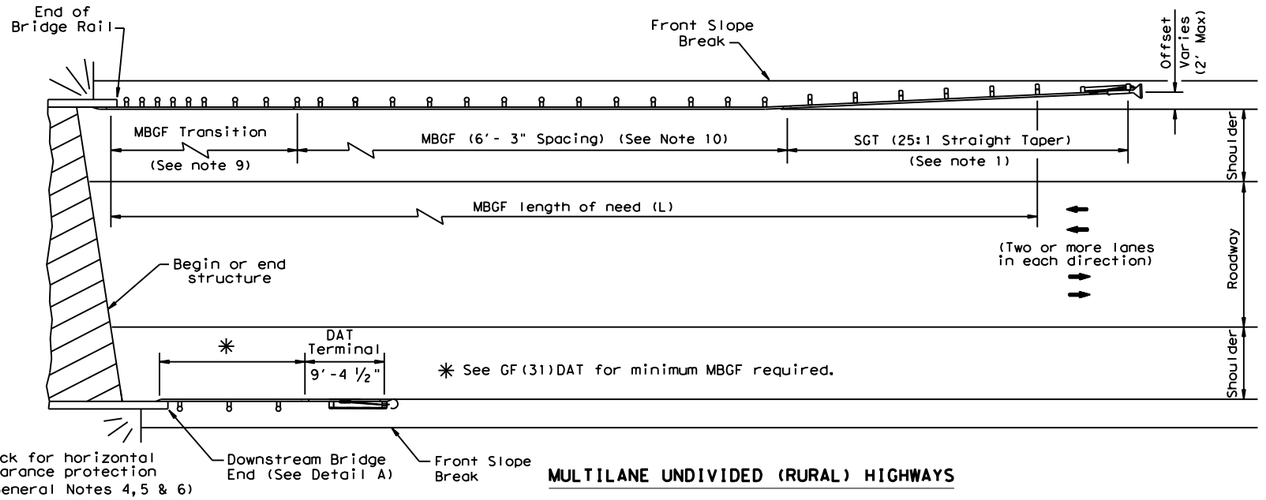
DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	
CHECK AM	CONTROL	SECTION	JOB	58
	2374	03	091	

DATE: 12/10/2021 8:50:20 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\STND\RDWY\bed14_dgn

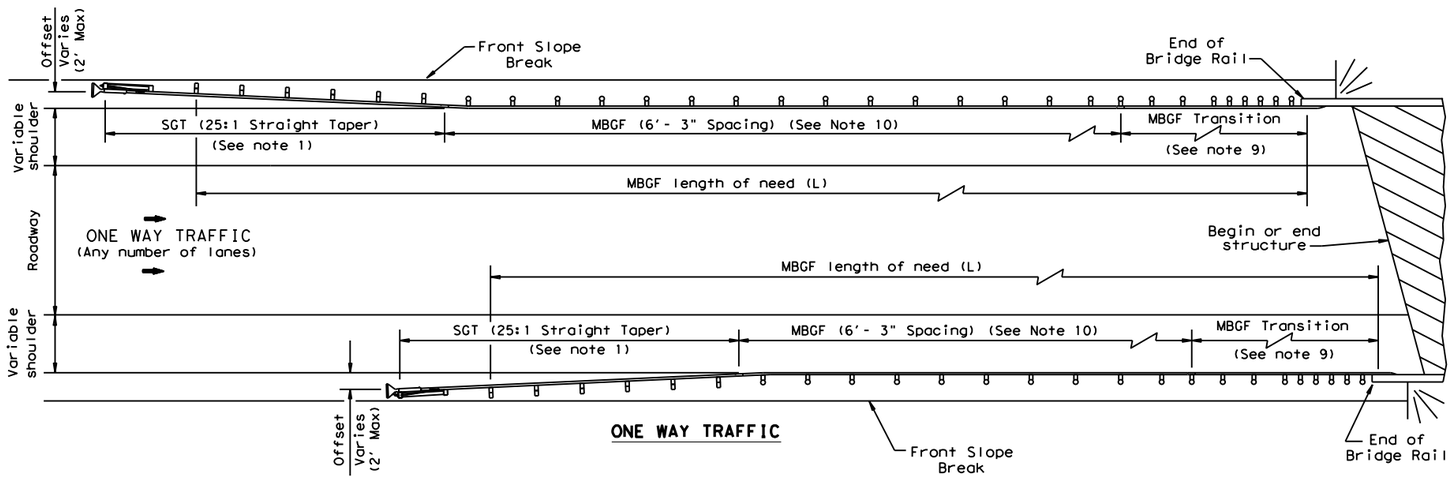


TWO LANE (RURAL) HIGHWAYS

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



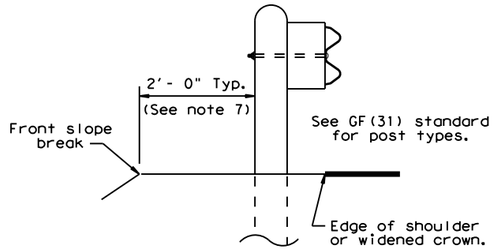
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



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

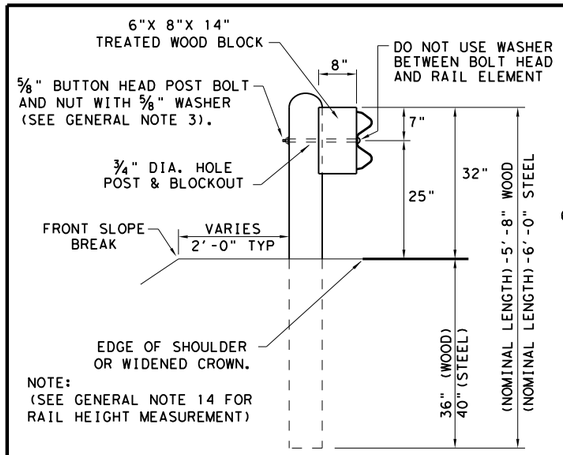
BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

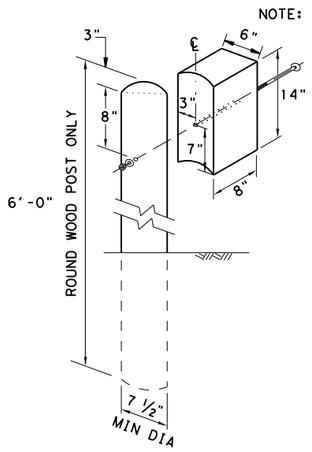
BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		59

DATE: 12/10/2021
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\on\IH20\23740309\Sheets\STNDRDWY\gf3119.dgn

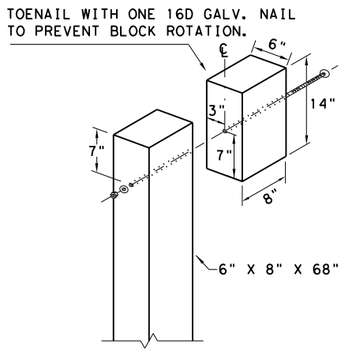


TYPICAL POST PLACEMENT

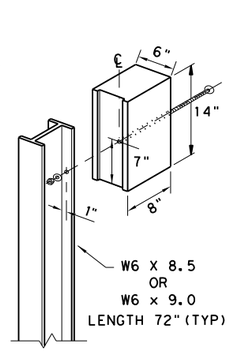


WOOD BLOCK TO ROUND WOOD POST

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

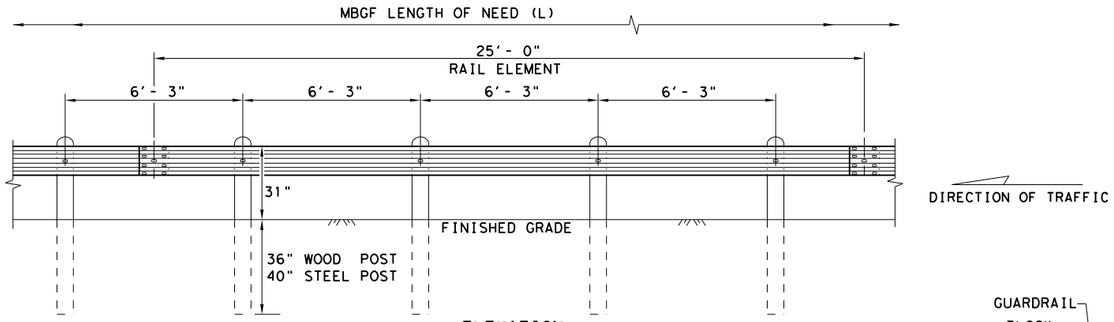


WOOD BLOCK TO RECTANGULAR WOOD POST



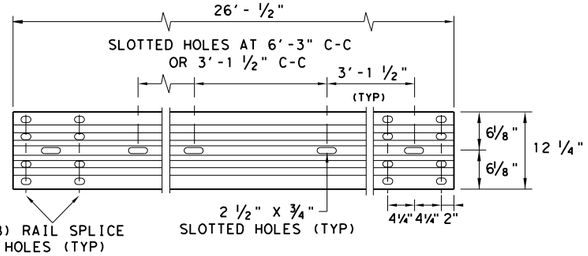
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



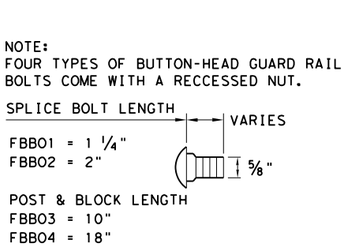
ELEVATION
MID-SPAN RAIL SPLICE

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



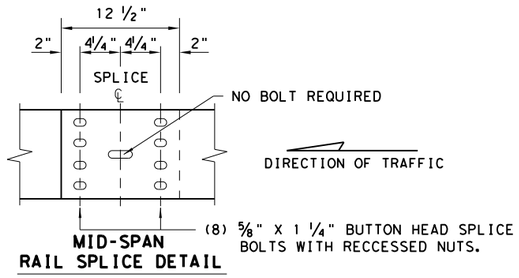
ELEVATION 25'- 0" (NOM.) W-BEAM SECTION

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



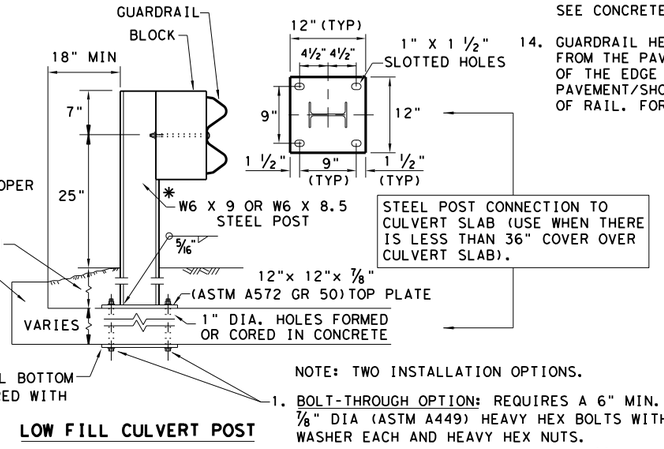
BUTTON HEAD BOLT

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).

12" X 12" X ¼" (ASTM A36) STEEL BOTTOM PLATE WITH 1" DIA. HOLES REQUIRED WITH BOLT-THROUGH INSTALLATION.

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

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

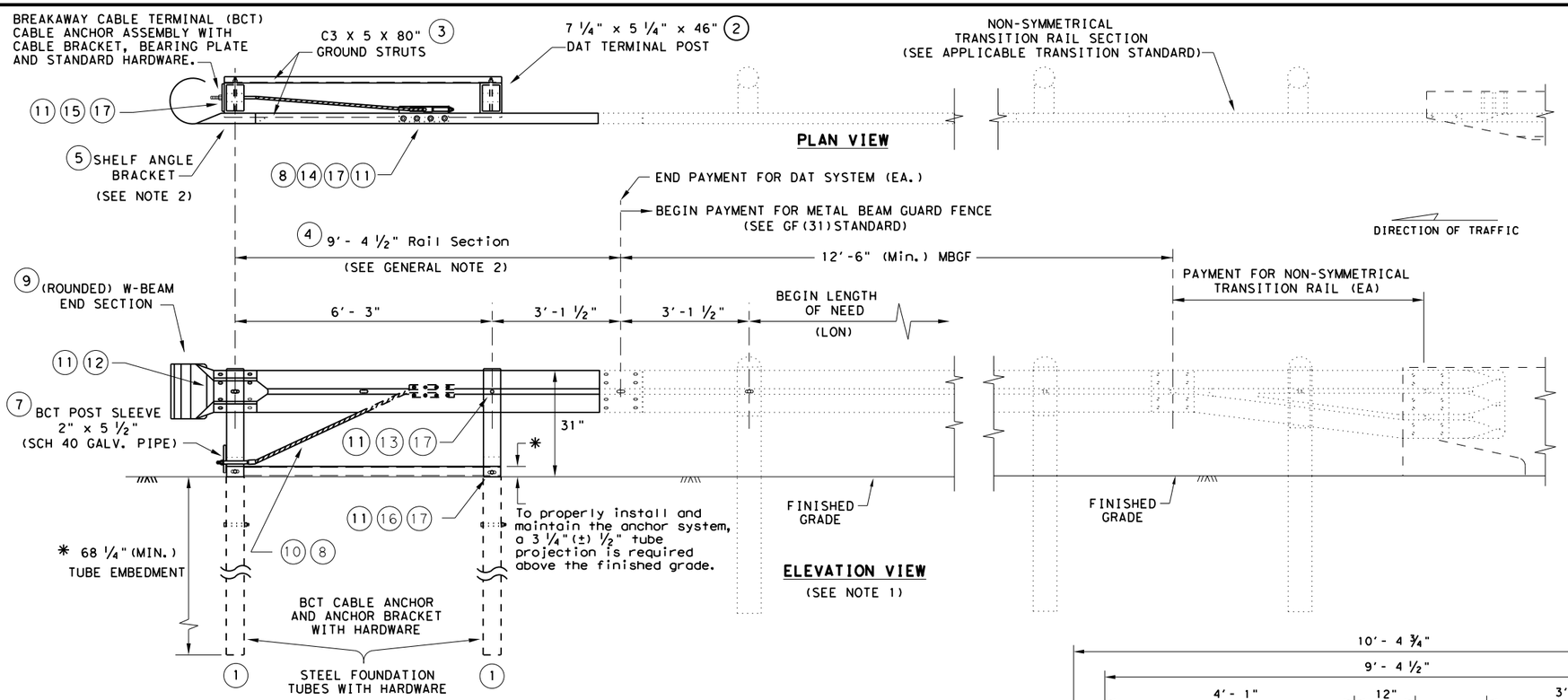
Texas Department of Transportation

Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		60

DATE: 12/10/2021
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAON\PROJECTS\ON\IH20\23740309\Sheets\STNDRDWY\gf31dat19.dgn



DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

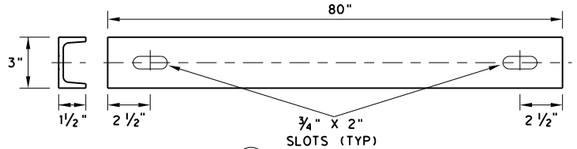
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

MOW STRIP INSTALLATION

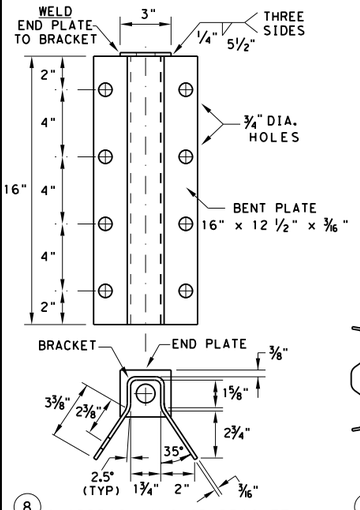
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

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

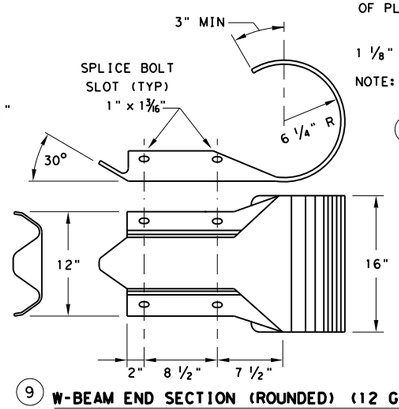
(4) TERMINAL RAIL ELEMENT FOR DAT



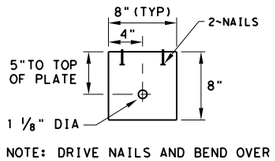
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

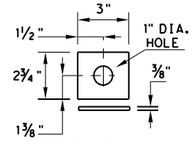


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

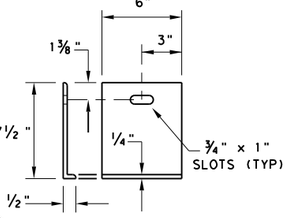


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

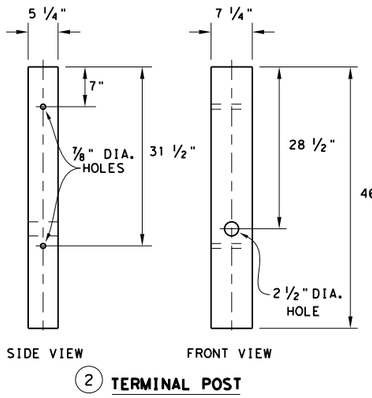
(6) BEARING PLATE
8"x 8"x 5/8" R



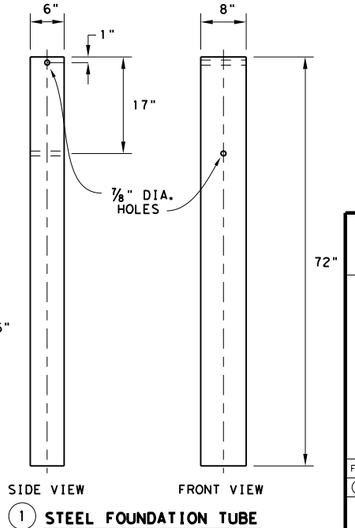
END PLATE



(5) SHELF ANGLE BRACKET



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



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

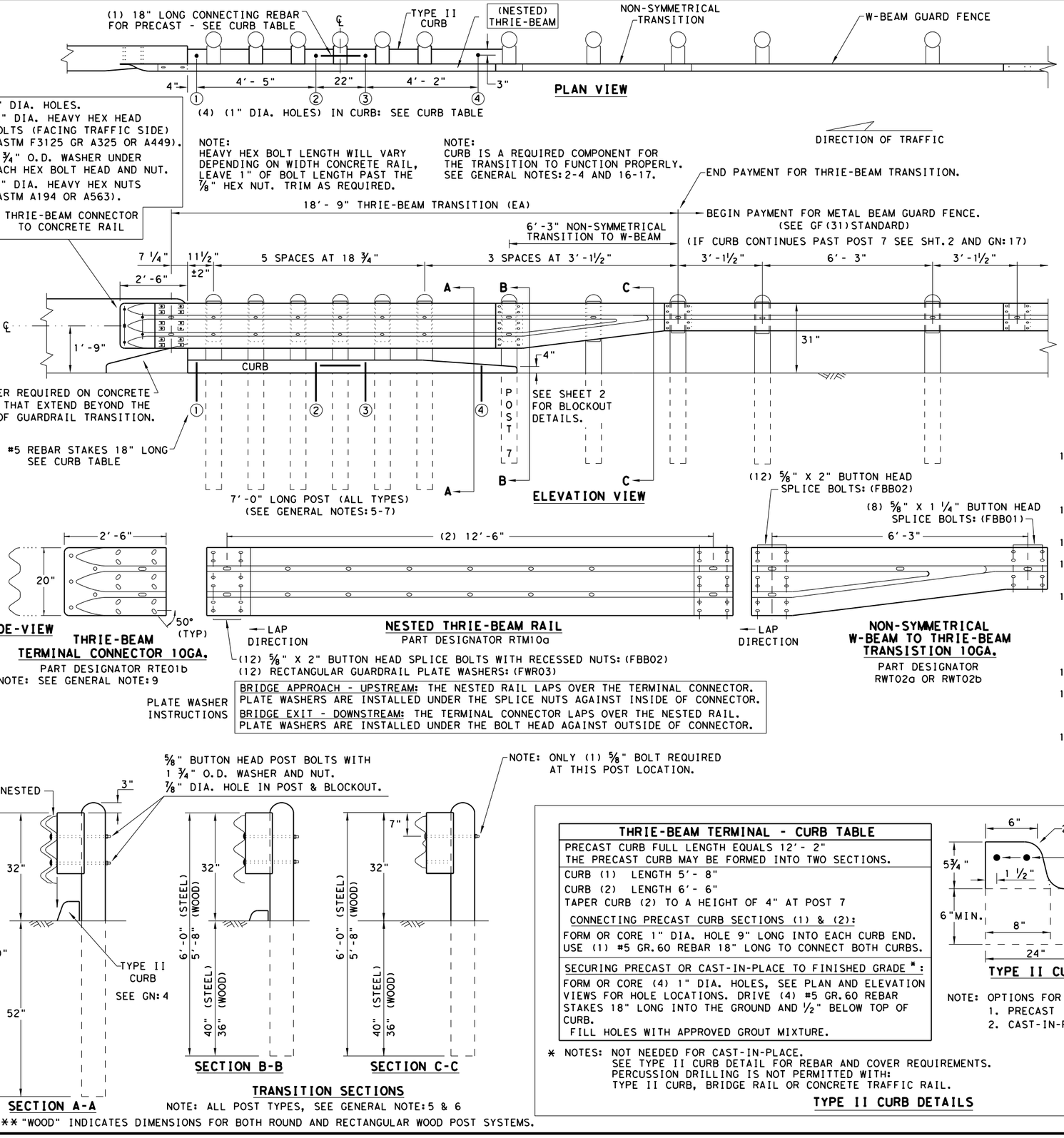
Texas Department of Transportation — Design Division Standard

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

GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		61

DATE: 12/10/2021
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\23740309 1\Sheets\STND\RDWY\gf31tr1320.dgn



GENERAL NOTES

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

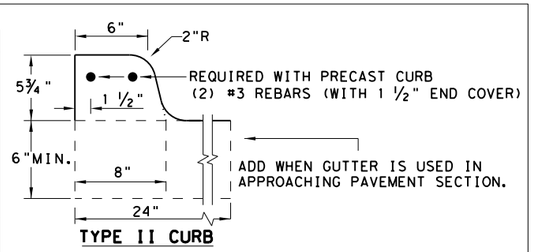
THRIE-BEAM TERMINAL - CURB TABLE

PRECAST CURB FULL LENGTH EQUALS 12'- 2"
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.

CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7

CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END.
USE (1) #5 GR. 60 REBAR 18" LONG TO CONNECT BOTH CURBS.

SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR. 60 REBAR STAKES 18" LONG INTO THE GROUND AND 1/2" BELOW TOP OF CURB.
FILL HOLES WITH APPROVED GROUT MIXTURE.



TYPE II CURB

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

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

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

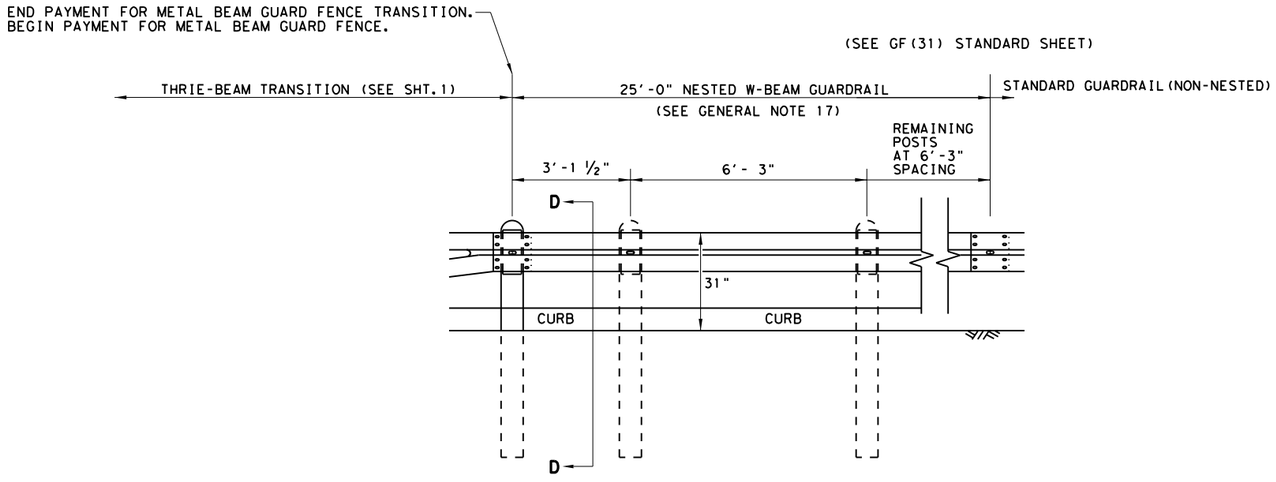
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

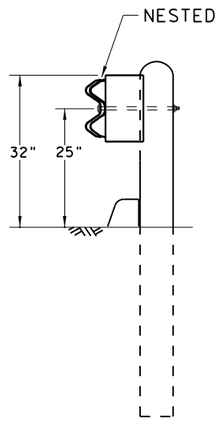
FILE: gf31tr1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		62

DATE: 12/10/2021
FILE: \\TXDOT4DVDALHQ\Dot01\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\STND\RDWY\gf31trt1320.dgn

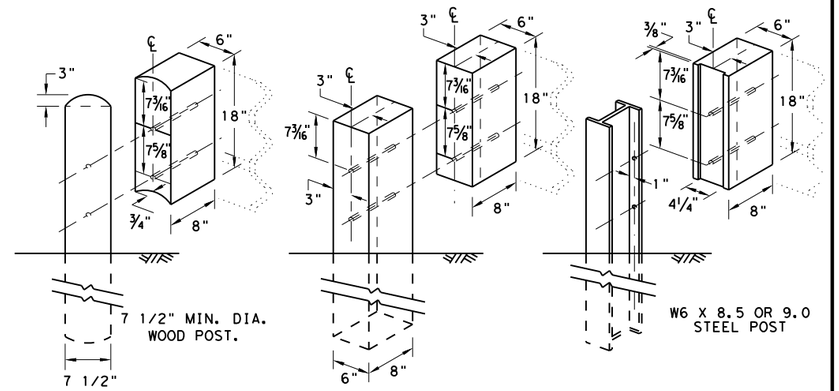
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

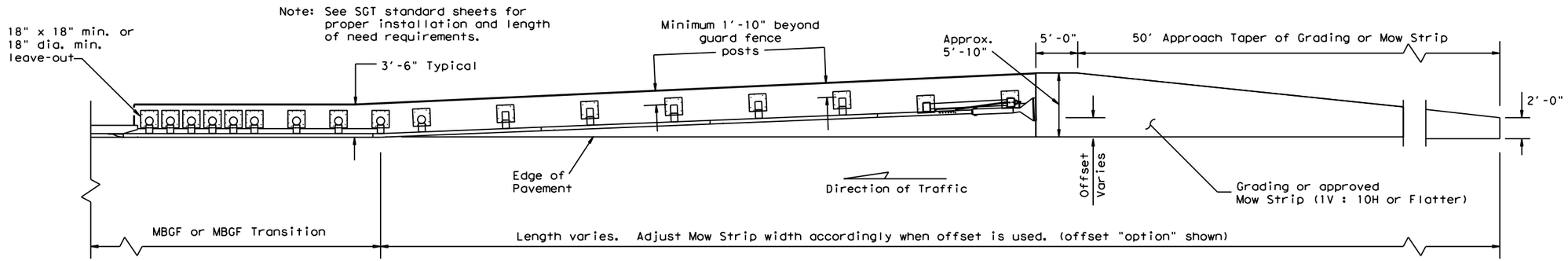
Texas Department of Transportation | Design Division Standard

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

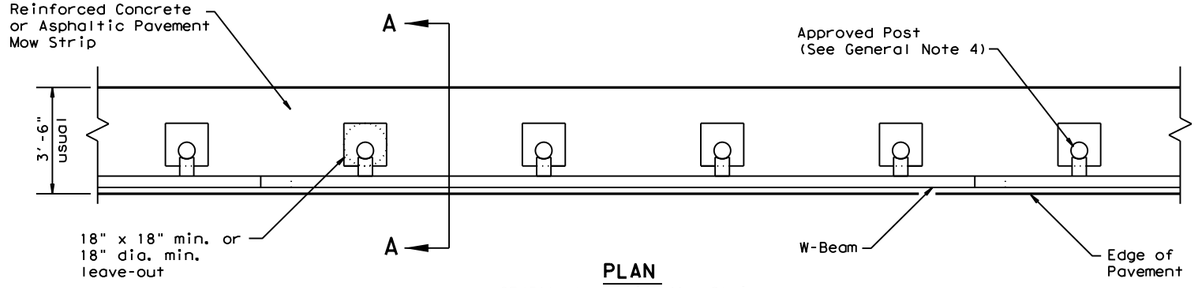
GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	2374	03	091	IH 20	
	DIST	COUNTY		SHEET NO.	
	DALLAS	DALLAS		63	

DATE: 12/10/2021
FILE: \\TXDOT40VDALHQ\Data1\DATA\DAL\GROUPS\DAL40\PROJECTS\ON\IH20\237403091\Sheets\STND\ROWY\gf31ms19.dgn

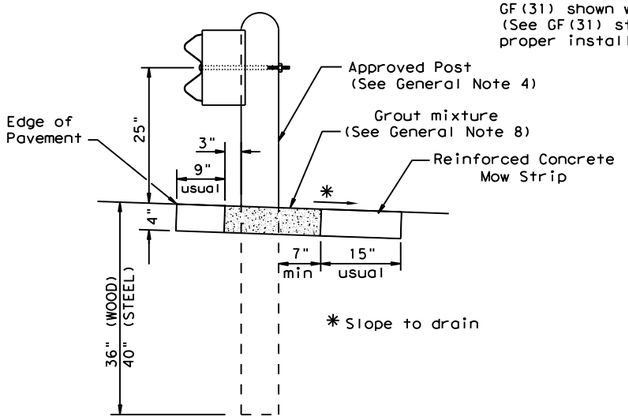


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



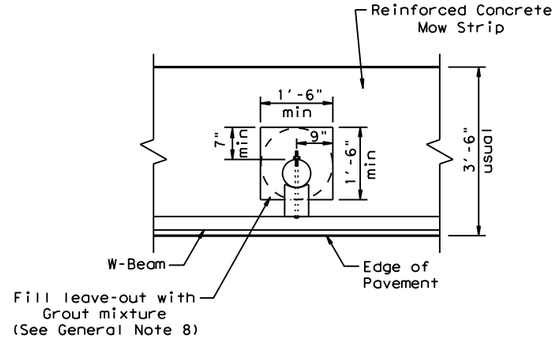
PLAN

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



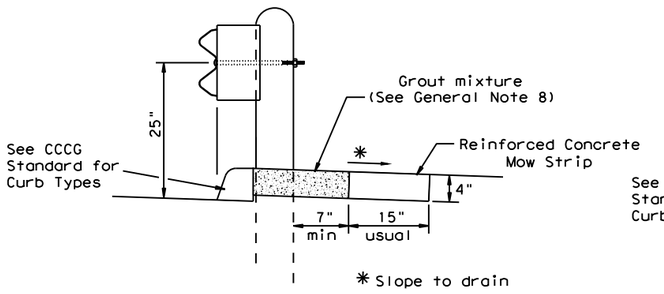
SECTION A-A

Typical



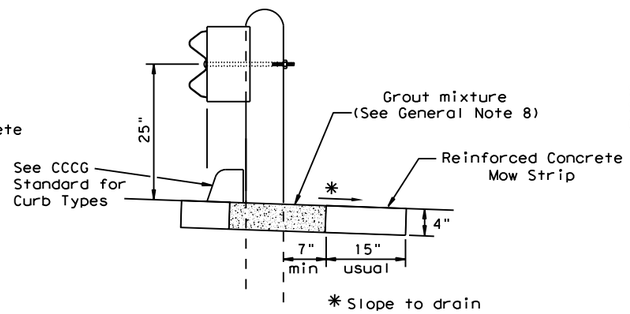
MOW STRIP DETAIL

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



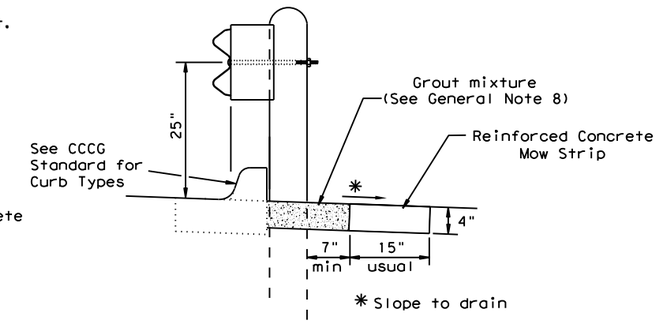
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		64

DATE: 12/10/2021
FILE: \\TXDOT4DVDALHQ\Dotal\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\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(1) POST(0)

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

TRAFFIC FLOW

PLAN VIEW

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

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

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

13/16" DIA. YIELDING HOLES

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

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

POST 40" DEPTH (TYP 1-8)

POST(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

6'-1⅜"

ELEVATION VIEW

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

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

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

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

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

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

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

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR. DH PN: 3245G

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

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

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

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

(2) ANCHOR POST ANGLE PN: 15201G

6'-1 ⅜" POST DEPTH

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

6" X 8" X 14" BLOCKOUT WOOD

W-BEAM RAIL 25'-0"

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST 32" HEIGHT

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 ⅞")
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.

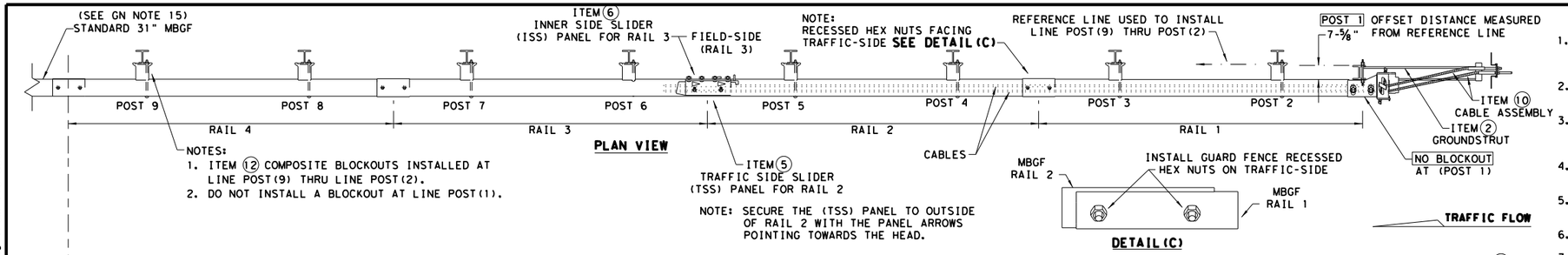
Texas Department of Transportation

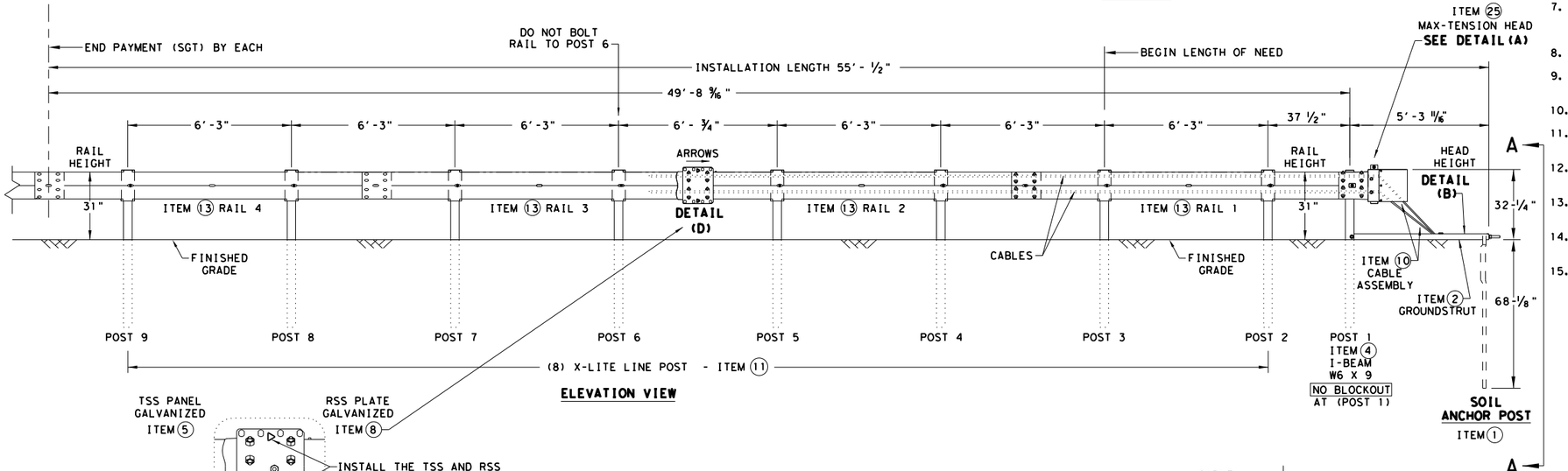
Design Division Standard

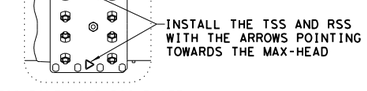
TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3
SGT(10S)31-16

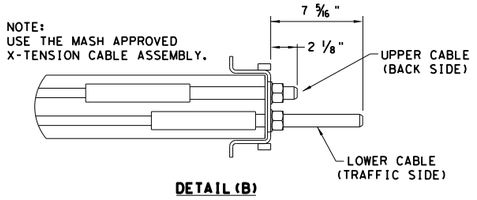
FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		65

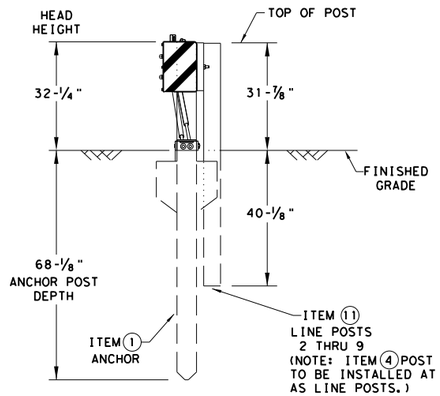
DATE: 12/10/2021
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\1H20\23740309\Sheet Files\STANDARD\sgt11s3118.dgn

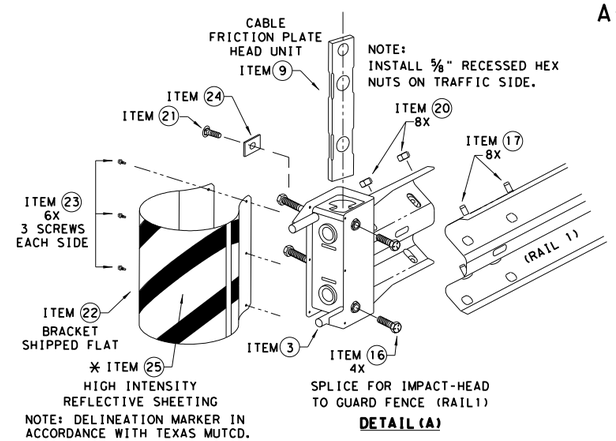


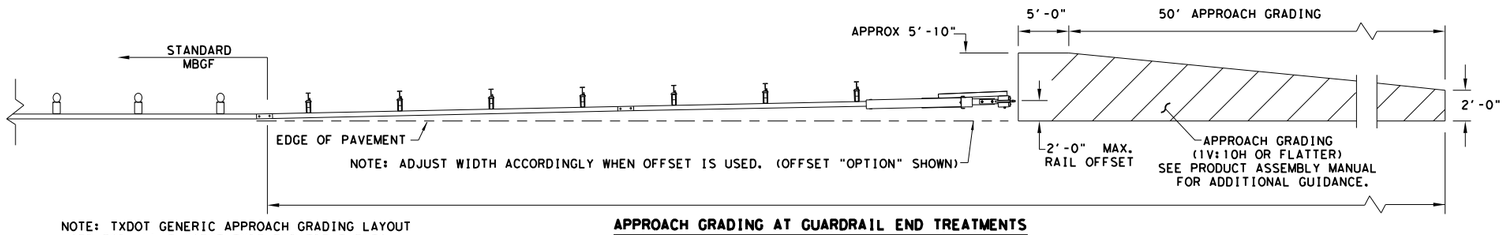












GENERAL NOTES

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.

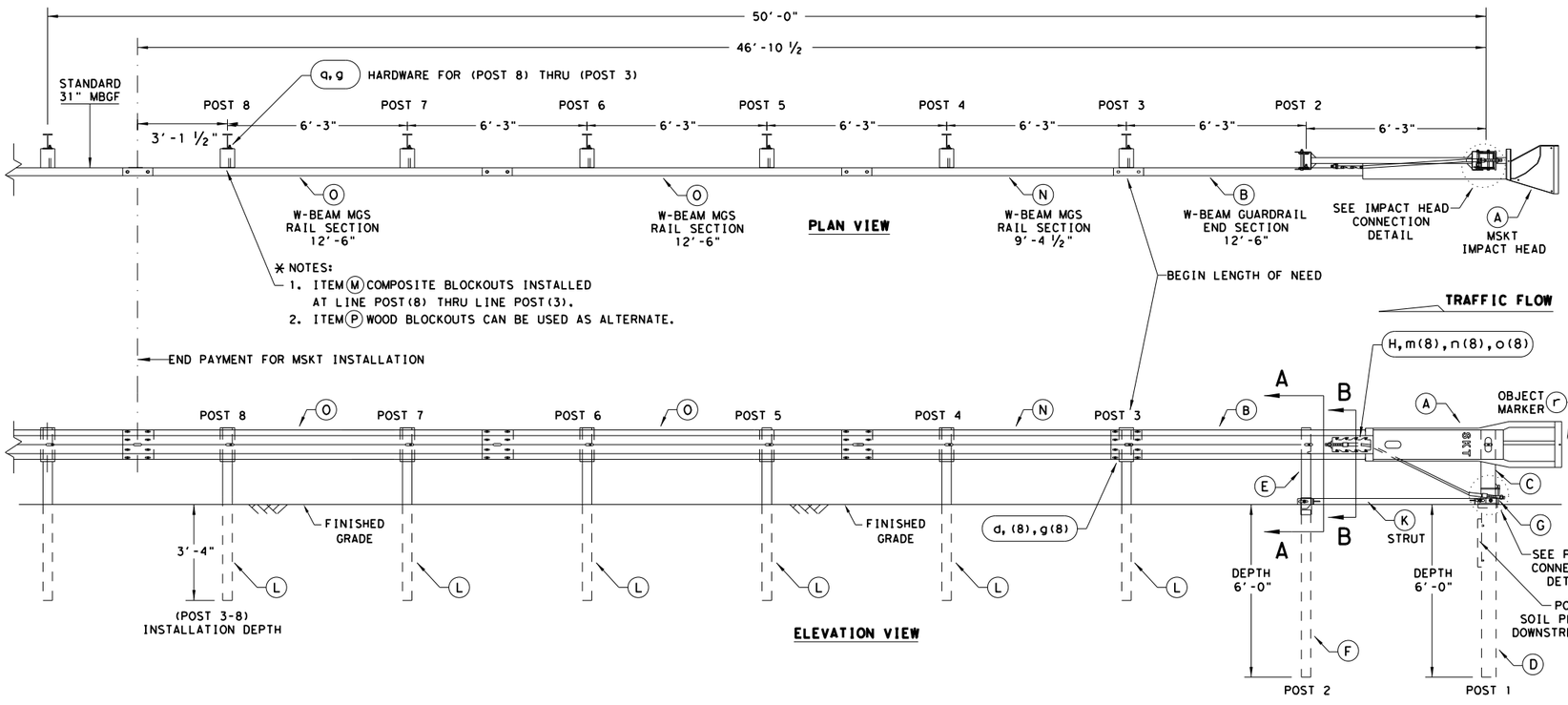
Texas Department of Transportation

Design Division Standard

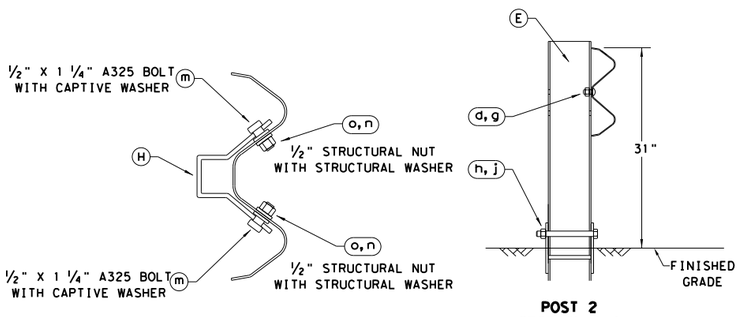
MAX-TENSION END TERMINAL
MASH - TL-3
SGT(11S)31-18

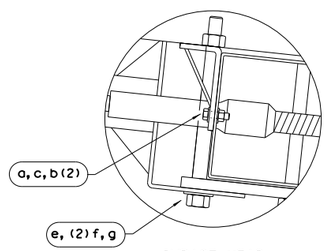
FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		66

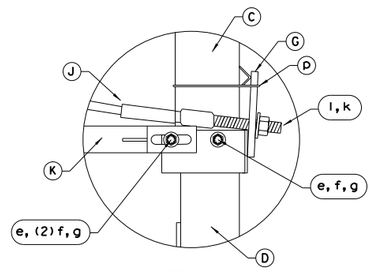
DATE: 12/10/2021
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\1H20\23740309\Sheets\STNDRDWY\sgt12s3118.dgn

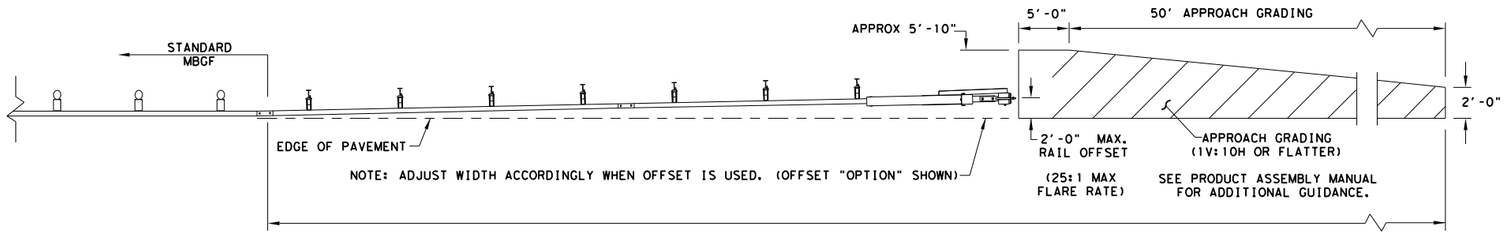


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.









APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

GENERAL NOTES

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

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

SEE NOTES: *

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

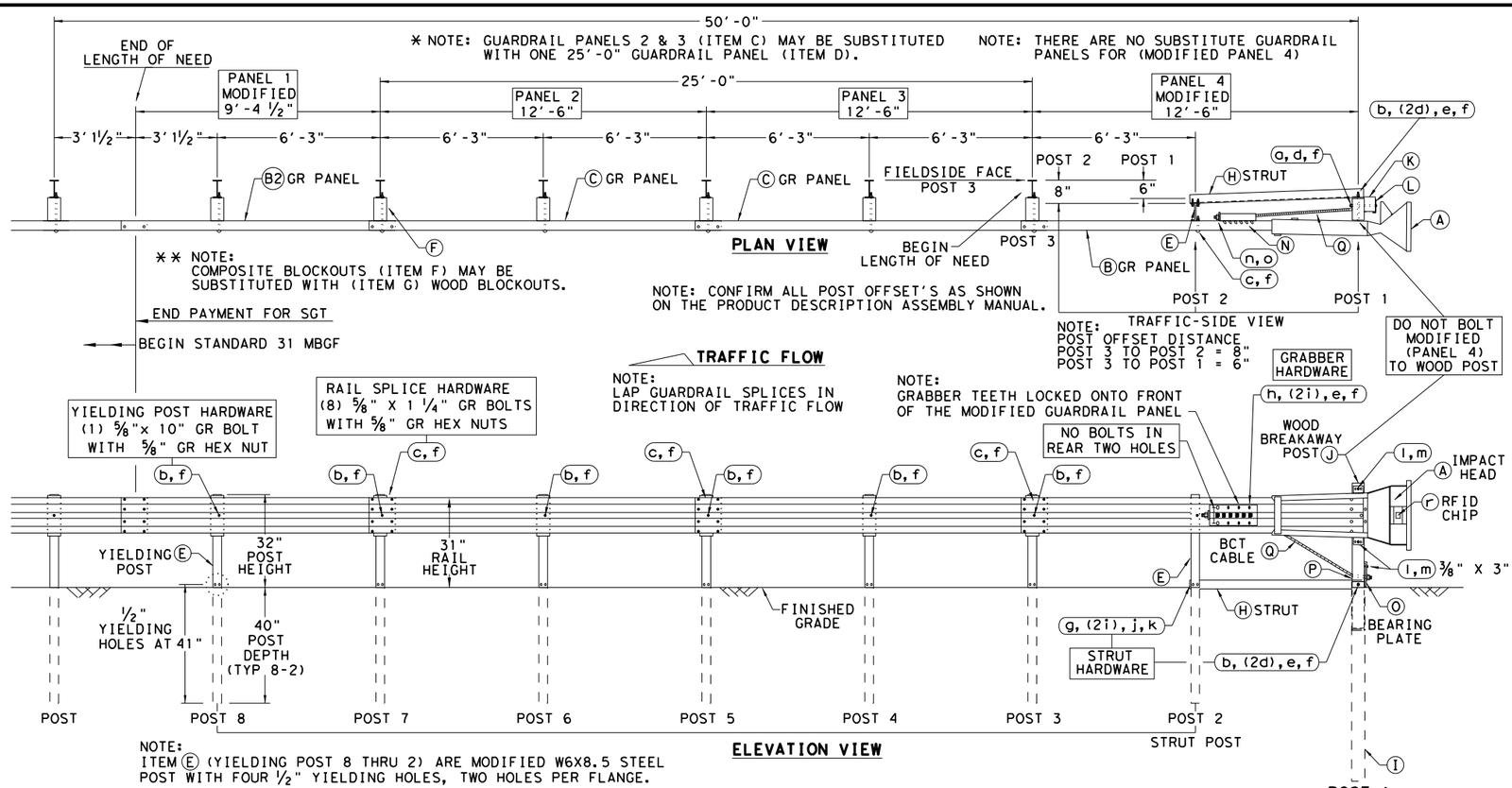
Texas Department of Transportation

Design Division Standard

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

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		67

DATE: 12/10/2021
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\ON\IH20\23740309\Sheets\STND\RDWY\sgt153120.dgn

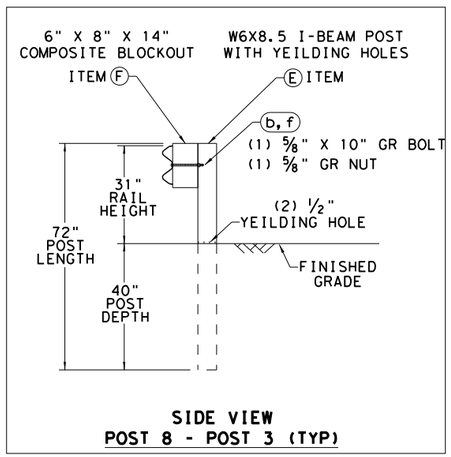


GENERAL NOTES

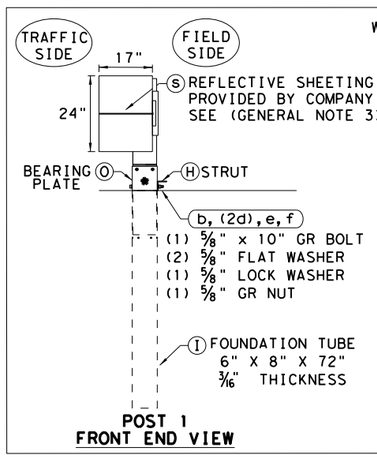
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

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

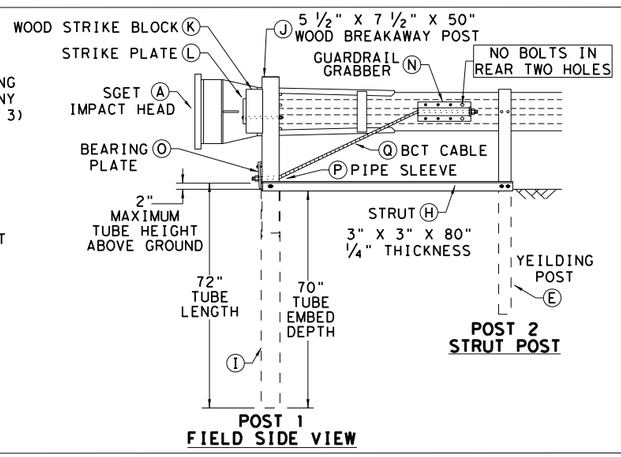
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



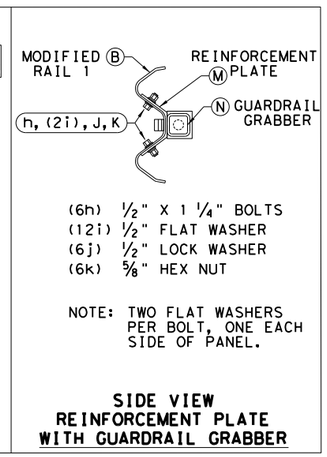
SIDE VIEW
POST 8 - POST 3 (TYP)



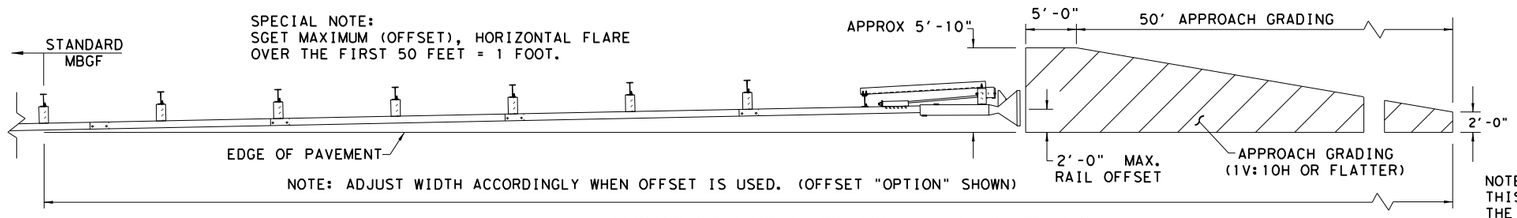
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

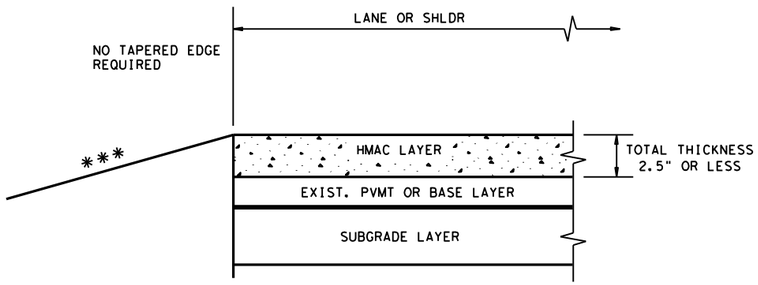
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Texas Department of Transportation
Design Division Standard

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

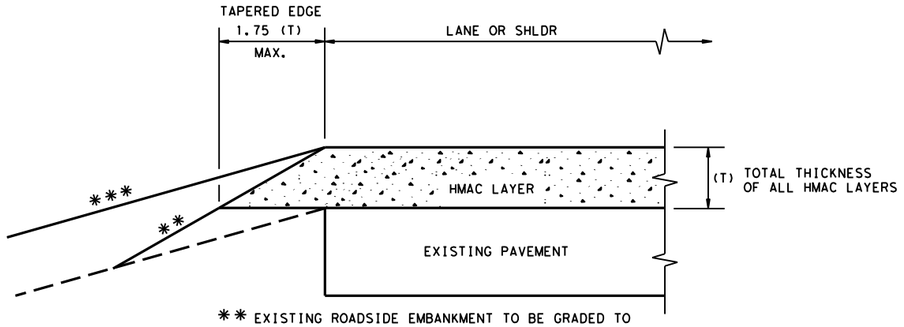
FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP		
©TxDOT: APRIL 2020	CONT	SECT	JOB		HIGHWAY	
REVISIONS	2374	03	091		IH 20	
	DIST	COUNTY			SHEET NO.	
	DALLAS	DALLAS			68	

DATE: 12/10/2021
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\on\IH20\23740309l\Sheets\STNDRDWY\tehmac11.dgn



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

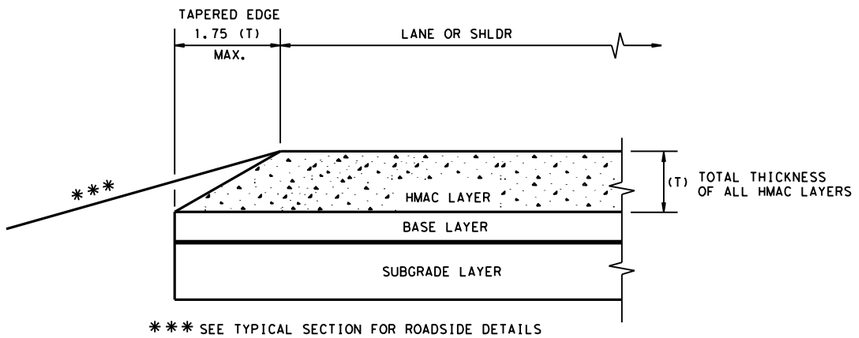
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



** 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.

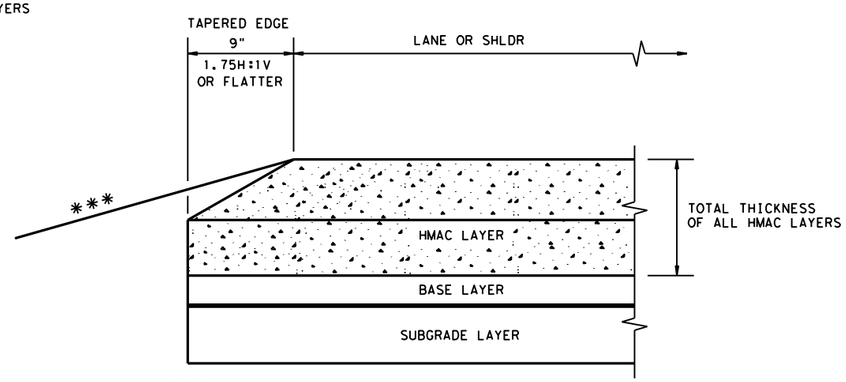
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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

TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
© TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		69

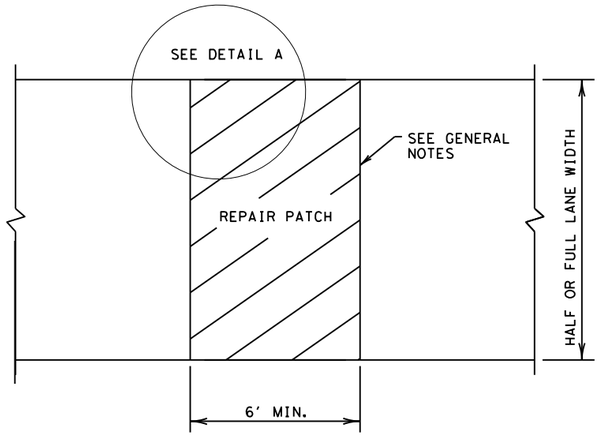
DATE: 12/10/2021
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\STND\RDWY\repcp14.dgn

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

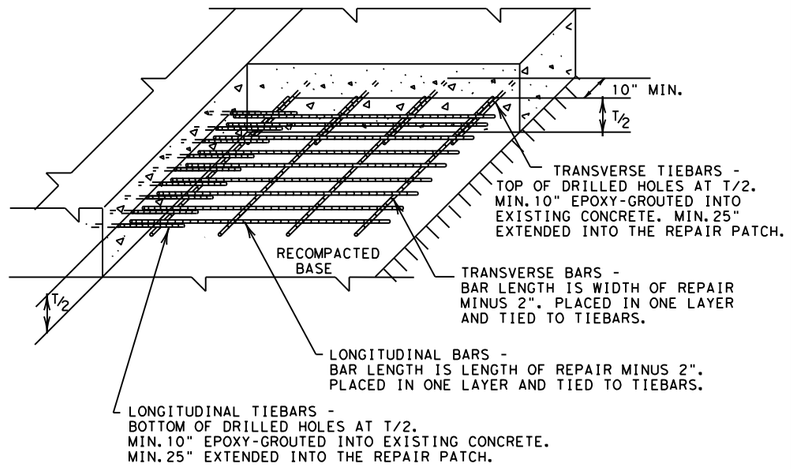
* USE 12" SPACING AS FIRST AND LAST SPACING AT END OR SIDE FOR ALL BARS.

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."



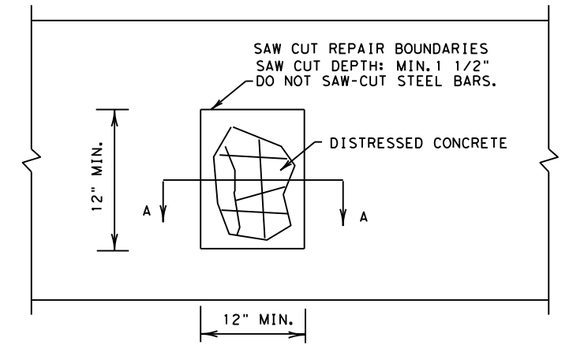
PLAN VIEW



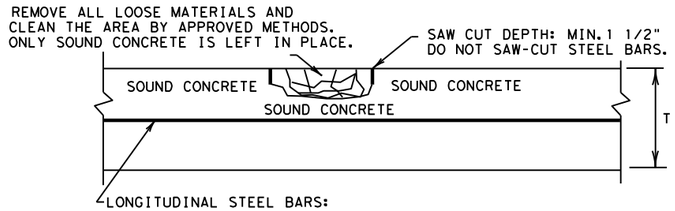
DETAIL A
GROUTED TIEBARS & REINFORCEMENT

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

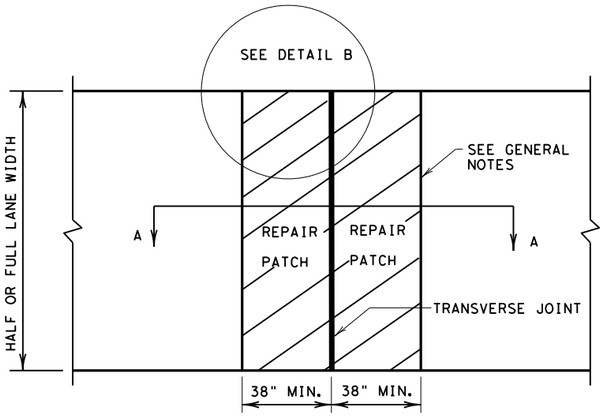
Texas Department of Transportation | Design Division Standard

REPAIR OF CONCRETE PAVEMENT

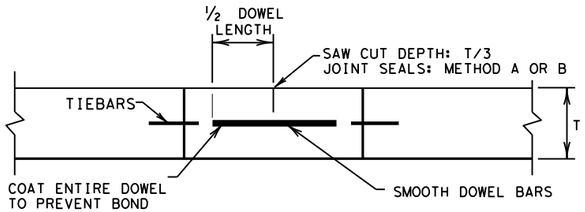
REPCP-14

FILE: repcp14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
©TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		70

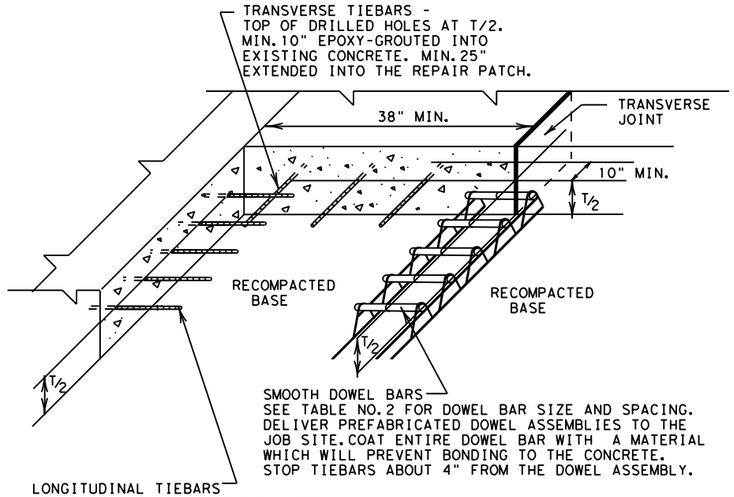
DATE: 12/10/2021
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\STND\RDWY\repcp14.dgn



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

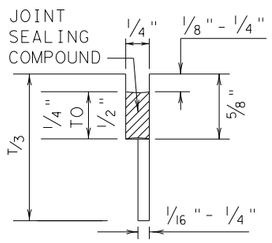
REPAIR OF CONCRETE PAVEMENT

REPCP-14

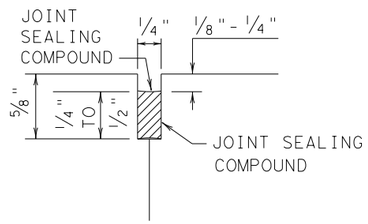
FILE: repcp14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
© TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		71

DATE: 12/10/2021
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\23740309\Sheets\STND\RDWY\js14.dgn

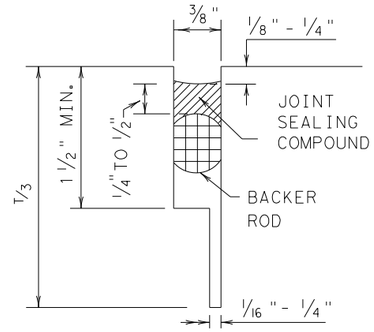
METHOD B: JOINT SEALING COMPOUND



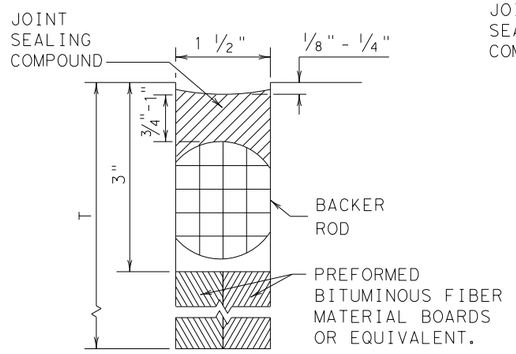
LONGITUDINAL SAWED CONTRACTION JOINT



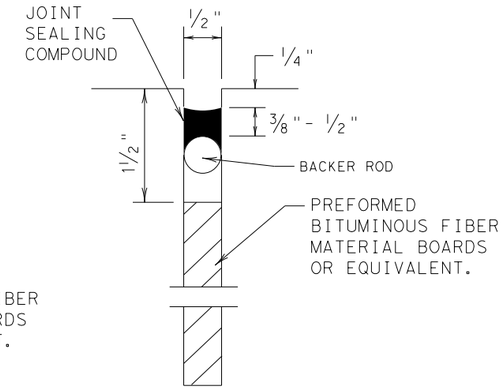
LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT

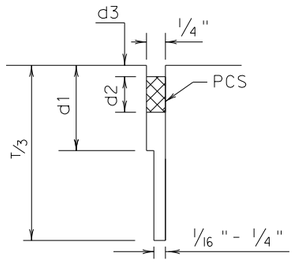


TRANSVERSE FORMED EXPANSION JOINT

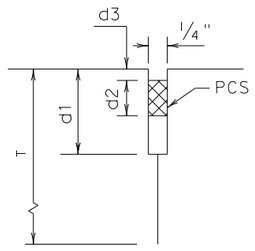


FORMED ISOLATION JOINT

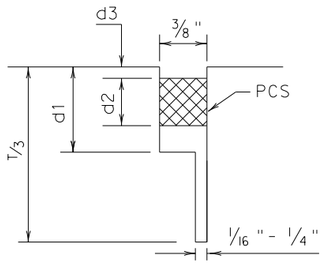
METHOD A: PREFORMED COMPRESSION SEALS (PCS)(DMS-6310 CLASS 6)



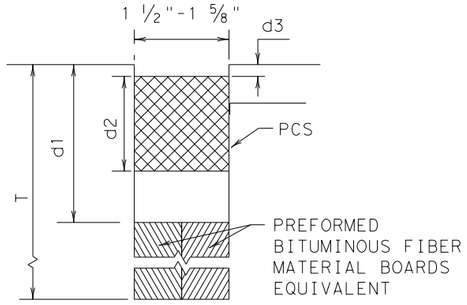
LONGITUDINAL SAWED CONTRACTION JOINT



LONGITUDINAL CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT



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

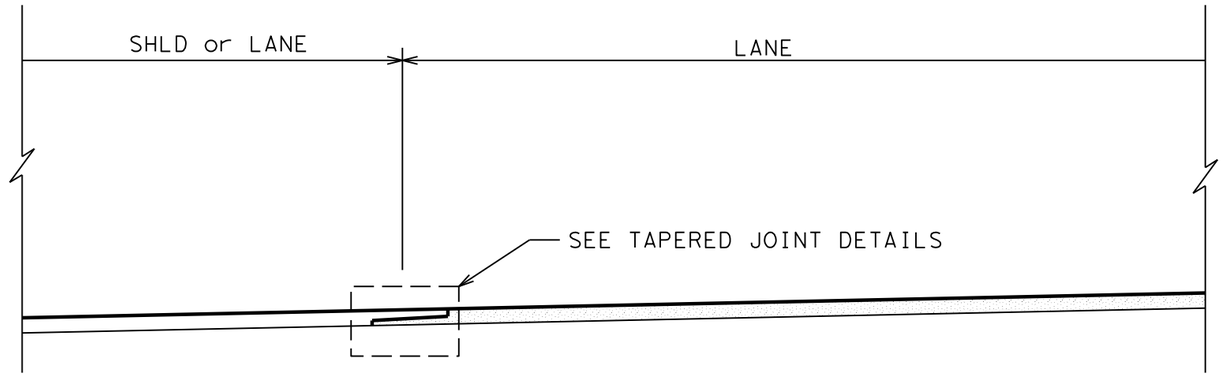
Design Division Standard

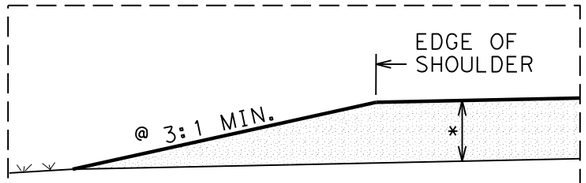
CONCRETE PAVING DETAILS

JOINT SEALS

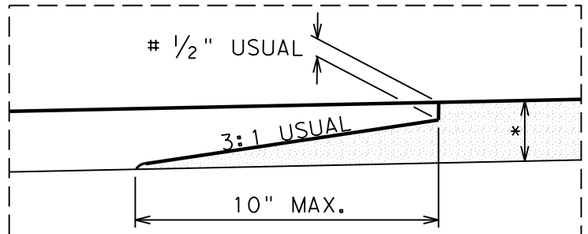
JS-14

FILE: js14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
©TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		72

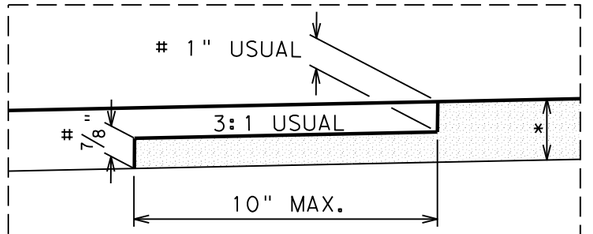




TAPERED OUTSIDE EDGE DETAIL



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

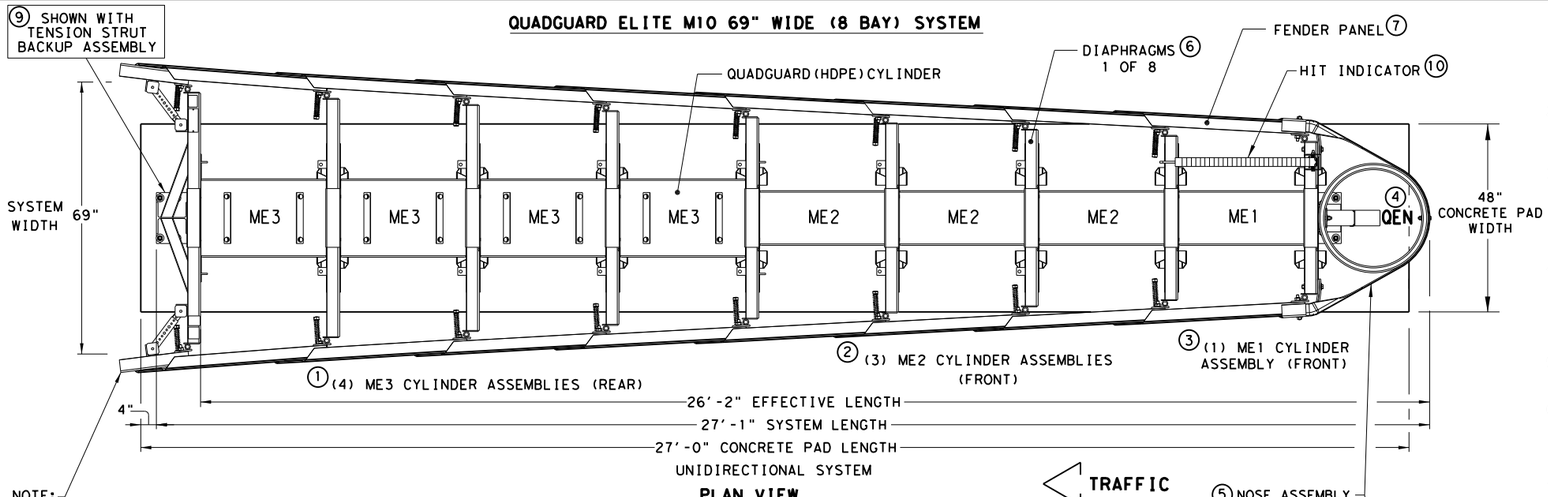
HOT MIX EDGE AND LONGITUDINAL JOINT DETAILS DALLAS DISTRICT STANDARD

LJD(1-1)-07

FED. RD. DIV. NO.	PROJECT NUMBER		SHEET NUMBER
18	(SEE TITLE SHEET)		73
STATE	DISTRICT	COUNTY	
TEXAS	DALLAS	DALLAS	
CONTROL	SECTION	JOB	HIGHWAY NUMBER
2374	03	091	IH 20

DATE: 12/10/2021
FILE: \\TXDOT40VDALHQ\Dot01\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\STND\ROWY\quadguard elite m10w.dgn

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.

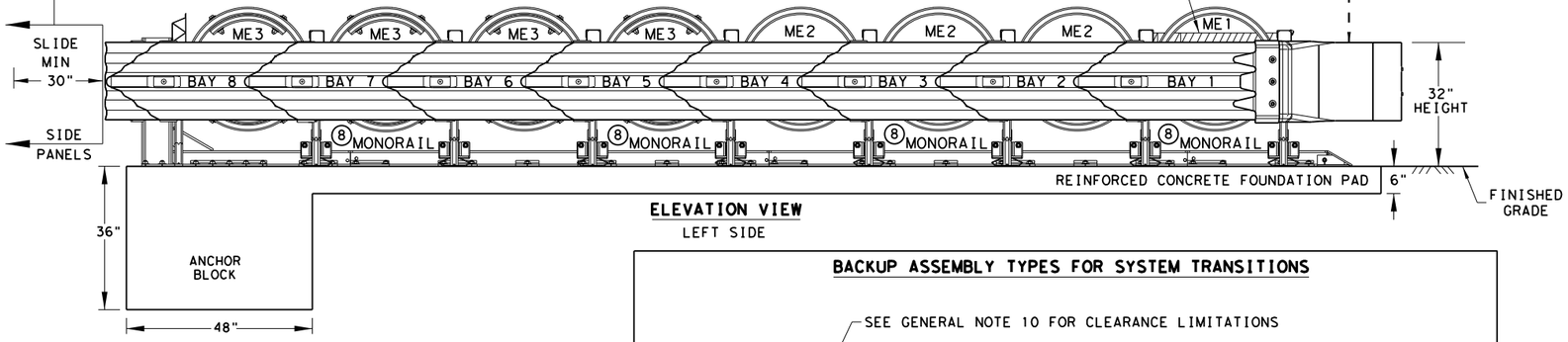
PLAN VIEW

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.

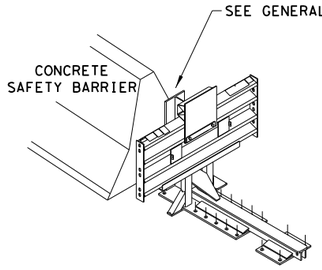
8" NON-REINFORCED CONCRETE PAD MAY NOT REQUIRE AN ANCHOR BLOCK, IF THE PAD IS INSTALLED AGAINST AN IMMOVABLE CONCRETE BACKUP.

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

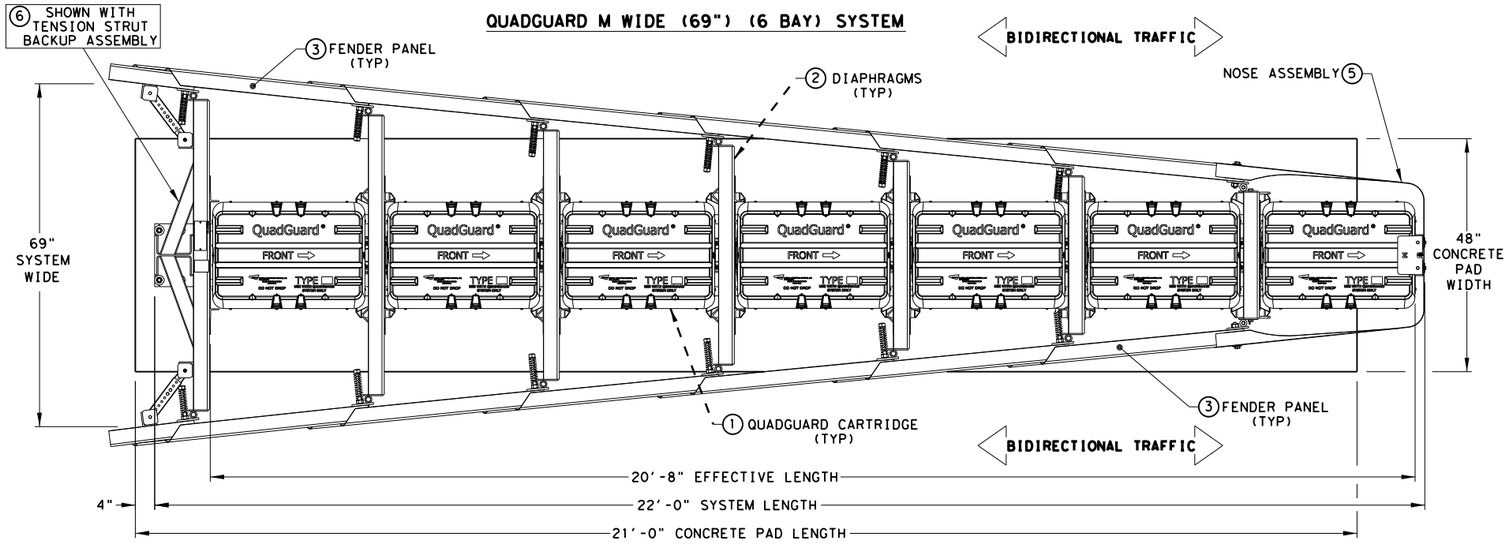
TRINITY HIGHWAY ENERGY ABSORPTION QUADGUARD ELITE M10 WIDE (MASH TL-3)

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	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		74

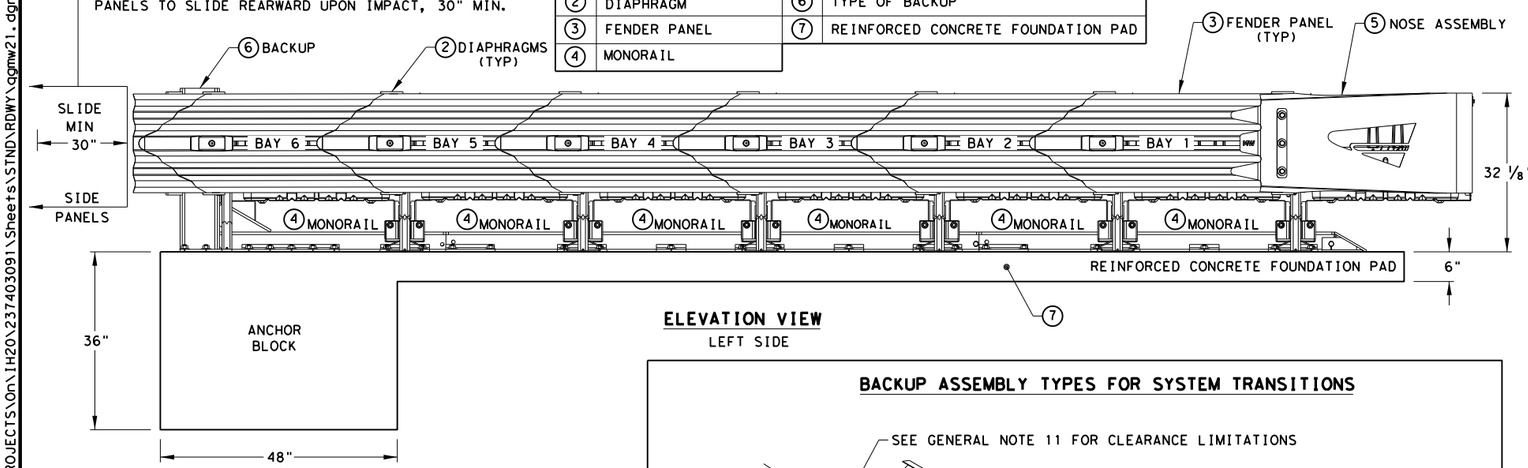
DATE: 12/10/2021
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\1H20\23740309\Sheets\STNDRDWY\qgmw21.dgn

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.

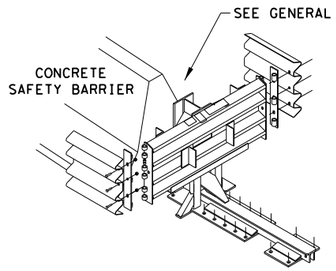
8" NON-REINFORCED CONCRETE PAD MAY NOT REQUIRE AN ANCHOR BLOCK, IF THE PAD IS INSTALLED AGAINST AN IMMOVABLE CONCRETE BACKUP.

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

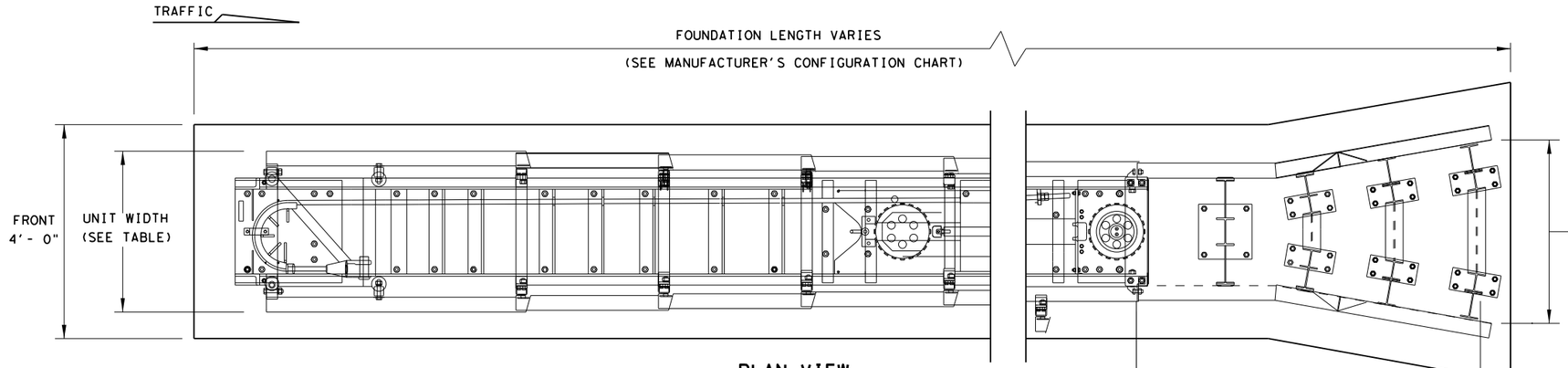
Design Division Standard

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

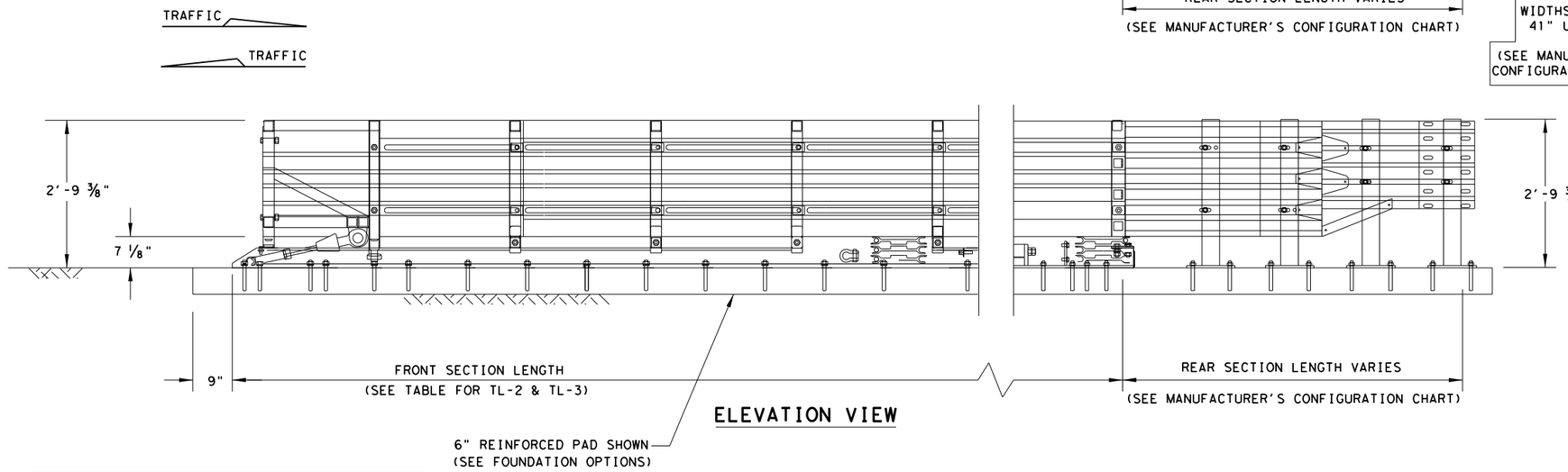
QG(M)(W)-21

FILE: qgmw21.dgn	DN: TXDOT	CK: KM	DW: SS	CK: CL
©TxDOT: JULY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		75

DATE: 12/10/2021
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\STND\RDWY\smtcw16.dgn



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

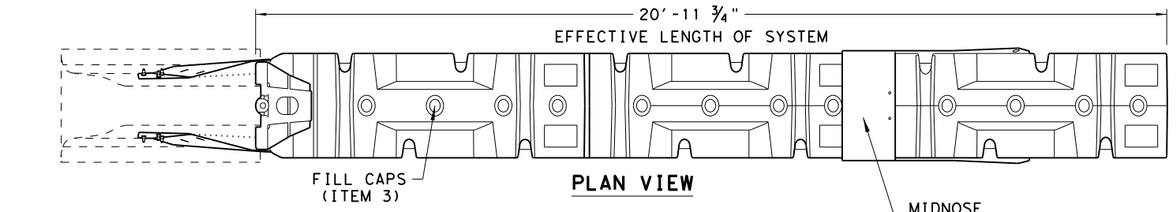
WORK AREA PROTECTION CORP (SMART-WIDE)

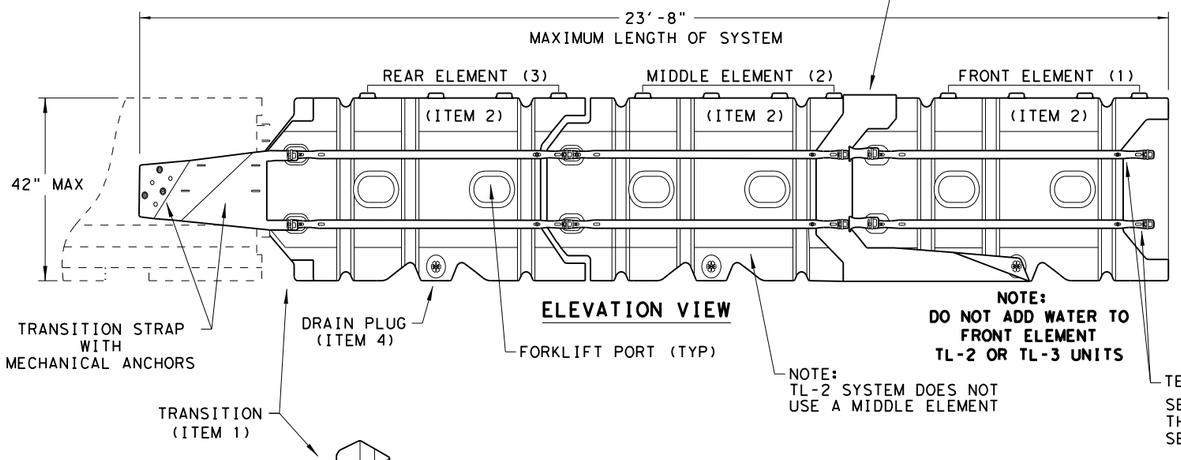
SMTC(W)-16

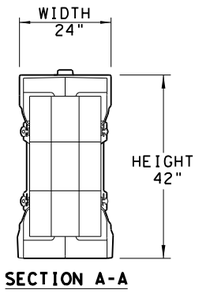
FILE: smtcw16.dgn	DN: TxDOT	CK: KM	DW: BD/VP	CK: VP
© TxDOT: FEBRUARY 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
REVISED 06, 2013 VP REVISED 03, 2016 VP REVISED 04, 2018 VP	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		76

DATE: 12/10/2021
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\23740309\Sheets\STND\RDWY\absorbm19.dgn

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.

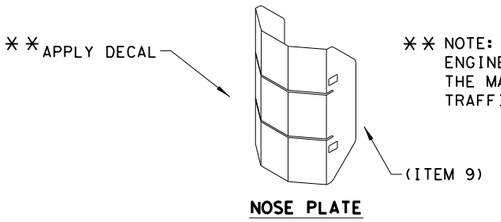
GENERAL NOTES

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.

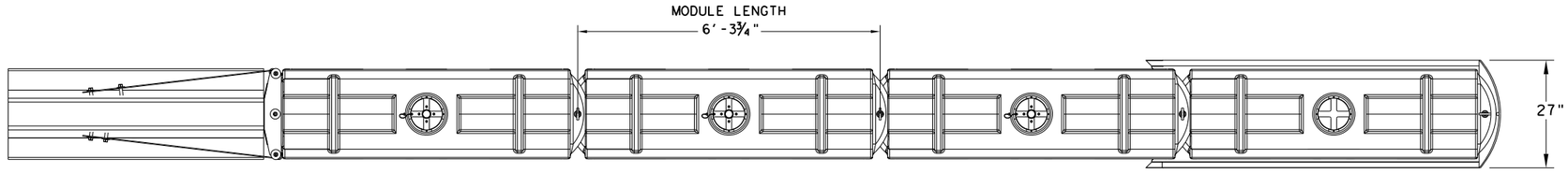
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE ABSORB-M, IT IS NOT INTENDED TO REPLACE THE INSTALLATION INSTRUCTIONS MANUAL.

SACRIFICIAL

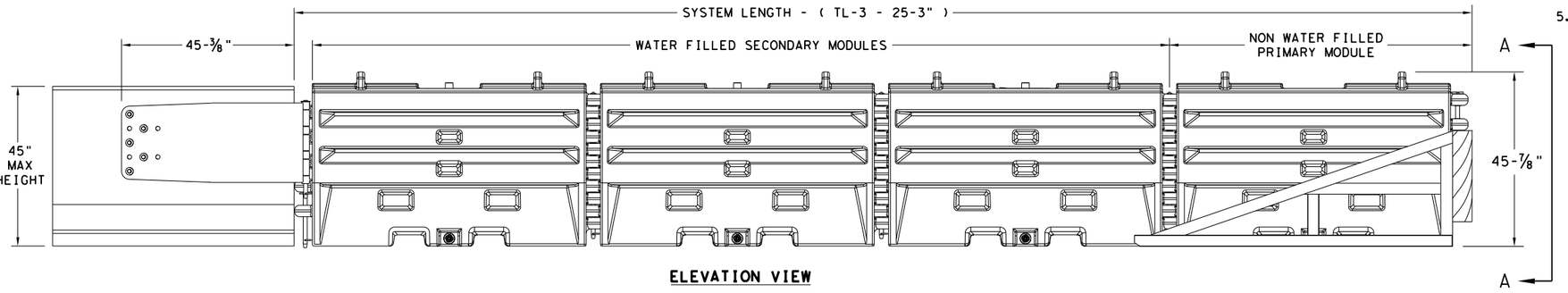
Texas Department of Transportation — Design Division Standard

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	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		77



PLAN VIEW



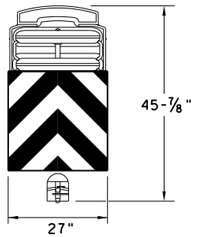
ELEVATION VIEW

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"



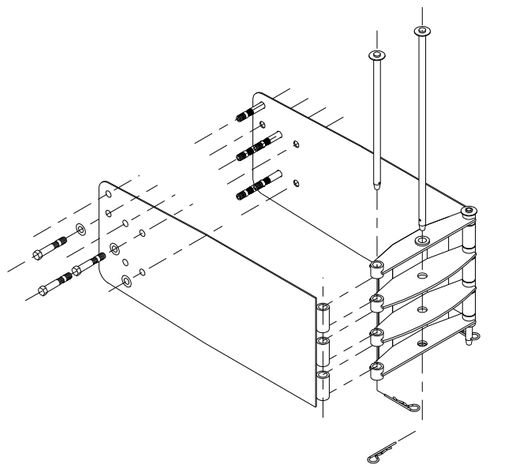
SECTION A-A

NOSE SHEETING PANEL DELINEATION

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

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



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

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:
©TxDOT: DECEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		78

DATE: 12/10/2021
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\ON\IH20\23740309 1\Sheets\STND\RDWY\sled19.dgn

SUMMARY OF ESTIMATED QUANTITIES

Pay item #	Description	Unit	Total
401-6001	FLOWABLE BACKFILL	CY	13
428-6001	PENETRATING CONCRETE SURFACE TREATMENT	SY	24173
429-6004	CONC STR REPAIR(RAPID DECK REP(PRT DPT)	SF	341
429-6007	CONC STR REPAIR (VERTICAL & OVERHEAD)	SF	908
438-6004	CLEANING AND SEALING EXIST JOINTS(CL7)	LF	2670
451-6024	RETROFIT RAIL (TY SSTR)	LF	4816
499-6001	ADJUST STEEL SHOES	EA	11
514-6036	PERM CTB (TRAN SSCB TO SSTR) (MOD)	LF	160
778-6001	CONCRETE RAIL REPAIR (IN-KIND)	LF	8
780-6004	CONC CRCK REPR(DISCRETE)(ROUT AND SEAL)	LF	150
785-6010	BRIDGE JOINT REPLACEMENT (ARMOR)	LF	214

GENERAL NOTES:

QUANTITIES VARIATIONS:

1. Quantities shown are based on the best information available. Actual quantities shall be field measured and paid for at the unit price bid. Limits of work for surface repairs shall be as directed by the Engineer.
2 Field verify limits and quantities shown prior to beginning work. Report substantial discrepancies to the Engineer of record for resolution adjustment of quantities as deemed neccessary. Payment will be for the field measured repair at the unit price bid.

UNEXPECTED CONDITIONS:

1. If conditions other than those indicated are encountered, perform repairs in accordance with any applicable details provided in the plans. In the event that no details provided fit the situation encountered, place temporary protection over the location as directed by the Engineer and refer the problem to the District Bridge Section for resolution. Provide the District Bridge Section with appropriate photos, sketches with dimensions and other material necessary to fully describe the problem.

JOINT SEALANT REQUIREMENTS:

1. Provide Class 7 Joint Sealant meeting the provisions of DMS-6310. Apply sealant in accordance with the provisions of Item 454. Prepare surfaces where sealant is to be placed in accordance with the manufacturers specifications. Prior to placing sealant, remove all debris, dirt, dust, saw cuttings and other foreign material from the joint by an approved method. See Items 438 and 454 for cleaning requirements and procedures. Extend sealant up into the rail or curb 6 inches on the low side or sides of the deck.

CONCRETE REQUIREMENTS:

1. For deck repair, use Class K concrete with aggregate grades 2-5 meeting a strength requirement of 4000 psi at 4 hours of curing time. Use Type A bagged materials in accordance with DMS 4655 as an alternative.
2. For concrete spalls repair, use Class "C" Concrete. Fc' = 3600 psi. Use Type C repair materials in accordance with DMS 4655 as an alternative.
3. All reinforcing steel shall be grade 60.
4. Concrete shall be of a low shrinkage or shrinkage controlled type.
5. Submit proposed repair material to the Engineer for approval.
6. Existing concrete shall be in saturated surface dry condition at the time of new concrete placement.
7. Provide repair materials and Perform all concrete repair work in accordance with Item 429 and TXDOT 2021 Concrete Repair Manual

ABUTMENT STEEL BEARING REPAIR NOTES:

1. Contractor must shore end span prior to beginning repair on abutment bearing.
2. Contractor must submit shoring details to TxDOT prior to beginning work.
3. Conduct work in accordance with Specification Item 784 " Steel member Repair " and Item 499. "Adjust Steel Shoes" or as approved by Engineer.

CLEANING DEBRIS:

1. Clear all debris from top of cap by methods that will not damage concrete or bearing devices (including coatings on steel bearings). See Special Specifications 7212 for cleaning requirements and procedures. Cleaning, removing and disposing of debris shall be subsidiary to various bid items.

STATE OF TEXAS
MAC A. WASSEF
121015
LICENSED
PROFESSIONAL ENGINEER

Mac Wassef

12/28/2021

1 OF 1

Texas Department of Transportation
Dallas District Bridge

IH 20
BRIDGE REPAIR

GENERAL NOTES
&
ESTIMATED QUANTITIES

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		79

NBI	Feature Crossed	Facility Carried	Location	428-6001 PENETRATING CONCRETE SURFACE TREATMENT (SY)	429-6004 CONC STR REPAIR(RAPID DECK REP(PRT DPT) (SF)	780-6004 CONC CRCK REPR(DISCRETE)(ROUT AND SEAL) (LF)
18-057-0-2374-03-146	Houston School Rd	IH 20 EB	Typ. Deck Spalls	1647		
			Abutment 1			
			Span 1		20	50
			Bent 2			
			Span 2		20	50
			Bent 3			
			Span 3		20	50
			Abutment 4			
18-057-0-2374-03-147	Houston School Rd	IH 20 WB	Abutment 1	1647		
			Span1			
			Bent 2			
			Span2			
			Bent 3			
			Span3			
			Abutment 4			
			Total	3294	60	150

NOTES:

1. For joint repair, see joint repair detail sheets.
2. For concrete substructure repair, see concrete Vertical and overhead repair detail sheet.
3. For bridge rail repair, see rail repair detail sheet.
4. For bridge deck repair, see deck repair detail sheet.

Repair quantities and locations may vary in the field; limits of repair shall be as directed by the Engineer.

STATE OF TEXAS
MAC A. WASSEF
121015
LICENSED
PROFESSIONAL ENGINEER

Mac Wassef

12/28/2021

Texas Department of Transportation | Dallas District Bridge

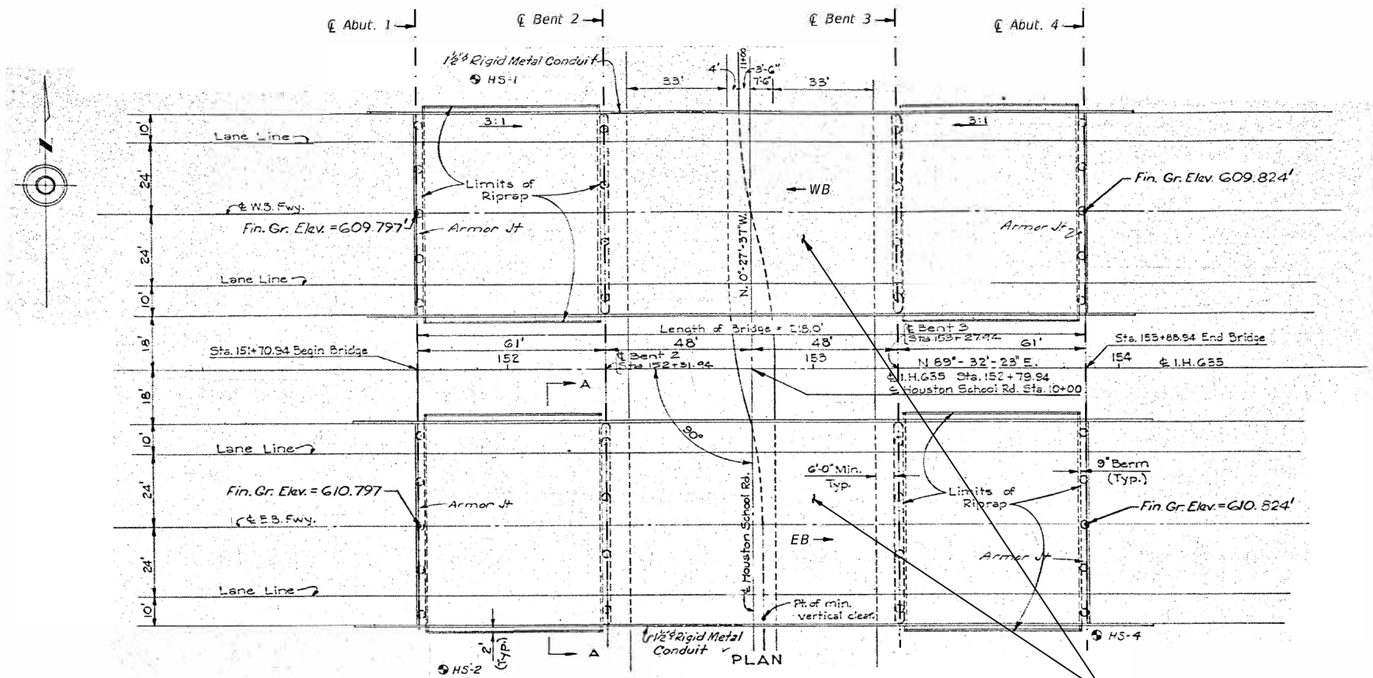
IH 20

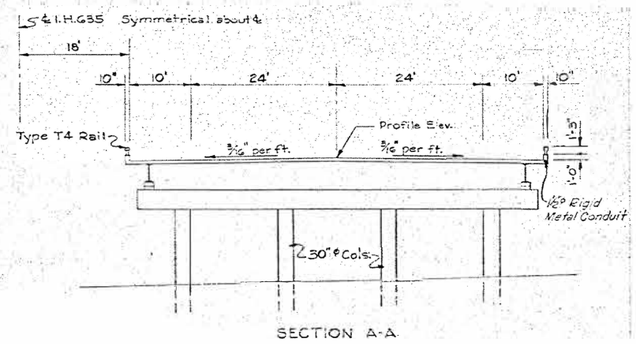
HOUSTON SCHOOL RD OVERPASS
ESTIMATED REPAIR QUANTITIES

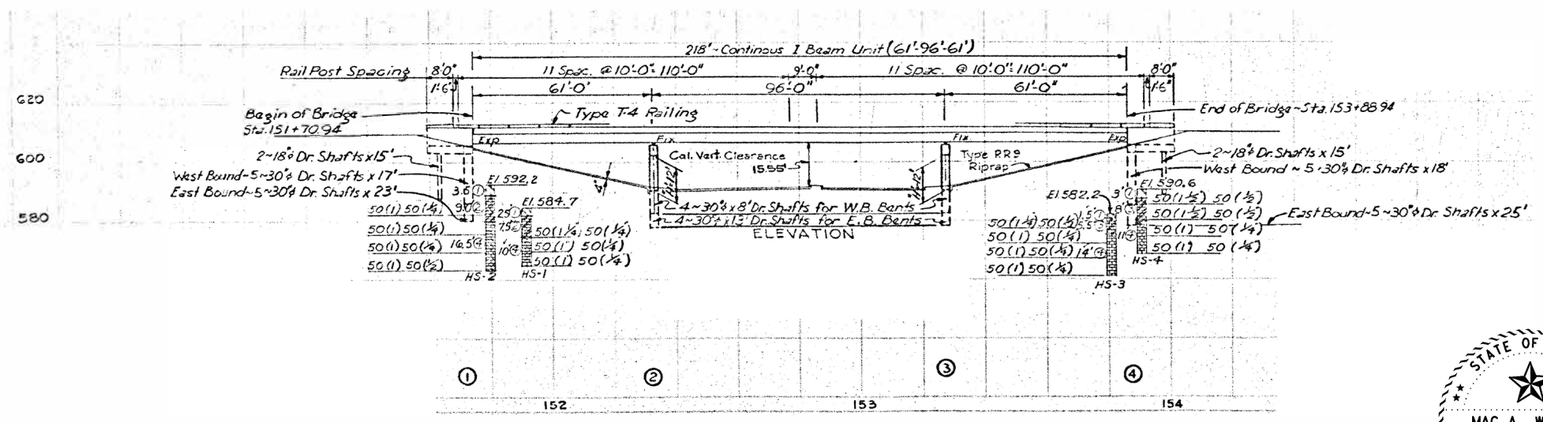
FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		80

User: $$$NODE$$$

DATE: $$$$date$$$$ TIME: $$$$$$TIME$$$$$$$ FILE: $$$$$$$$$$$$$$$$$$$$$$$$$$$$dgnspec$$$







NOTE:

See Estimated Quantities Table for the Location and Type of Repairs.

Repair quantities and locations may vary in the field; limits of repair shall be as directed by the Engineer.

NBI: 18-057-0-2374-03-146 EB
NBI: 18-057-0-2374-03-147 WB

2 OF 2

MAC A. WASSEF
121015

Mac Wassef

12/28/2021

Texas Department of Transportation

Dallas District Bridge

IH 20

HOUSTON SCHOOL RD OVERPASS
REPAIR LAYOUT

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		81

NBI	Feature Crossed	Facility Carried	Location	428-6001 PENETRATING CONCRETE SURFACE TREATMENT (SY)	429-6004 CONC STR REPAIR(RAPID DECK REP(PRT DPT) (SF)	429-6007 CONC STR REPAIR (VERTICAL & OVERHEAD) (SF)	438-6004 CLEANING AND SEALING EXIST JOINTS(CL7) (LF)	499-6001 ADJUST STEEL SHOES (EA)	778-6001 CONCRETE RAIL REPAIR (IN-KIND) (LF)
18-057-0-2374-03-144	IH 20	SH 342 (Lancaster)	Typ. Deck Spalls	3575					
			Abutment 1				101		
			Span 1						
			Bent 2						
			Span 2		40				
			Bent 3						
			Span 3						
			Bent 4						
			Span 4			40			8
			Abutment 5				101	1	
			Total	3575	40	40	202	1	8

PHOTO 1: CORRODED BEARING
@ ABUT. 5 @ BEAM 6 FROM WEST

Repair quantities and locations may vary in the field; limits of repair shall be as directed by the field Engineer.

NOTES:

1. For joint repair, see joint repair detail sheets.
2. For concrete substructure repair, see concrete Vertical and overhead repair detail sheet.
3. For bridge rail repair, see rail repair detail sheet.
4. For beam bearing repair, see rocker bearing repair detail sheet.

STATE OF TEXAS
MD NOORE A. SARKAR
133572
LICENSED PROFESSIONAL ENGINEER
11/10/2021

1 OF 2

Texas Department of Transportation

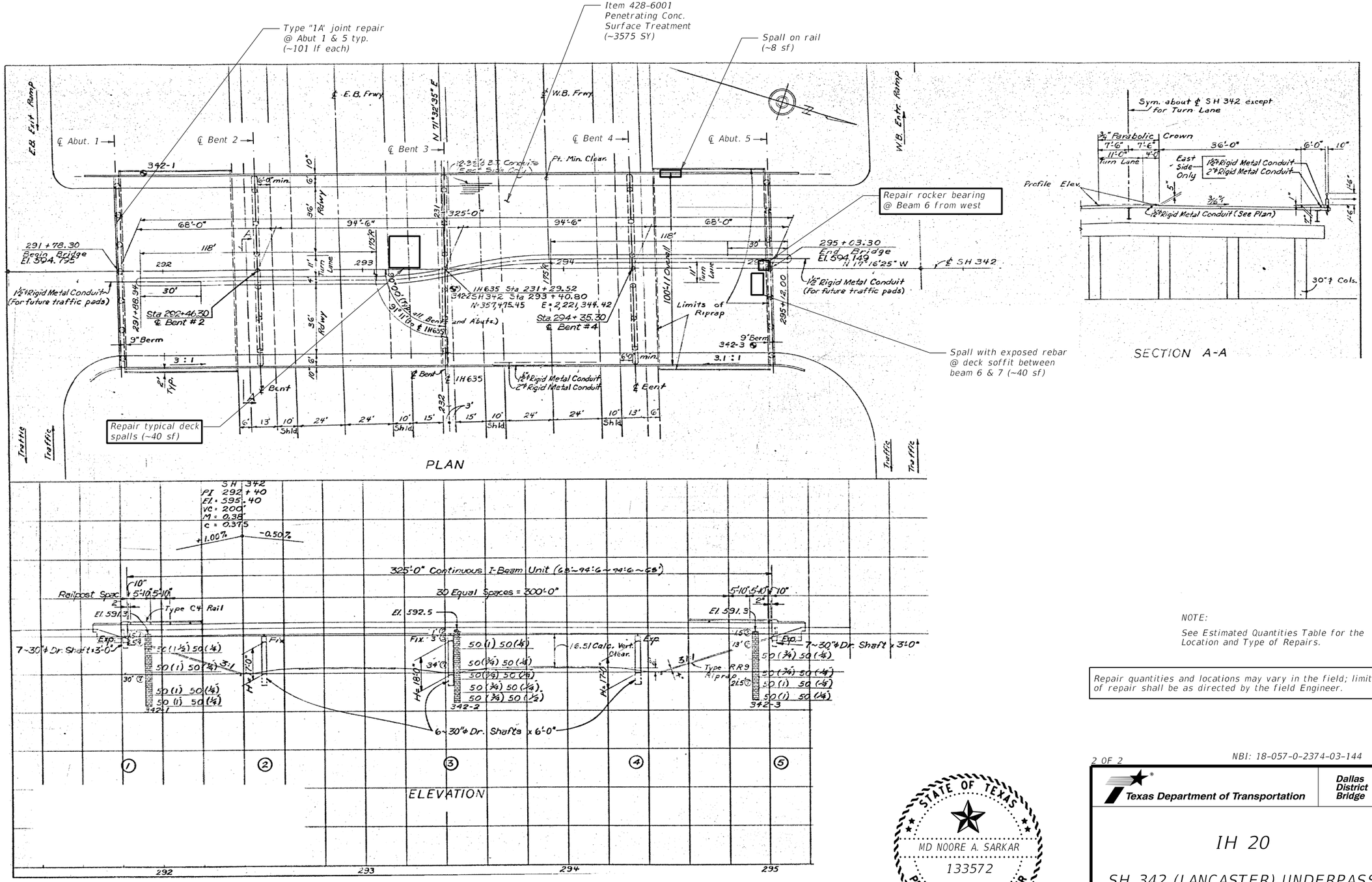
Dallas District Bridge

IH 20

SH 342 (LANCASTER) UNDERPASS ESTIMATED REPAIR QUANTITIES

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		82

DATE: 11/7/2021 TIME: 7:31:32 PM FILE: \\FS-DALHQ.dot.state.tx.us\Data1\DATA\DAL\Groups\DALBRDG\Bridge Repair\2374-03-091, IH 20\Details\5-18-057-0-2374-03-144.dgn User: dalbrdg



NOTE:

See Estimated Quantities Table for the Location and Type of Repairs.

Repair quantities and locations may vary in the field; limits of repair shall be as directed by the field Engineer.

STATE OF TEXAS
MD NOORE A. SARKAR
133572
LICENSED PROFESSIONAL ENGINEER
11/10/2021

2 OF 2

NBI: 18-057-0-2374-03-144

Texas Department of Transportation

Dallas District Bridge

IH 20

SH 342 (LANCASTER) UNDERPASS REPAIR LAYOUT

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		83

NBI	Feature Crossed	Facility Carried	Location	401-6001 FLOWABLE BACKFILL	428-6001 PENETRATING CONCRETE SURFACE TREATMENT	429-6004 CONC STR REPAIR(RAPID DECK REP(PRT DPT)	429-6007 CONC STR REPAIR (VERTICAL & OVERHEAD)	438-6004 CLEANING AND SEALING EXIST JOINTS(CL7)	451-6024 RETROFIT RAIL (TY SSTR)	0514-6036 PERM CTB (TRAN SSCB TO SSTR) (MOD)	785-6010 BRIDGE JOINT REPLACEMENT (ARMOR)
				CY	SY	SF	SF	LF	LF	LF	LF
18-057-0-2374-03-140	Newton Creek	IH 20 EB	West Relief JT.					12	481		
			Abutment 1								100
			Span 1			20					
			Bent 2					100			
			Span 2			10					
			Bent 3					100			
			Span 3								
			Abutment 4								100
			East Relief JT.								
18-057-0-2374-03-141	Newton Creek	IH 20 WB	West Relief JT.		1621				481	40	
			Abutment 1				32				14
			Span1				32				
			Bent 2								
			Span2								
			Bent 3								
			Span3								
			Abutment 4	7							
			East Approach slab			50					
			East Relief JT.			16					
			Total	7	1621	96	64	212	962	40	214

NOTES:

1. For joint repair, see joint repair detail sheets.
2. For concrete substructure repair, see concrete Vertical and overhead repair detail sheet.
3. For bridge rail repair, see rail repair detail sheet.
4. For bridge deck repair, see deck repair detail sheet.
5. For bridge rail retrofit, see retrofit SSTR concrete rails sheets.

Repair quantities and locations may vary in the field; limits of repair shall be as directed by the Engineer.

MAC A. WASSEF
121015

Mac Wassef

12/28/2021

1 OF 2

Texas Department of Transportation | Dallas District Bridge

IH 20

NEWTON CREEK OVERPASS
ESTIMATED REPAIR QUANTITIES

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		84

DATE: $$$$date$$$$ TIME: $$$$$$TIME$$$$$$ FILE: $$$$$$$$$$$$$$$$$$$$$$$$$$$$sdgnspec$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$ User: $$$NODE$$$

Spall w/ exposed rebar on abutment backwall (~32 sf)

Spall with exposed rebar @ deck soffit (~32 sf)

Item 428-6001 Penetrating Conc. Surface Treatment (~1621 SY)

Type "2B" joint repair @ Abut 1 (~14 lf)

Deck spall @ East relief JT. (~8 sf each)

Item 451-6024 Retrofit Rail (TY SSTR) (Typ)

Transition Rail SSCB TO SSTR (20 ft)

Type "1B" joint repair @ West relief joint (~12 lf)

Type "2B" joint repair @ Abut 1 (~100 lf)

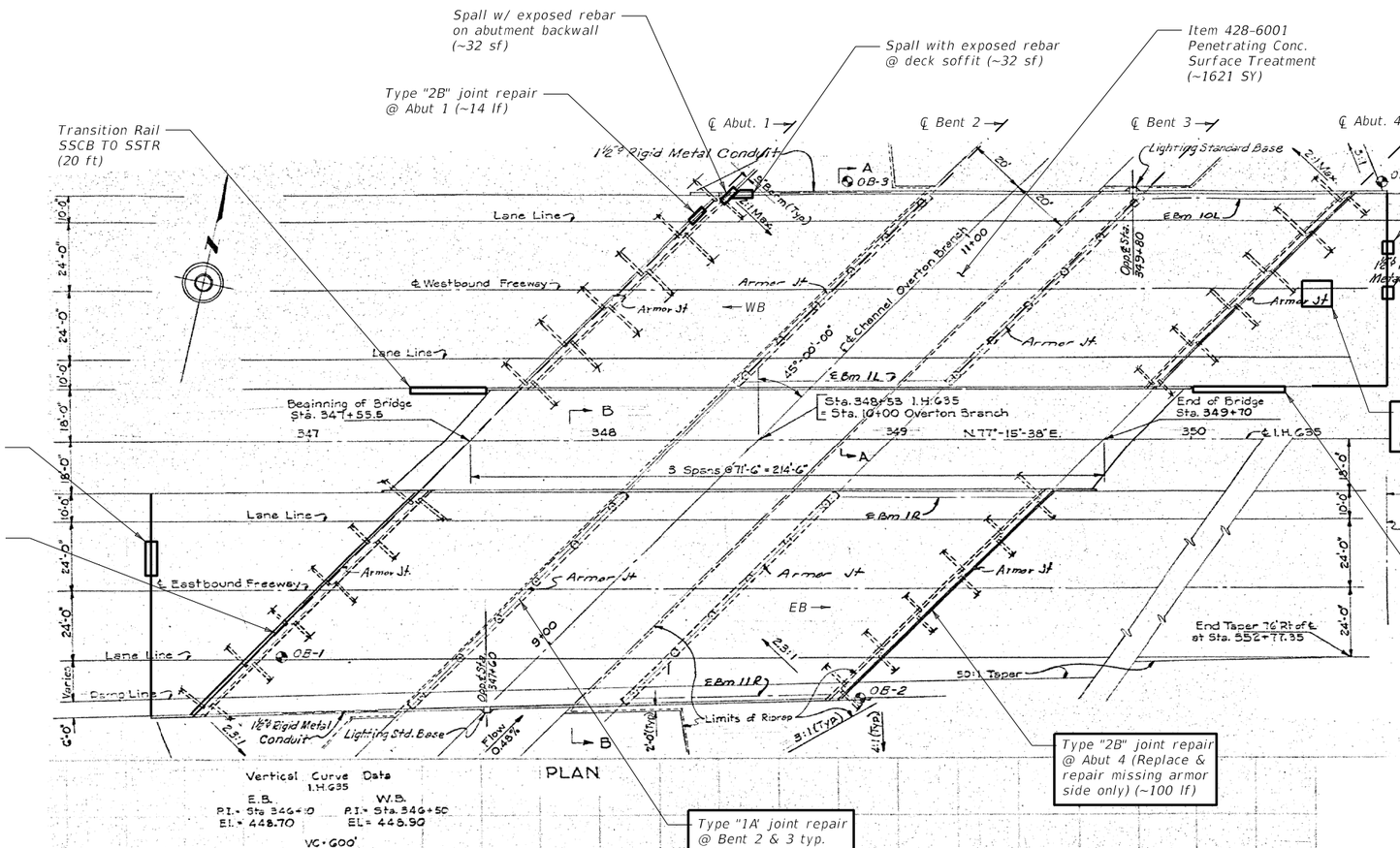
Replace settled patch @ approach slab (~50 sf)

Type "2B" joint repair @ Abut 4 (Replace & repair missing armor side only) (~100 lf)

Type "1A" joint repair @ Bent 2 & 3 typ. (~100 lf each)

Item 451-6024 Retrofit Rail (TY SSTR) (Typ)

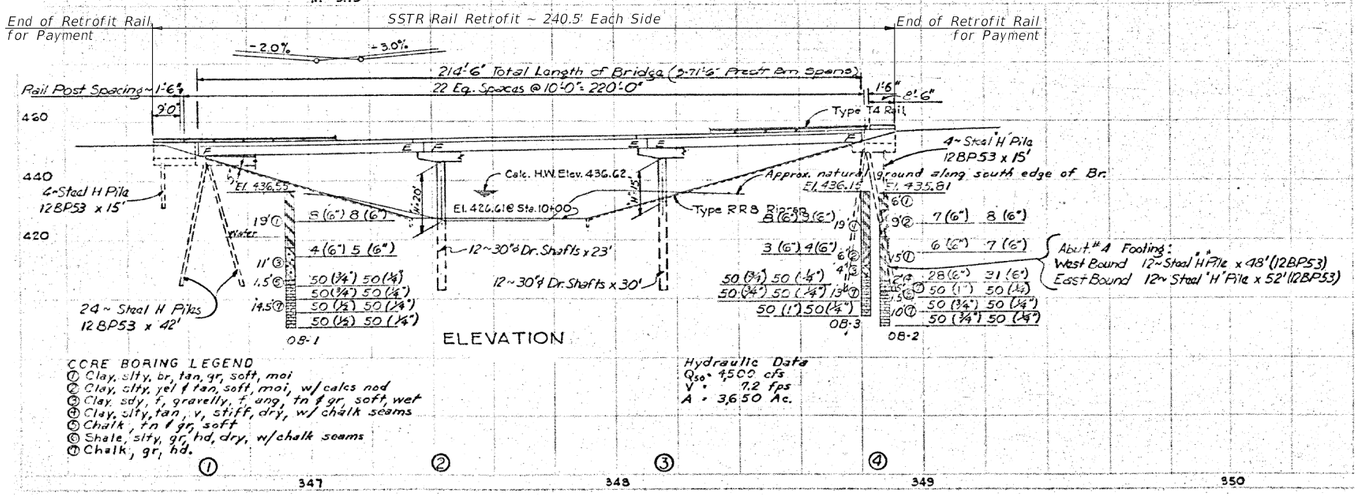
Transition Rail SSCB TO SSTR (20 ft)



Vertical Curve Data I.H.635

E.B.	W.B.
P.I.= Sta 346+10	P.I.= Sta. 346+50
El.= 448.70	El.= 448.90

VC = 600'
c = 0.41'
M = 3.75'



CORE BORING LEGEND
① Clay, silty, br, tan, gr, soft, moi
② Clay, silty, yel & tan, soft, moi, w/ calcs nod
③ Clay, sdy, f, gravelly, f. ang, tn & gr, soft, wet
④ Clay, silty, tan, v, stiff, dry, w/ chalk seams
⑤ Chalk, tn & gr, soft
⑥ Shale, silty, gr, hd, dry, w/chalk seams
⑦ Chalk, gr, hd.

Hydraulic Data
Q_{50} = 4,500 cfs
V = 7.2 fps
A = 3,650 Ac.

NOTE:
See Estimated Quantities Table for the Location and Type of Repairs.

Repair quantities and locations may vary in the field; limits of repair shall be as directed by the Engineer.

NBI: 18-057-0-2374-03-140 EB
NBI: 18-057-0-2374-03-141 WB

2 OF 2

STATE OF TEXAS
MD NOORE A. SARKAR
133572
LICENSED PROFESSIONAL ENGINEER
11/10/2021

Texas Department of Transportation

Dallas District Bridge

IH 20

NEWTON CREEK OVERPASS REPAIR LAYOUT

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		85

NBI	Feature Crossed	Facility Carried	Location	428-6001	429-6004	429-6007	438-6004	451-6024	0514-6036
				PENETRATING CONCRETE SURFACE TREATMENT	CONC STR REPAIR(RAPID DECK REP(PRT DPT)	CONC STR REPAIR (VERTICAL & OVERHEAD)	CLEANING AND SEALING EXIST JOINTS(CL7)	RETROFIT RAIL (TY SSTR)	PERM CTB (TRAN SSCB TO SSTR) (MOD)
				SY	SF	SF	LF	LF	LF
18-057-0-2374-03-138	BNSF RR	IH 20 EB	West Relief JT.	2872				784	
			Abutment 1			64	72		
			Span 1		15				
			Bent 2				72		
			Span 2						
			Bent 3				72		
			Span 3		10				
			Bent 4				72		
			Span 4						
			Bent 5				72		
			Span 5						
			Abutment 6			72	72		
18-057-0-2374-03-139	BNSF RR	IH 20 WB	West Relief JT.	2872				784	40
			Abutment 1			32	72		
			Span1						
			Bent 2				72		
			Span2		10				
			Bent 3			10	72		
			Span3						
			Bent 4				72		
			Span4						
			Bent 5			16	72		
			Span5						
			Abutment 6			32	72		
			Total	5744	35	226	864	1568	40

NOTES:

1. For joint repair, see joint repair detail sheets.
2. For concrete substructure repair, see concrete Vertical and overhead repair detail sheet.
3. For bridge rail repair, see rail repair detail sheet.
4. For bridge rail retrofit, see retrofit SSTR concrete rails sheets.

Repair quantities and locations may vary in the field; limits of repair shall be as directed by the Engineer.

STATE OF TEXAS
MAC A. WASSEF
121015
LICENSED
PROFESSIONAL ENGINEER

Mac Wassef

12/28/2021

1 OF 2

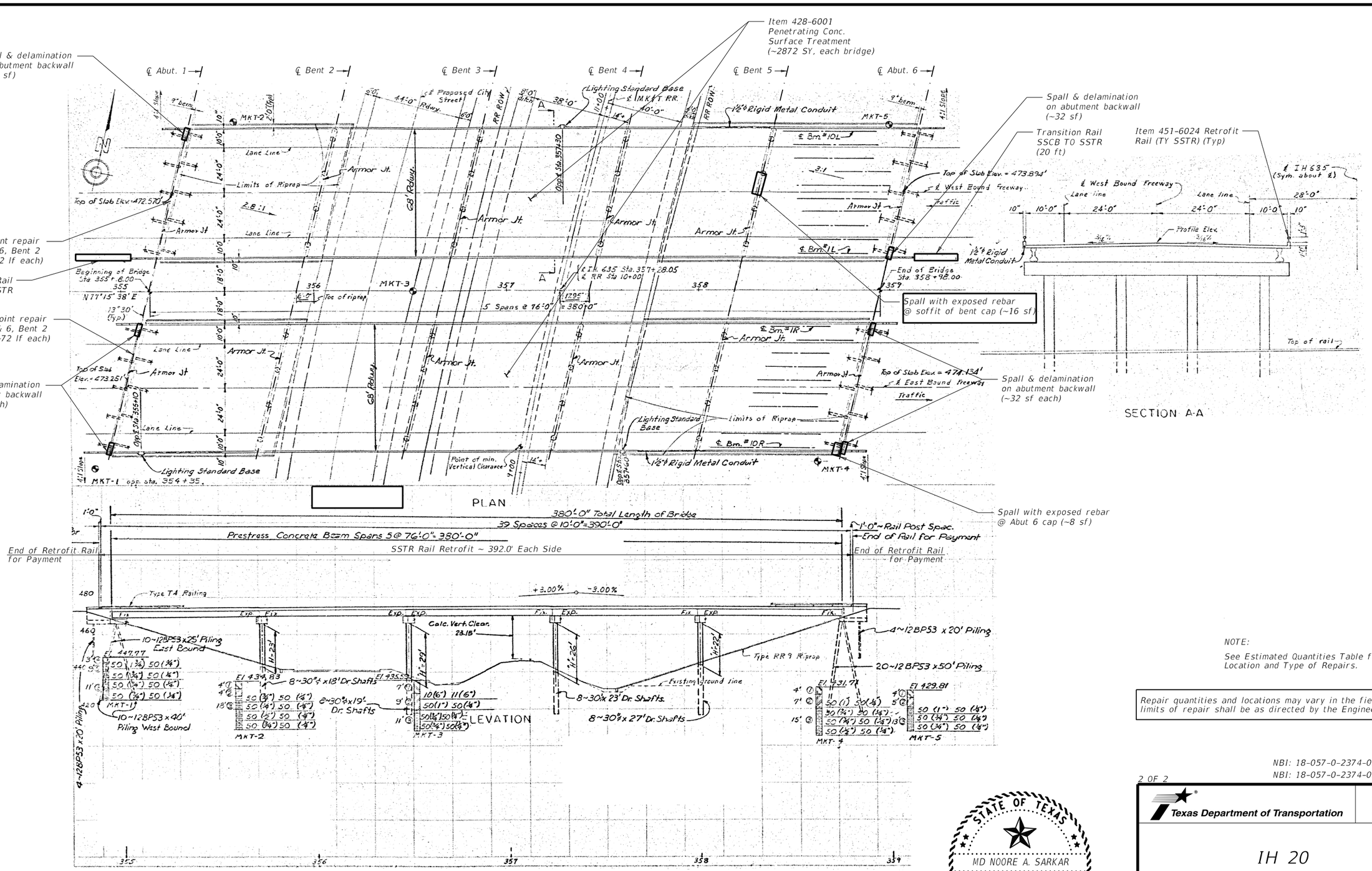
Texas Department of Transportation

Dallas
District
Bridge

IH 20

BNSF RR OVERPASS ESTIMATED REPAIR QUANTITIES

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW	
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY	
REVISIONS	2374	03	091	IH 20	
	DIST	COUNTY		SHEET NO.	
	DAL	DALLAS		86	



NOTE:

See Estimated Quantities Table for the Location and Type of Repairs.

Repair quantities and locations may vary in the field; limits of repair shall be as directed by the Engineer.

NBI: 18-057-0-2374-03-138 EB
NBI: 18-057-0-2374-03-139 WB

STATE OF TEXAS
MD NOORE A. SARKAR
133572
LICENSED PROFESSIONAL ENGINEER
11/10/2021

2 OF 2

Texas Department of Transportation

Dallas District Bridge

IH 20

BNSF RR OVERPASS REPAIR LAYOUT

FILE: SEE PATH		DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY	
REVISIONS	2374	03	091	IH 20	
	DIST	COUNTY		SHEET NO.	
	DAL	DALLAS		87	

DATE: 11/7/2021 TIME: 7:32:26 PM FILE: T:\DALBRDG\Bridge Repair\2374-03-091, IH 20\Details\10-18-057-0-2374-03-138&139 - with Retrofit Rail (Ty SSTR).dgn User: dalbrdg

NBI	Feature Crossed	Facility Carried	Location	428-6001 PENETRATING CONCRETE SURFACE TREATMENT SY	429-6004 CONC STR REPAIR(RAPID DECK REP(PRT DPT) SF	429-6007 CONC STR REPAIR (VERTICAL & OVERHEAD) SF	438-6004 CLEANING AND SEALING EXIST JOINTS(CL7) LF	451-6024 RETROFIT RAIL (TY SSTR) LF	0514-6036 PERM CTB (TRAN SSCB TO SSTR) (MOD) LF
18-057-0-2374-03-136	Whites Branch	IH 20 EB	Abutment 1	1542		120	72	423	
			Span 1						
			Bent 2			16	72		
			Span 2		12				
			Bent 3				72		
			Span 3		6				
			Bent 4			10	72		
			Span 4		6				
			Bent 5			8	72		
			Span 5						
			Abutment 6			92	72		
18-057-0-2374-03-137	Whites Branch	IH 20 WB	West Relief JT.	1542			72	423	40
			Abutment 1			32	72		
			Span1						
			Bent 2				72		
			Span2						
			Bent 3				72		
			Span3						
			Bent 4				72		
			Span4						
			Bent 5				72		
			Span5			12			
			Abutment 6			32	72		
			East Relief JT.				72		
			Total	3084	24	322	1008	846	40

NOTES:

1. For joint repair, see joint repair detail sheets.
2. For concrete substructure repair, see concrete Vertical and overhead repair detail sheet.
3. For bridge rail repair, see rail repair detail sheet.
4. For bridge rail retrofit, see retrofit SSTR concrete rails sheets.

Repair quantities and locations may vary in the field; limits of repair shall be as directed by the Engineer.

MAC A. WASSEF
121015

Mac Wassef

12/28/2021

1 OF 2

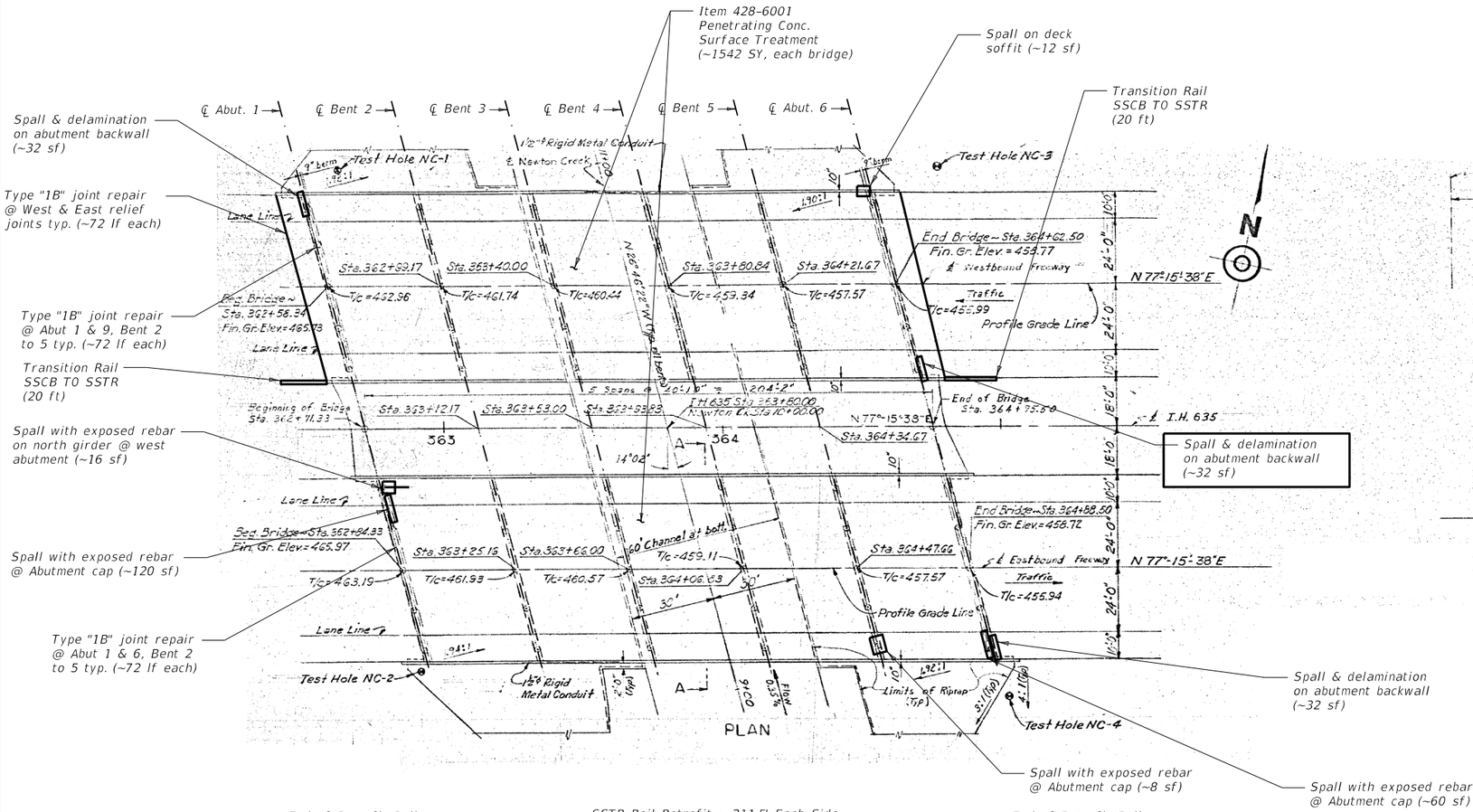
Texas Department of Transportation

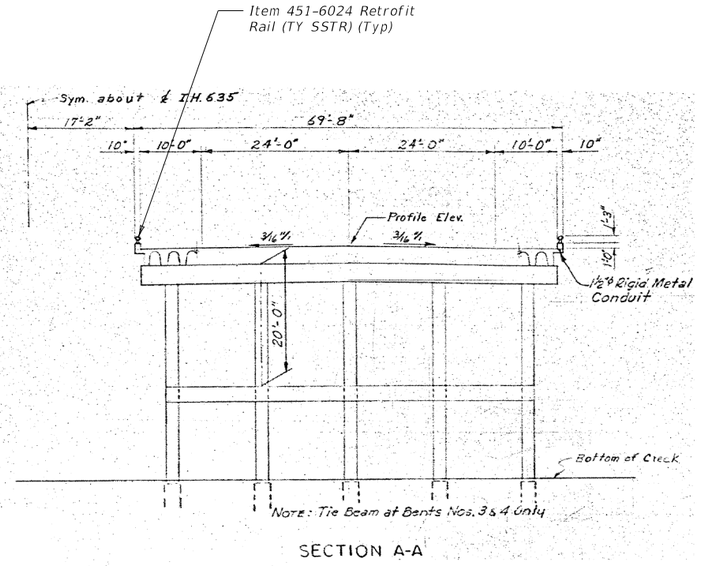
Dallas
District
Bridge

IH 20

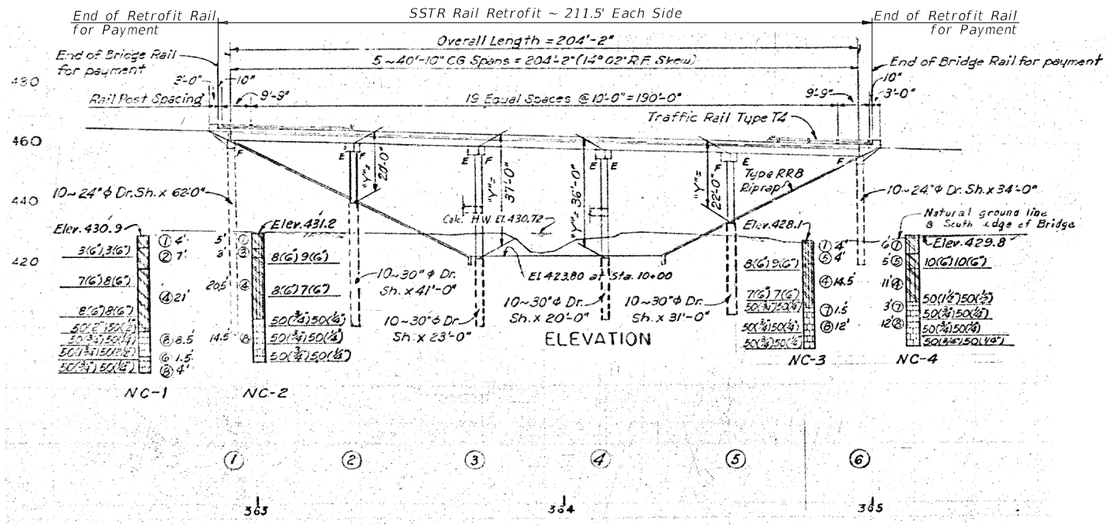
WHITES BRANCH OVERPASS
ESTIMATED REPAIR QUANTITIES

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		88





SECTION A-A



NOTE:

See Estimated Quantities Table for the Location and Type of Repairs.

Repair quantities and locations may vary in the field; limits of repair shall be as directed by the Engineer.

STATE OF TEXAS
MD NOORE A. SARKAR
133572
LICENSED PROFESSIONAL ENGINEER
11/10/2021

NBI: 18-057-0-2374-03-136 EB
NBI: 18-057-0-2374-03-137 WB

2 OF 2

Texas Department of Transportation

Dallas District Bridge

IH 20

WHITES BRANCH OVERPASS REPAIR LAYOUT

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		89

NBI	Feature Crossed	Facility Carried	Location	428-6001 PENETRATING CONCRETE SURFACE TREATMENT (SY)	429-6004 CONC STR REPAIR(RAPID DECK REP(PRT DPT) (SF)	438-6004 CLEANING AND SEALING EXIST JOINTS(CL7) (LF)
18-057-0-2374-03-308	IH 20	JJ Lemmon Rd	South Relief JT.	1867		42
			Abutment 1			42
			Span 1			
			Bent 2			
			Span 2			
			Bent 3			
			Span 3		16	
			Bent 4			
			Span 4			
			Bent 5			42
			Span 5			
			Abutment 6			
			North Relief JT.			42
			Total	1867	16	168

NOTES:

1. For joint repair, see joint repair detail sheets.
2. For bridge deck repair, see deck repair detail sheet.

Repair quantities and locations may vary in the field; limits of repair shall be as directed by the Engineer.

STATE OF TEXAS
MD NOORE A. SARKAR
133572
LICENSED PROFESSIONAL ENGINEER
11/10/2021

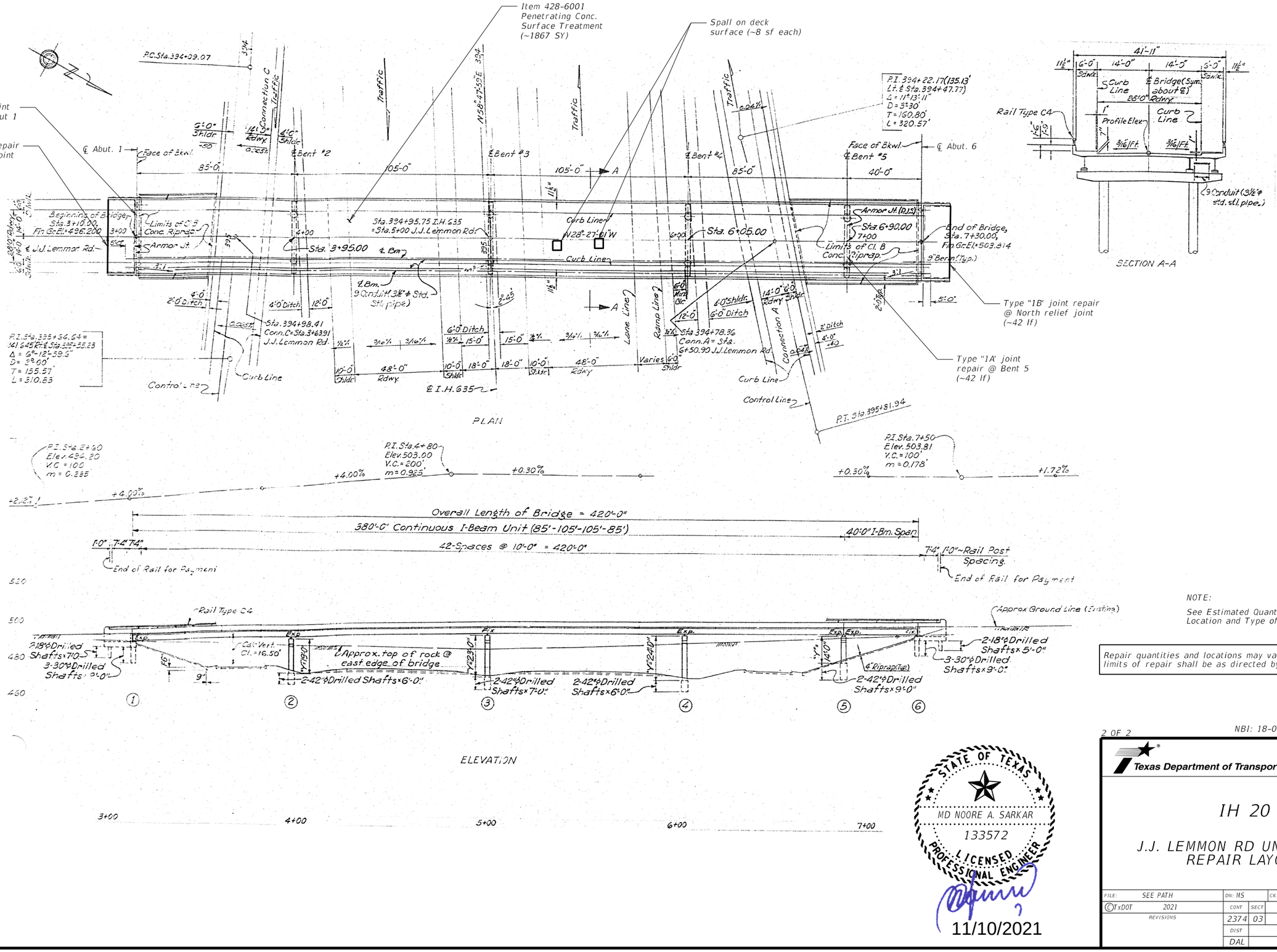
Texas Department of Transportation

Dallas District Bridge

IH 20

J.J. LEMMON RD UNDERPASS ESTIMATED REPAIR QUANTITIES

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		90



SECTION A-A

NOTE:

See Estimated Quantities Table for the Location and Type of Repairs.

Repair quantities and locations may vary in the field; limits of repair shall be as directed by the Engineer.

STATE OF TEXAS
MD NOORE A. SARKAR
133572
LICENSED
PROFESSIONAL ENGINEER
11/10/2021

2 OF 2

NBI: 18-057-0-2374-03-308

Texas Department of Transportation

Dallas District Bridge

IH 20

J.J. LEMMON RD UNDERPASS REPAIR LAYOUT

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		91

NBI	Feature Crossed	Facility Carried	Location	401-6001	428-6001	429-6004	429-6007	438-6004	451-6024	499-6001	0514-6036
				FLOWABLE BACKFILL	PENETRATING CONCRETE SURFACE TREATMENT	CONC STR REPAIR(RAPID DECK REP(PRT DPT)	CONC STR REPAIR (VERTICAL & OVERHEAD)	CLEANING AND SEALING EXIST JOINTS(CL7)	RETROFIT RAIL (TY SSTR)	ADJUST STEEL SHOES	PERM CTB (TRAN SSCB TO SSTR) (MOD)
				CY	SY	SF	SF	LF	LF	EA	LF
18-057-0-2374-03-306	IH 45	IH 20 EB	West Relief JT.		2494			72	720		
			Abutment 1	2			64			3	
			Span 1			6					
			Bent 2								
			Span 2								
			Bent 3								
			Span 3								
			Bent 4								
			Span 4								
			Abutment 5				64			2	
			East Relief JT.								
18-057-0-2374-03-307	IH 45	IH 20 WB	West Relief JT.		2494			72	720		40
			Abutment 1	4			64			1	
			Span1								
			Bent 2								
			Span2			32					
			Bent 3								
			Span3			32					
			Bent 4								
			Span4								
			Abutment 5				64			4	
			East Relief JT.					72			
			Total	6	4988	70	256	216	1440	10	40

NOTES:

1. For joint repair, see joint repair detail sheets.
2. For concrete substructure repair, see concrete Vertical and overhead repair detail sheet.
3. For bridge rail repair, see rail repair detail sheet.
4. For beam bearing repair, see rocker bearing repair detail sheet.
5. For bridge rail transition repair, see rail transition parapet repair detail sheet.

Repair quantities and locations may vary in the field; limits of repair shall be as directed by the field Engineer.

MAC A. WASSEF
121015

Mac Wassef

12/28/2021

1 OF 2

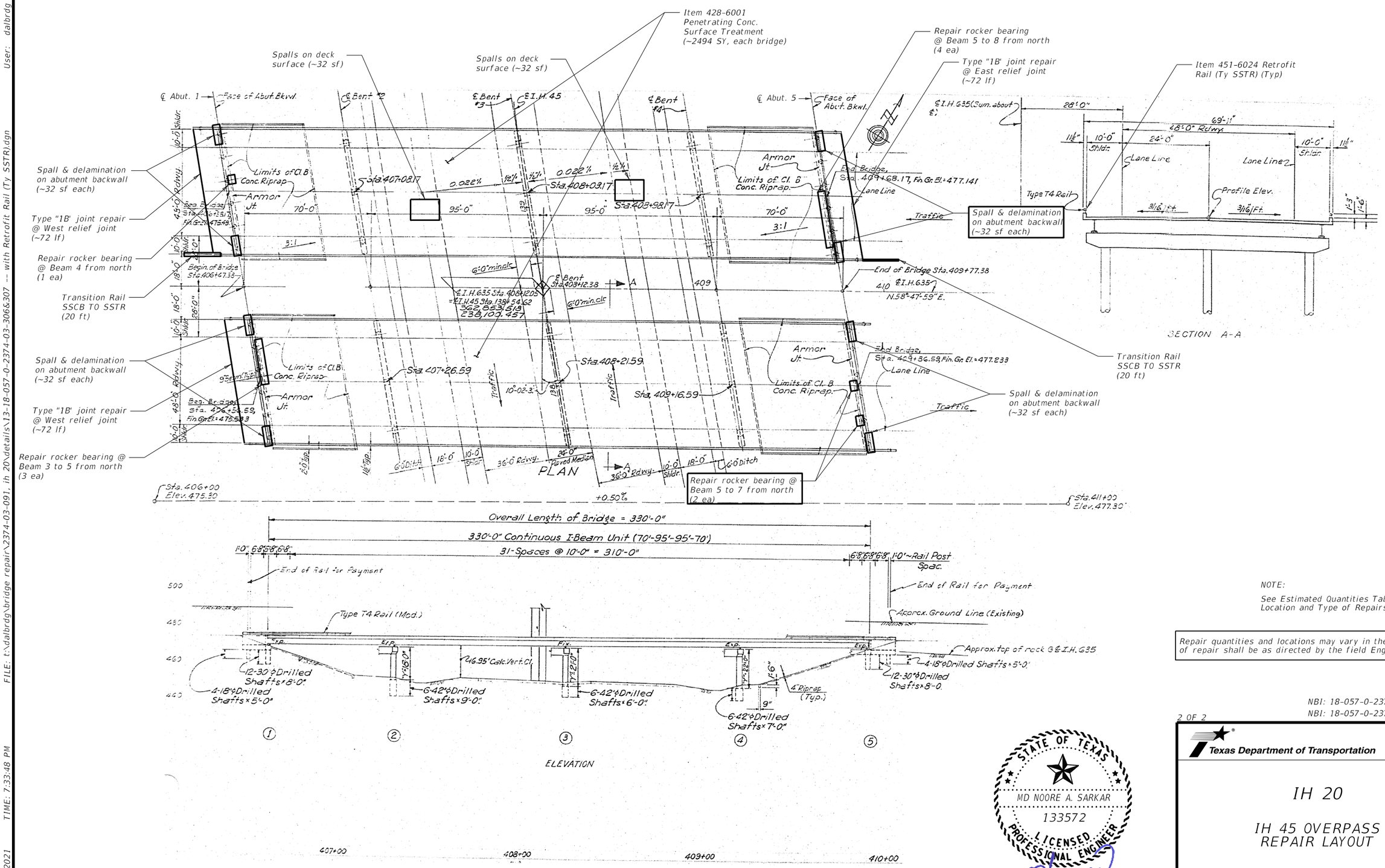
Texas Department of Transportation

Dallas District Bridge

IH 20

IH 45 OVERPASS
ESTIMATED REPAIR QUANTITIES

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		92



NOTE:

See Estimated Quantities Table for the Location and Type of Repairs.

Repair quantities and locations may vary in the field; limits of repair shall be as directed by the field Engineer.

NBI: 18-057-0-2374-03-306 EB
NBI: 18-057-0-2374-03-307 WB

2 OF 2

STATE OF TEXAS
MD NOORE A. SARKAR
133572
LICENSED
PROFESSIONAL ENGINEER
11/10/2021

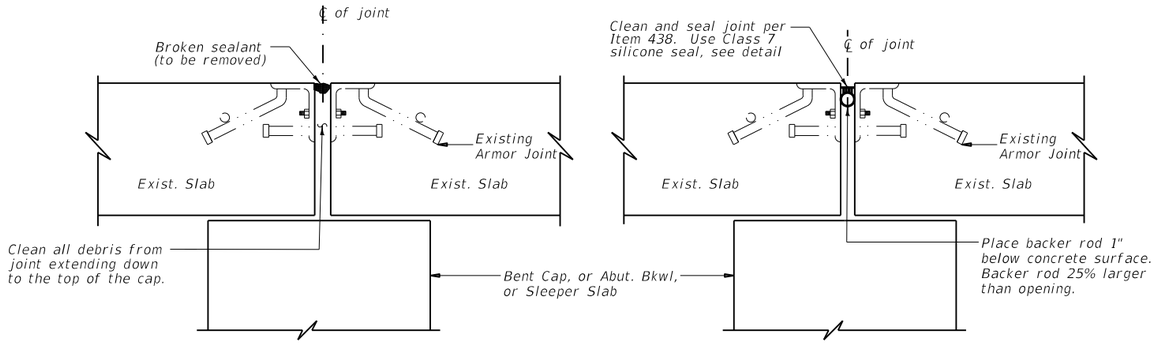
Texas Department of Transportation

Dallas District Bridge

IH 20

IH 45 OVERPASS REPAIR LAYOUT

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		93

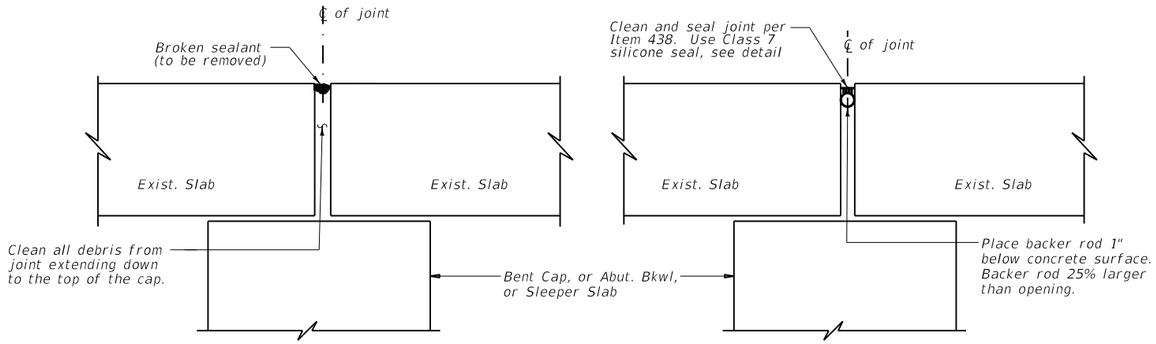


EXISTING JOINT CONDITION

JOINT REPAIR DETAILS

CLEANING AND SEALING EXISTING ARMOR JOINT

Type "1A" Joint Repair Details



EXISTING JOINT CONDITION

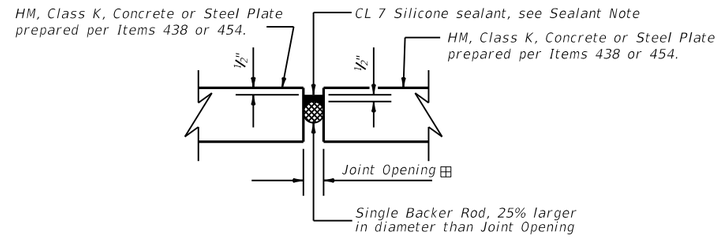
JOINT REPAIR DETAILS

CLEANING AND SEALING EXISTING EXPANSION JOINT

Type "1B" Joint Repair Details

NOTES:

1. For more info, see general notes sheet.



CLASS 7 SILICONE SEAL DETAIL
(NTS)

⊞ Joint Opening to be clean and free of debris prior to placement of seal.

STATE OF TEXAS
MD NOORE A. SARKAR
133572
LICENSED
PROFESSIONAL ENGINEER
11/10/2021

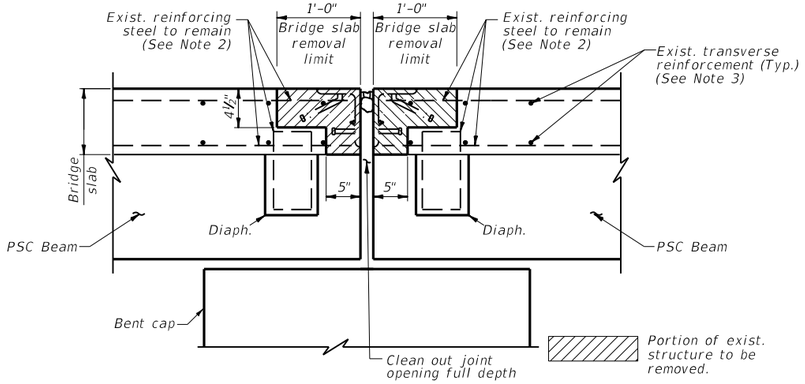
Texas Department of Transportation

Dallas
District
Bridge

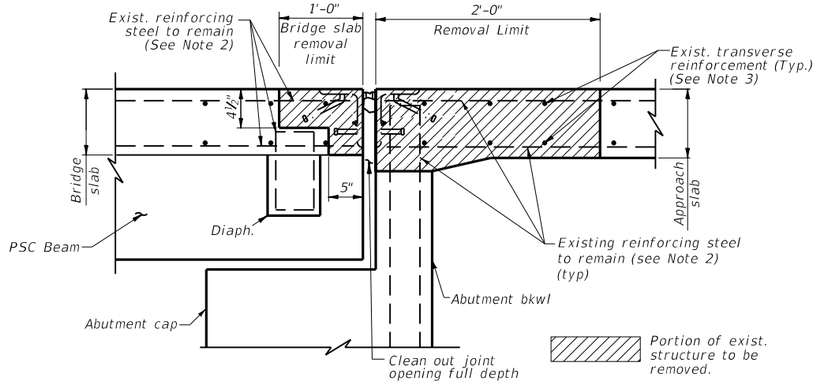
IH 20

JOINT REPAIR DETAIL 1
JOINTS WITHOUT OVERLAY

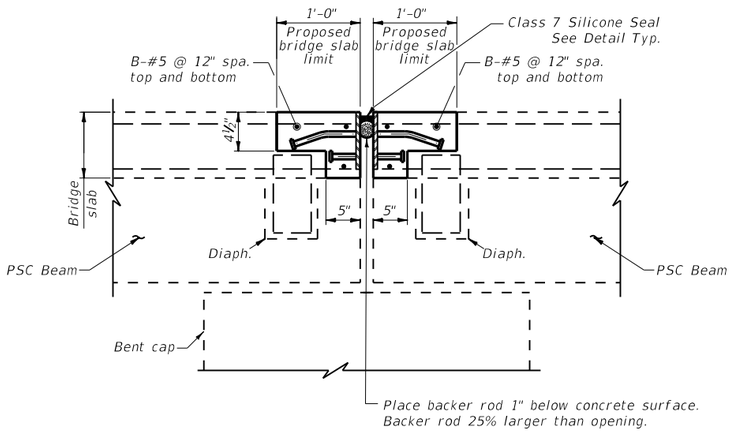
FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MPB
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		94



Step 1 Existing Joint Removal @ Bent

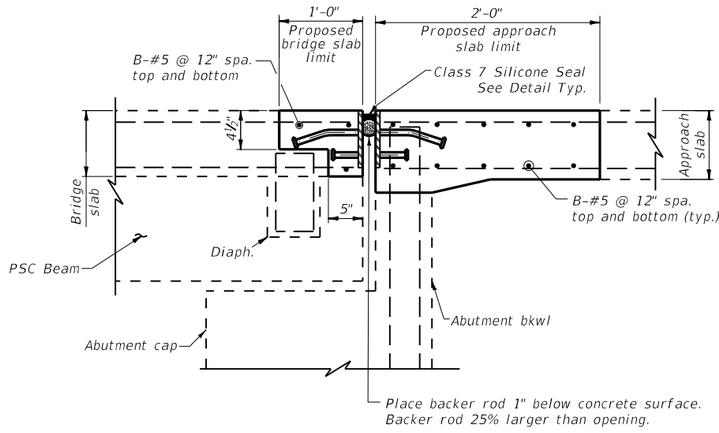


Step 1 Existing Joint Removal @ Abutment



Step 2 Proposed Joint Repair @ Bent

JOINT TYPE "2A" REPAIR



Step 2 Proposed Joint Repair @ Abutment

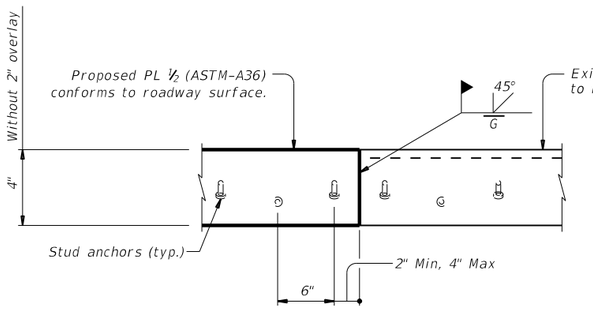
JOINT TYPE "2B" REPAIR

JOINT REPAIR NOTES:

1. All the work associated with removing and replacing the existing armor joints, shall be paid under pay Item 785-6010.
2. Leave existing longitudinal reinforcing steel in place as shown.
3. Extend existing transverse bars into new concrete 2'-2" min. and provide 2'-0" lapping with 2" end cover.
4. Clean and straighten existing bars prior to placing concrete.
5. Refer to as-built plans for existing dimensions and reinforcements.
6. Match the existing cover.
7. Existing concrete shall be in a surface saturated dry condition at the time new concrete is placed. Forms shall be free of ponded water.
8. 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.
9. See Armor Joint Standard for details not shown.

CONCRETE REQUIREMENTS:

Provide Class K concrete with coarse aggregate grades 2-5 meeting a strength requirement of 4,000 psi at 4 hours cure time. Concrete provided shall be of a low shrinkage or shrinkage controlled type. Submit proposed repair materials to the Engineer for approval. Do not use magnesium phosphate materials.
Existing concrete shall be in surface saturated dry condition at the time of new concrete placement. Cure concrete to a point acceptable to the Manufacturer prior to placing headers, overlays, or joint seals.
Perform joint repair work in accordance with Chapter 3, Section 4 of the TxDOT Concrete Repair Manual



TYP. EXIST. ARMOR ANGLE TO PROPOSED ARMOR PLATE SPLICES

STATE OF TEXAS
MD NOORE A. SARKAR
133572
LICENSED PROFESSIONAL ENGINEER
11/10/2021

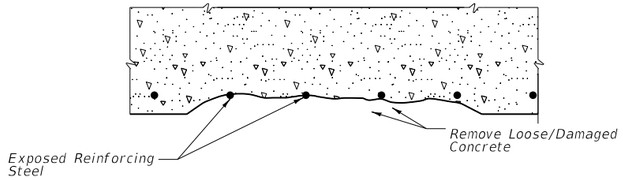
2 OF 2

Texas Department of Transportation | Dallas District Bridge

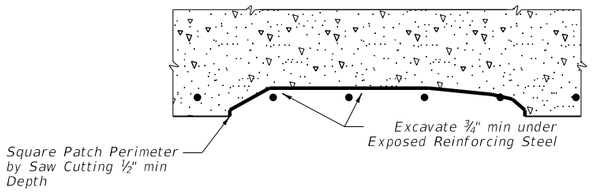
IH 20

JOINT REPAIR DETAIL 2 JOINTS WITHOUT OVERLAY

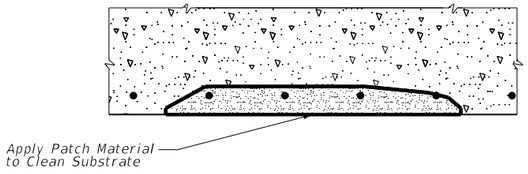
FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MPB
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		95



SHOWING DAMAGED CONDITION



SHOWING EXCAVATION & PREPARATION



SHOWING PATCHING

CONCRETE STRUCTURE REPAIR (VERTICAL & OVERHEAD)

REPAIR PROCEDURE (CONCRETE, VERTICAL AND OVERHEAD):

1. Damage locations and quantities are based on March 2021 Assessment. Immediately notify TxDOT if any discrepancies are noted between the plans and actual conditions.
2. Submit detailed repair procedures, including proposed proprietary materials, for approval prior to commencing work.
3. Some repair areas indicated do not exhibit visible spalling and will need to be identified by sounding the concrete with hammers to determine the location and limits of repairs.
4. Sound all surfaces to identify and mark all delaminated areas for review and approval by the Engineer. Confirm square footage of repair areas prior to commencing removal and notify Engineer of any discrepancies. Provide access to Engineer for verification.
5. Remove delaminated, loose, and unsound concrete. Use only hand tools or power- driven chipping hammers (15 lb. max) to remove concrete and to excavate behind reinforcing bars.
6. Remove rust, oil, and other contaminants from concrete and reinforcing steel surfaces. Prior to patching, abrasive blast the repair area.
7. Use Type C Repair Materials in accordance with DMS-4655.
8. Notify Engineer once existing concrete is removed and repair areas for each structure elements have been prepared. Provide access to the Engineer for verification of prepared repair areas.
9. Perform all repairs in accordance with the Section 3.2 of the "Concrete Repair Manual". Not all de laminations may be visible.
10. Abutments, bent cap, pan girder, bent column , concrete beam with minor repair and bridge deck overhang edge shall be repaired under pay item "CONC STR REPAIR (VERTICAL & OVERHEAD)"

STATE OF TEXAS
MD NOORE A. SARKAR
133572
LICENSED PROFESSIONAL ENGINEER
11/10/2021

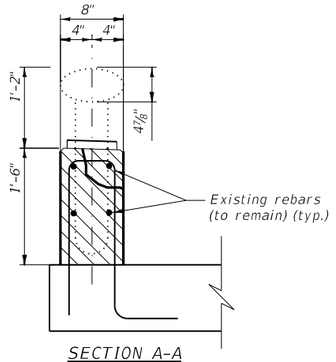
Texas Department of Transportation

Dallas District Bridge

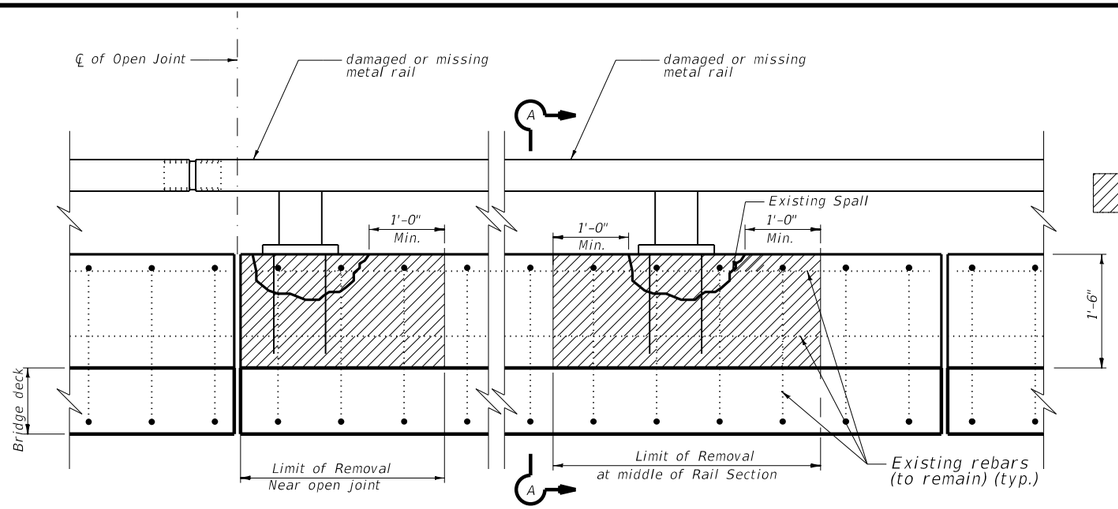
IH 20

CONCRETE VERTICAL AND OVERHEAD REPAIR DETAILS

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		96



SECTION A-A

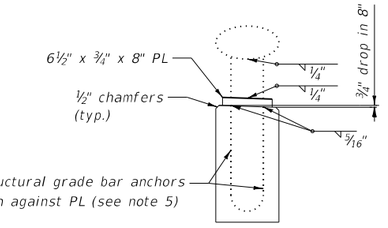


MULTI POST REPAIR

ELEVATION

LEGEND:

HATCHED AREA INDICATES REMOVE
DAMAGED CONCRETE & REPLACE IN-KIND.



METAL RAIL WELDING DETAIL

CONCRETE SPALL REPAIR

ELEVATION

LEGEND:

HATCHED AREA INDICATES REMOVE
DAMAGED CONCRETE & REPLACE IN-KIND.

NOTES:

1. Damage locations and quantities are based on March 2021 Assessment. Immediately notify TxDOT if any discrepancies are noted between the plans and actual conditions.
2. Reconstruct railing in-kind per "Existing Railing Details" and in accordance with Item 778 "Concrete Railing Repair" and Item 429 "Concrete Structure Repair." Use Type C Repair Materials in accordance with DMS-4655.
3. Cure concrete rail in the forms or using one of the methods described in Item 422 "Concrete Superstructures".
4. Traffic control and temporary barrier shall remain in place until concrete has reached full compressive strength and installation of metal railing components is complete.
5. Provide new anchor bar at locations within the concrete repair limits Payment for anchor bar is considered subsidiary to Item 778 "Concrete Railing Repair."
6. Replace aluminum rail components at locations indicated or as directed by the engineer in accordance with Item 776 "Metal Rail Repair." Rail lengths provided are for payment purposes only. Field verify all rail lengths prior to ordering materials.
7. For repair location, see Repair Layout Sheets.
8. Rails are to have an elliptical cross section of the dimensions shown in the details. The rails shall be made from 6" Ø std. block seamless pipe by pressing in elliptical dies or other approved methods.

STATE OF TEXAS
MD NOORE A. SARKAR
133572
LICENSED
PROFESSIONAL ENGINEER

11/10/2021

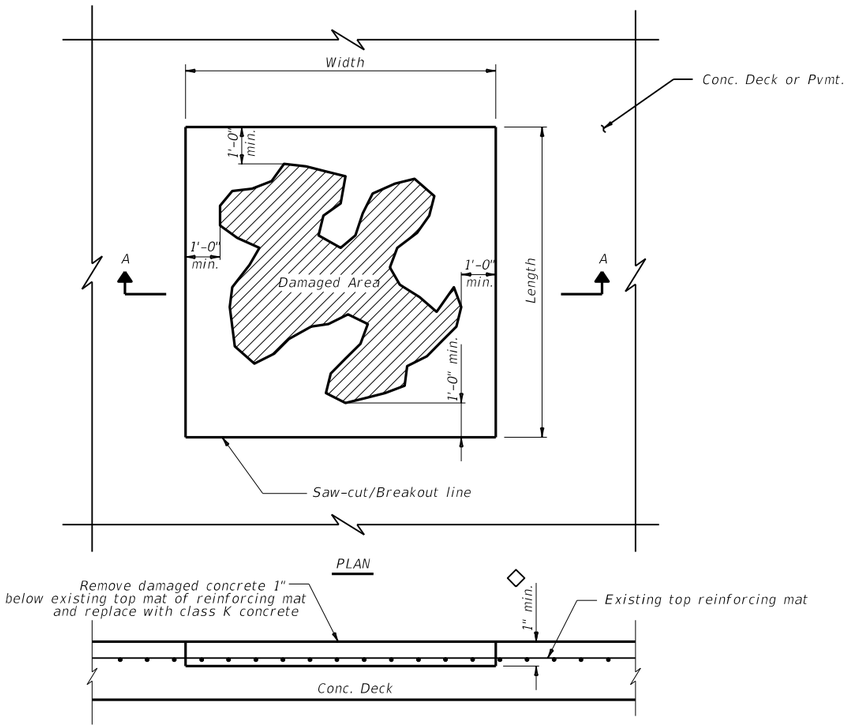
1 OF 1

Texas Department of Transportation | Dallas District Bridge

IH 20

RAIL REPAIR DETAILS

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		97



PLAN

SECTION A-A

PARTIAL DEPTH DECK REPAIR DETAIL
(Length and Width as directed by the Engineer)
(NTS)

◇ Or deeper as required to obtain sound concrete. Existing reinforcement exposed during removal to remain in place. Clean and straighten prior to placing RHC.

NOTES:

1. Perform work in accordance with the 2014 TXDOT standard specifications and TXDOT concrete repair manual.
2. Avoid damage to sound concrete that is to remain in place by saw cutting the perimeter of the patch area or taking other appropriate measures acceptable to the Engineer.
3. Saw-cut the perimeter of the proposed repair approximately ½ to ¾ inches but do not cut existing reinforcing steel . Adjust depth as necessary to avoid damaging deck steel.
4. Clean and Extend Existing reinforcing steel.
5. For the repair locations and quantities, see repair layout sheets.

Unexpected conditions:

If conditions other than those indicated are encountered , perform repairs in accordance with any applicable details provided in the plans. In the event that no details provided fit the situation encountered. Place temporary protection over the location as directed by the Engineer and refer the problem to the District Bridge Section for resolution. provide the District Bridge Section with appropriate photos, Sketches with dimensions and other material necessary to fully describe the problem.

Concrete requirements:

Use concrete class K with 3,000 psi in 4 hours of curing time according to DMS 4655 (Type B).
Use grade 60 reinforcing bars conforming to A615.

STATE OF TEXAS
MD NOORE A. SARKAR
133572
LICENSED
PROFESSIONAL ENGINEER
11/10/2021

1 OF 1

Texas Department of Transportation

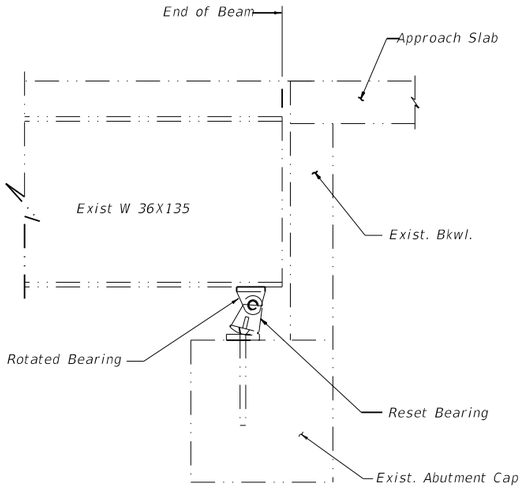
Dallas District Bridge

IH 20

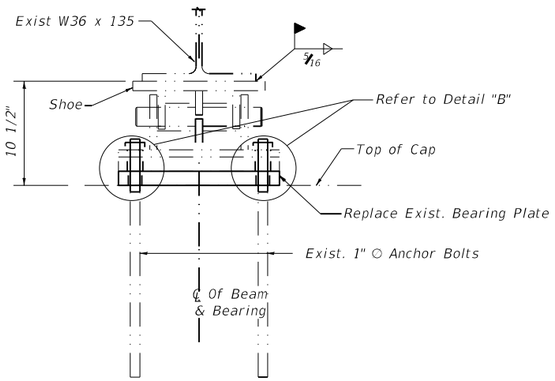
BRIDGE PARTIAL DECK REPAIR DETAILS

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		98

DATE: 11/7/2021 TIME: 7:34:32 PM FILE: \\FS-DALHQ.dot.state.tx.us\Data1\DATA\DAL\Groups\DALBRDG\Bridge Repair\2374-03-091, IH 20\Details\17-PARTIAL DECK REP.dgnUser: dalbrdg



ROCKER BEARING ◆
(SHOWN ~ EXISTING CONDITION)
NTS

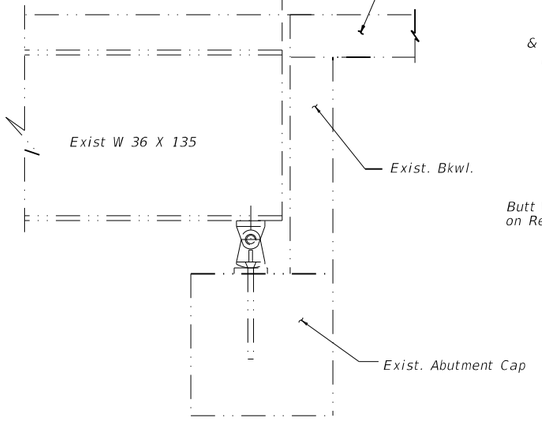


(REMOVED & REPLACED ROCKER BEARING) ■
NTS

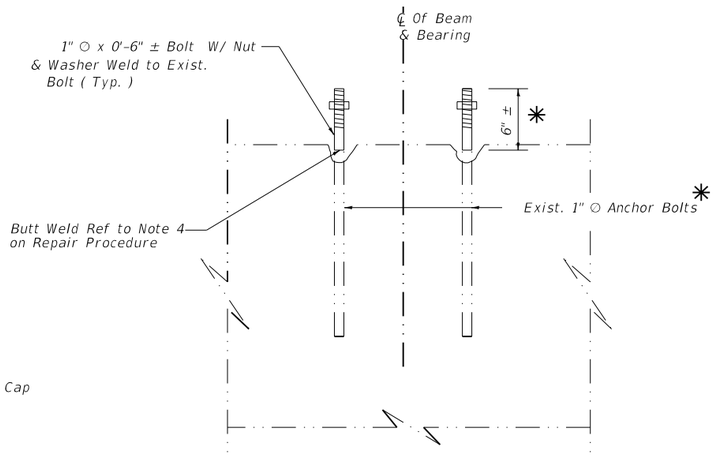
■ ~ Replace Bearing Plate (Shoe Assembly)

◆ ~ Reset Rocker Bearing (Adjust Steel Shoes)

✳ ~ To be Field verified



(SHOWN AFTER RE-SETTING OF ROCKER) ◆
NTS



DETAIL "B" ■

JACKING LOADS (INCLUDING FACTOR OF SAFETY OF 2)

NBI	Span #	LOCATION	NUMBER OF BEAMS	JACKING DEAD LOAD TON/BEAM
18-057-0-2374-03-306	1	Abutment 1	1	75
	4	Abutment 5	4	75
18-057-0-2374-03-307	1	Abutment 1	3	75
	4	Abutment 5	2	75
18-057-0-2374-03-144	4	Abutment 5	1	75

GENERAL NOTES:

1. All structural steel shall be ASTM A-709, Grade 36 or Grade 50.
2. All welding involved in this repair work shall be done by a certified welder in accordance with Item 448 "Structural Field Welding."
3. Welding shall be inspected by a Bridge Division structural steel Inspector.
4. Anchor bolt repair, bearing plate removal & reinstallation shall be performed per Item 499.
5. Contractor to submit shop Drawing for Jacking to TxDoT for approval prior to performing work.
6. See as-built plans for bearing plate dimensions and more information.

Rocker Bearing Repair & Reset

1. No traffic is allowed on the bridge during the time of raising the bridge and replacing existing bearings.
2. If an anchor bolt is to be replaced, then the base plate of the rocker shall be replaced.
3. If the weld between the bottom of the beam flange and the top portion of the bearing has cracked or failed, then a new weld will be used to reattach the beam to the bearing. Remove all portions of the old weld from both the flange and bearing. Both surfaces will be prepared to accept a new weld. Use 5/16" weld size. Welds and welding process shall conform to Item 448, "Structural Field Welding."
4. Reset bearing in accordance with Item 499, "Adjusting Steel Shoes."
5. All repairs to rocker bearings will be paid for under Item 499.

REPAIR PROCEDURE

1. Shore the beams at the abutment. The shoring system should be designed by a licensed Professional Engineer in the state of Texas to support dead loads.
2. Remove the bearing shoe, including removal of the welds to the bottom flange and removal of bottom bearing plate on the top of the cap.
3. Remove 1-1.5" deep or more concrete (depending on the need) around the remaining part of the bolt on the top cap and clean it with abrasive blasting.
4. Butt weld a new threaded rod of proper length and same diameter to the remaining bolt using the detail in spec book, Item 448, Figure "Double bevel V-groove weld in vertical position". Then, grind out the vertical position plates and fill holes with epoxy grout.
5. Replace the bottom bearing plate with new plate. It may need to replace existing plate with a new plate of a larger width to accommodate the existing position of shoe.
6. Jack up all beams at the end to the height needed for installing the low rocking part of the shoe. Do not jack more than needed height. Install the low rocking part first, then the top part and the pin – this will give more room and flexibility for the installation and justifying the position. Then weld the top of the shoe to the bottom flange of the beam.

See bridge repair layouts for estimated quantities and locations.

NBI: 18-057-0-2374-03-144
NBI: 18-057-0-2374-03-306 EB
NBI: 18-057-0-2374-03-307 WB

STATE OF TEXAS
MD NOORE A. SARKAR
133572
LICENSED
PROFESSIONAL ENGINEER
11/10/2021

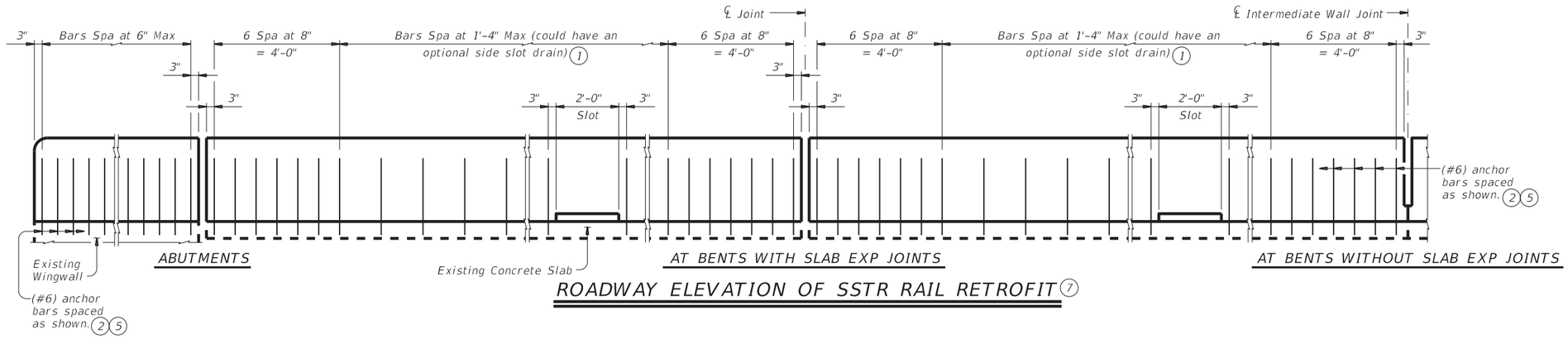
Texas Department of Transportation
Dallas District Bridge

IH 20

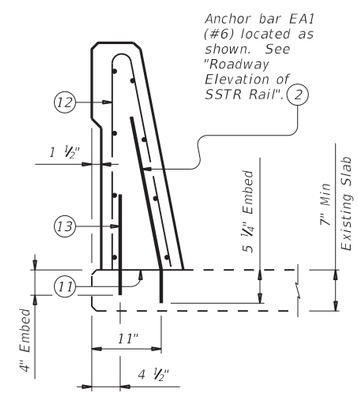
ROCKER BEARING REPAIR DETAILS

FILE: SEE PATH	DN: MS	CK: MAW	DW: MS	CK: MAW
©TxDOT 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		99

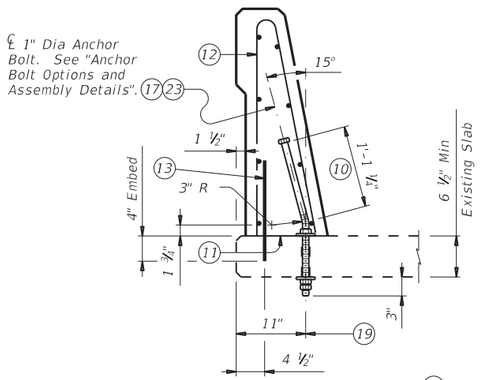
DATE: 11/7/2021 TIME: 7:34:48 PM FILE: t:\dalbrdg\bridge repair\2374-03-091, ih 20\details\SSTR-Retrofit-20.dgn User: dalbrdg



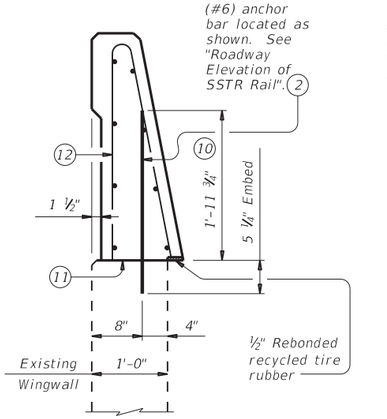
ROADWAY ELEVATION OF SSTR RAIL RETROFIT (7)



RAIL ON CONCRETE SLABS USING ADHESIVE ANCHORS (9)

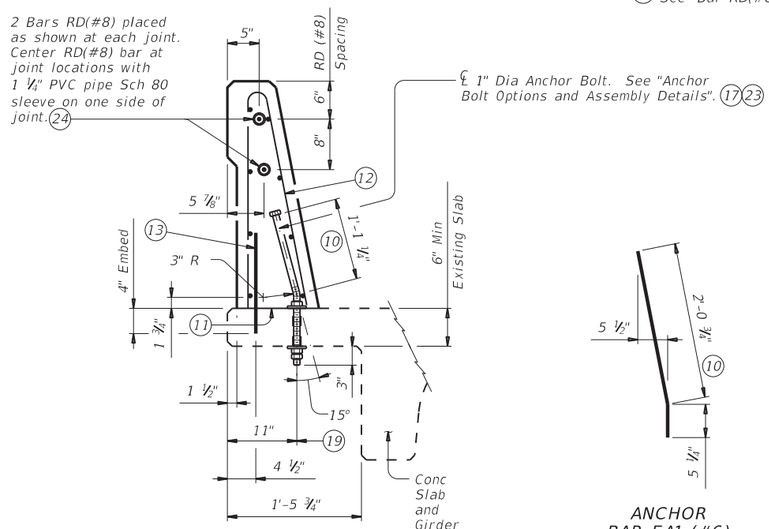


RAIL ON SLABS USING ANCHOR BOLTS (20)



RAIL ON WINGWALLS USING ADHESIVE ANCHORS (9)

Rail retrofits on existing Traffic Rail Foundations (TRF) are similar.



RAIL ON CG (PAN FORM) SPANS (20)

ANCHOR BAR EA1 (#6)

(11) Do not cast rails or parapet walls on top of overlays/seal coats.

(12) 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.

(13) 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).

(17) ℄ 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).

(19) ℄ 1 1#16" to 1 1#4" Dia holes. Core drill holes through existing deck (percussion drilling not permitted). Concrete spalls in the bottom of the deck exceeding 1#2" from edge of holes will be patched in accordance with Item 429, "Concrete Structure Repair" at the Contractor's expense.

(20) Showing location of anchor bars and anchor bolts in a rail retrofit condition. See SSTR rail standard for details and notes not shown.

(23) Galvanize anchor bolts, nuts and plate washers.

(24) See "Bar RD(#8) Assembly Detail".

(1) When side slot drains are used, provide 8'-0" Min clear spacing between drain slots.

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

(5) See SSTR Rail Sections in "Rail on Wingwalls using Adhesive Anchors" and/or "Rail on Concrete Slabs using Adhesive Anchors".

(7) 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 SSSTR rail standard for details and notes not shown.

(9) Showing location or locations of anchor bars in a rail retrofit condition. See appropriate rail standard for details and notes not shown.

(10) 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.

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 these retrofit details will result in a railing acceptable for the MASH Test Level indicated on the applicable rail standard.

Do not remove any part of a curb until it has been evaluated to not be a load-carrying structural component.

These details are not for use at other locations.

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 (TY SSTR)". All details shown herein are subsidiary to rail retrofit.

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

STATE OF TEXAS
ROSTAM MAHBOD
122181
LICENSED
PROFESSIONAL ENGINEER

Rostam

11/09/2021

Texas Department of Transportation

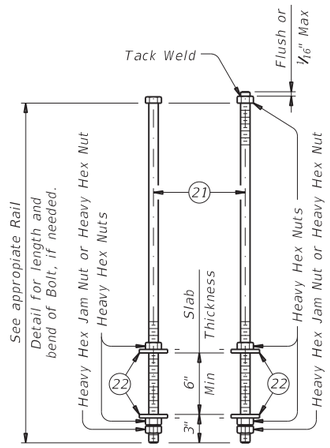
Bridge Division Standard

RETROFIT GUIDE FOR SSTR RAILS

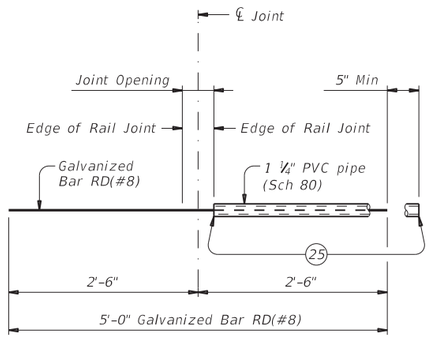
C-RAIL-R (MOD)

FILE: rlstd022-20.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
07-20: Text change from epoxy to adhesive and changed MASH Test Level note.	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		100

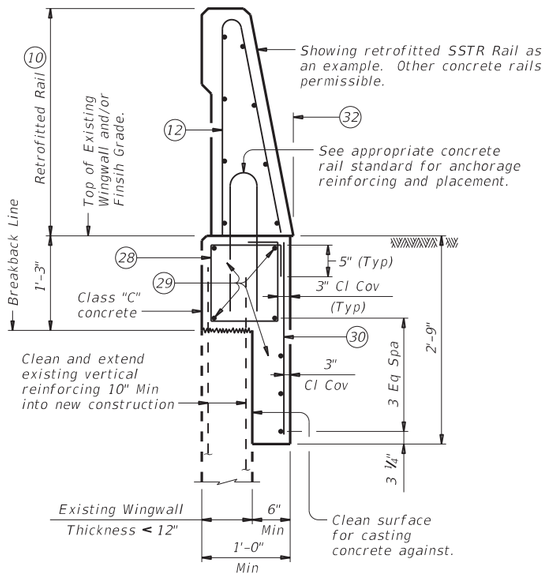
DATE: 11/7/2021 TIME: 7:34:49 PM FILE: t:\dalbrdg\bridge repair\2374-03-091, ih 20\details\SSTR-Retrofit-20.dgn User: dalbrdg



ANCHOR BOLT OPTIONS (23) AND ASSEMBLY DETAILS



BAR RD(#8) ASSEMBLY DETAIL



SECTION OF EXISTING PARALLEL WINGWALLS LESS THAN 12" THICK

(10) 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.

(12) 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.

(21) ℄ 1" Dia ASTM F1554 Gr 55 Anchor Bolt or Threaded Rod. Nuts must conform to ASTM A563 requirements.

(22) Plate Washer 3/8 x 3 x 3 ASTM A36 with 1 1/16" Dia Hole centered.

(23) Galvanize anchor bolts, nuts and plate washers.

(25) Tape ends of 1 1/4" PVC pipe Sch 80 to prevent concrete or mortar from seeping in.

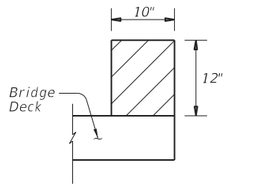
(28) Space (#4) stirrups at 8" Max. (Spaced 3 1#4" longitudinally from retrofitted ends of wingwall).

(29) 7 ~ (#5) bars with 3" end cover.

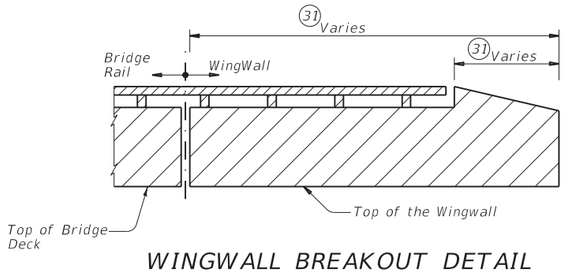
(30) Space (#4) bars at 8" Max with 3" end cover, spaced with (#4) stirrups.

(31) See approriate As-built for dimension.

(32) Face of rail and/or toe of rail. Location or placement of rail retrofit must match face of rail and/or toe of rail on bridge.



PARAPET BREAKOUT DETAIL



WINGWALL BREAKOUT DETAIL

~ Indicates portion of existing structures to be removed.

STATE OF TEXAS
ROSTAM MAHBOD
122181
LICENSED PROFESSIONAL ENGINEER

Rostam

11/09/2021

SHEET 2 OF 2

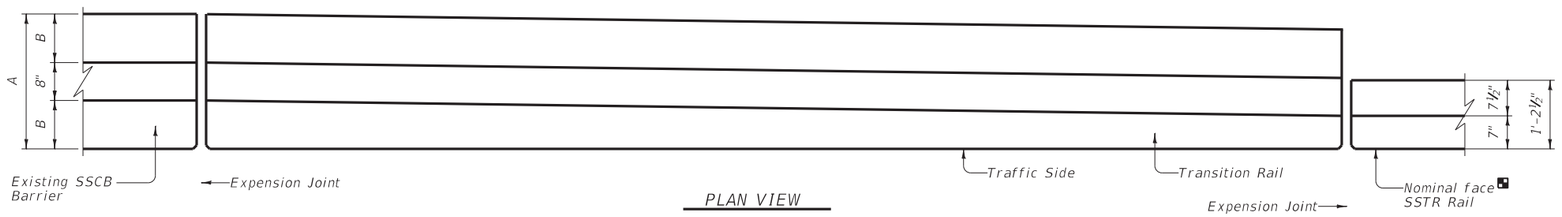
Texas Department of Transportation

Bridge Division Standard

RETROFIT GUIDE FOR SSTR RAILS

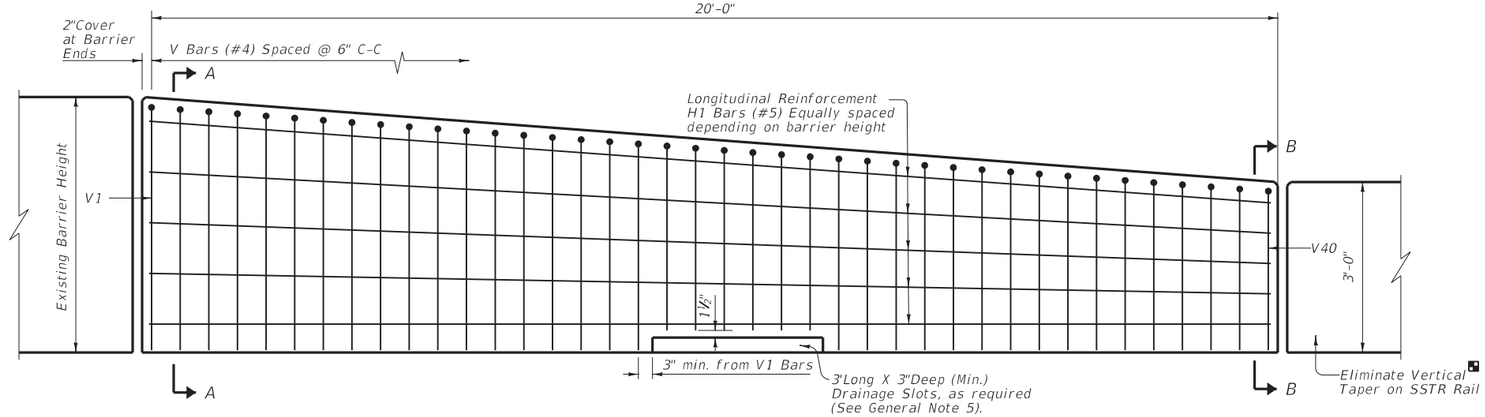
C-RAIL-R (MOD)

FILE:	r1std022-20.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT	September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS		2374	03	091	IH 20
07-20: Text change from epoxy to adhesive and changed MASH Test Level note.		DIST	COUNTY		SHEET NO.
		DAL	DALLAS		101



PLAN VIEW

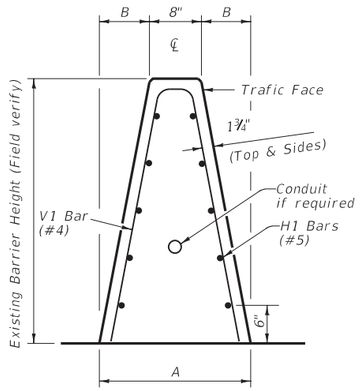
Existing 54" SSCB Barrier shown. Field verify, for 42" and 48" SSCB barrier are similar.



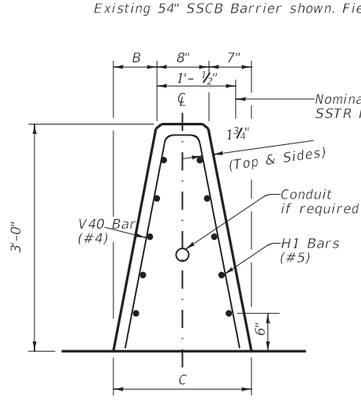
ELEVATION VIEW

Existing 54" SSCB Barrier shown. Field verify, for 42" and 48" SSCB barrier are similar.

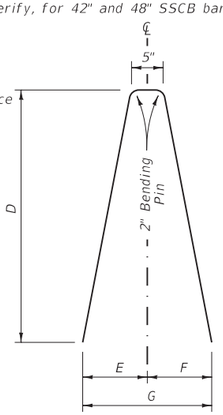
See SSTR Rail standard sheet for details not shown here. where the SSTR Rail is connected to transition rail eliminate vertical taper.



SECTION A-A



SECTION B-B



V Bar

#4 Rebar

Existing Barier Hegiht (IN.)	CONCRETE DIMENSIONS (IN.)			BAR DIMENSIONS (IN.) ◆							
				V1 ◆				V40 ◆			
	A	B	C	D	E	F	G	D	E	F	G
42	24	8	23	40 1/4	6 1/4	6 1/4	20 1/2	34 1/4	6 1/4	5 1/4	19 1/2
48	26 1/4	9 1/8	24 1/8	46 1/4	7 3/8	7 3/8	22 3/4	34 1/4	7 3/8	5 1/4	20 5/8
54	28 1/2	10 1/4	25 1/4	52 1/4	8 1/2	8 1/2	25 1/16	34 1/4	8 1/2	5 1/4	21 3/4

◆ Bars "V" details and dimensions varies between Bar V1 to Bar V40.

GENERAL NOTES

1. Concrete shall be Class C, unless otherwise specified in the plans.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Axis of cast-in-place barrier shall be vertical, except where roadway is superelevated, then axis is normal to roadway surface.
4. Top edges of cast-in-place barrier shall have a ¾" chamfer or tooled radius.
5. Drainage slot depths may be increased 1" to accommodate ACP. Slot locations (12'- 0", C-C Min. Spacing) are shown elsewhere, or as directed by the Engineer.
6. Cast-in-place barrier may be slip formed. Bracing may be tied or tack welded to the reinforcement cage to provide cage stability. Do not weld to anchor bars. The reinforcement cage may rest on top of the finished grade.
7. For Anchorage, Expansion Joint and other details not shown here see SSCB(1)-16 standard sheets for transition barrier on CRCP, and See SSCB(1F)-10 standard sheets for transition barier on Flexible pavement.
8. Payment for Transition rail will be as per Item 514 6036, "Permanent Conceret Traffic Barrier Transition SSCB TO SSTR (MOD)".
9. Payment for optional drill shaft, anchorage and others are subsidiary to Item 514 6036, "PERM CTB (TRAN SSCB TO SSTR) (MOD)"
10. see somewhere else in bridge layout for location.
11. Removing existing SSCB transition are considered subsidiary to Item 514 6036, "PERM CTB (TRAN SSCB TO SSTR) (MOD)"

Cast-In-Place or Slip-Formed (CSB)

Cast-in-Place barrier may be connected to precast SSCB. Joint connection "Types" may be used in Cast-in-Place barrier, to match the precast barrier connection. (See required connection "Type" elsewhere in the plans)

STATE OF TEXAS
ROSTAM MAHBOD
122181
LICENSED
PROFESSIONAL ENGINEER

11/09/2021

Texas Department of Transportation

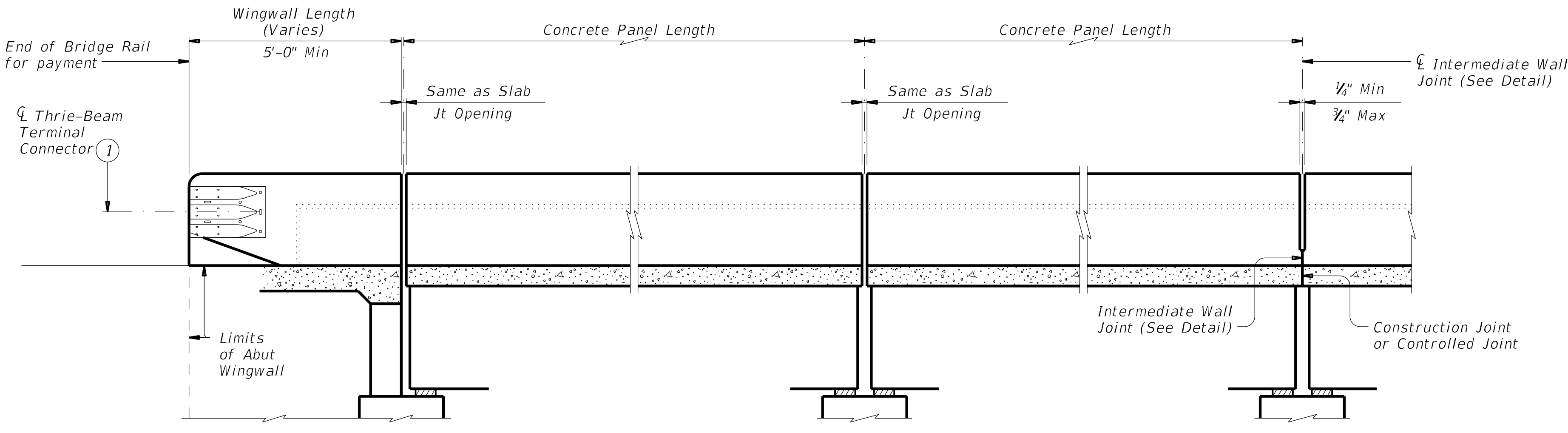
Dallas District Bridge

IH20

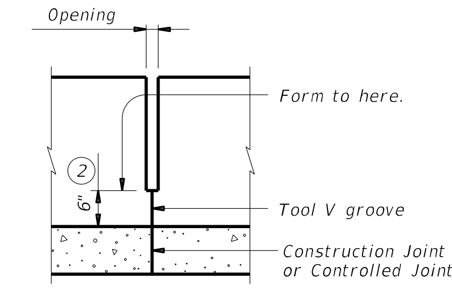
TRANSITION RAIL SSCB TO SSTR

FILE: SEE PATH	DN: RM	CK: YD	DW: RM	CK: YD
©TxDOT 2021 REVISIONS	CONT	SECT	JOB	HIGHWAY
	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DAL	DALLAS		102

DATE: 11/7/2021 TIME: 7:34:55 PM FILE: t:\dalbrdg\bridge repair\2374-03-091, ih 20\details\Transition Rail - SSCB to SSTR.dgn User: dalbrdg

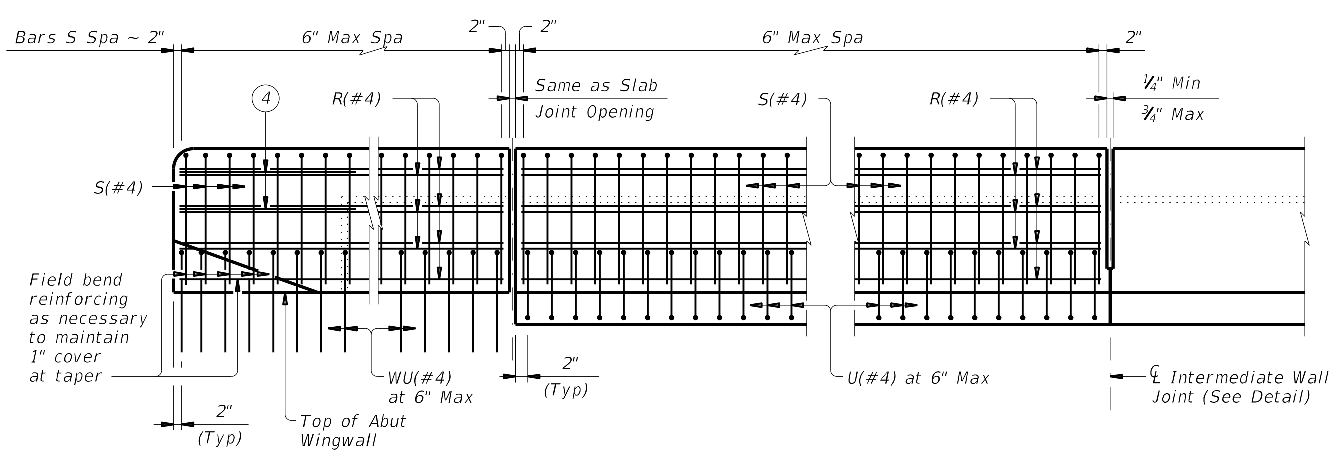


ROADWAY ELEVATION OF RAIL



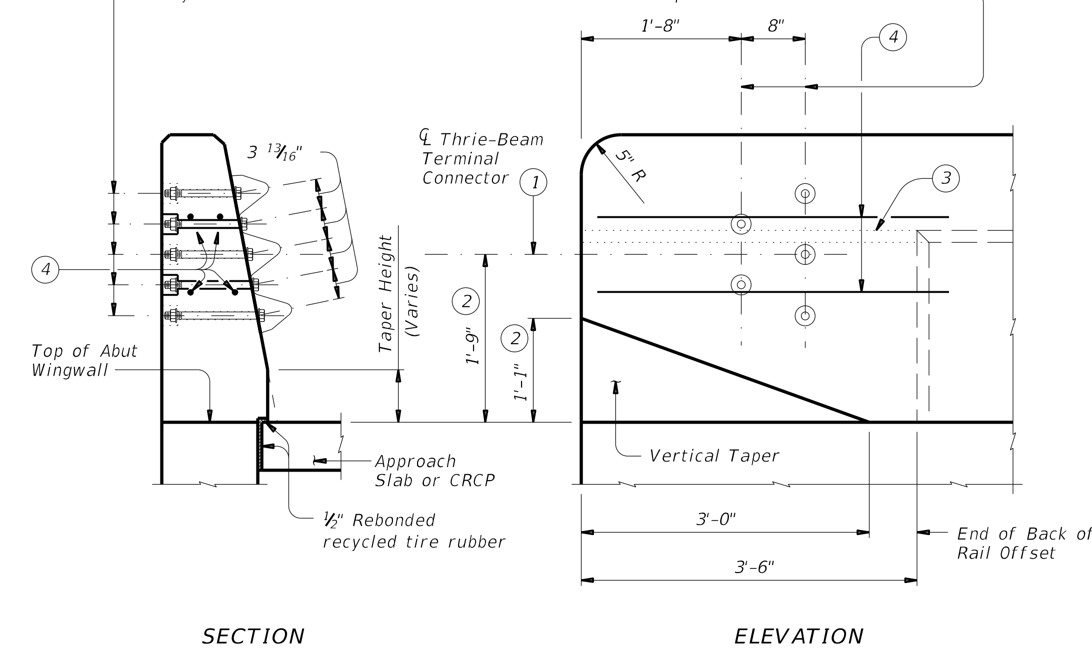
INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.

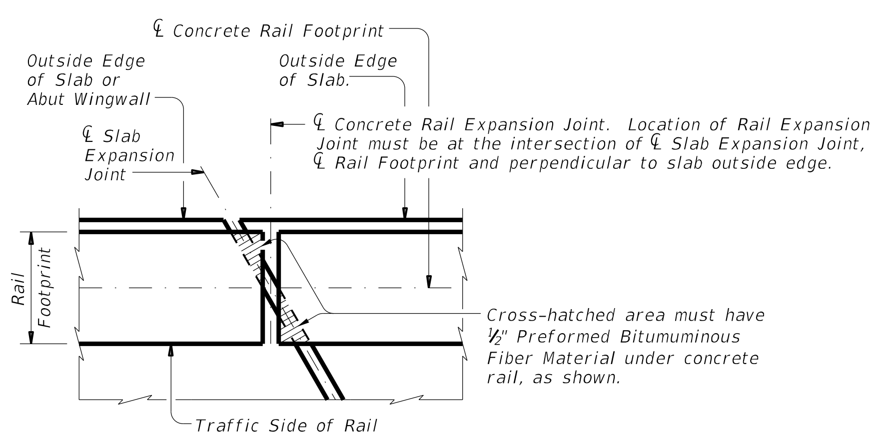


ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

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



TERMINAL CONNECTION DETAILS



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

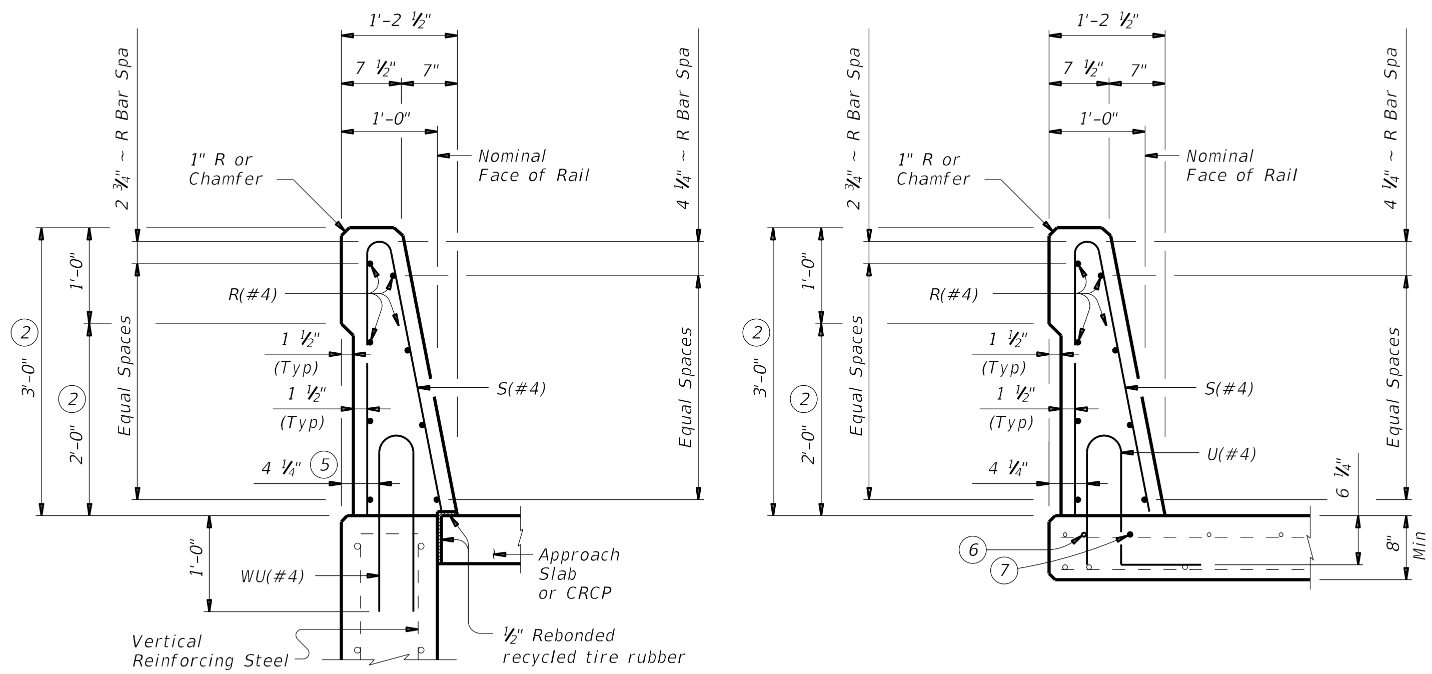
1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
2. Increase 2" for structures with Overlay.
3. Back of rail offset 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.

Texas Department of Transportation | Bridge Division Standard

TRAFFIC RAIL SINGLE SLOPE

TYPE SSTR

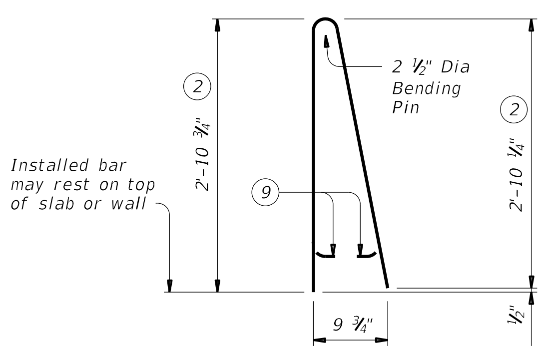
FILE: rlstd014-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST		COUNTY	SHEET NO.
	DALLAS		DALLAS	103



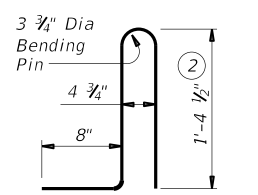
ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS

ON BRIDGE SLAB

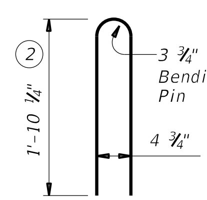
SECTIONS THRU RAIL



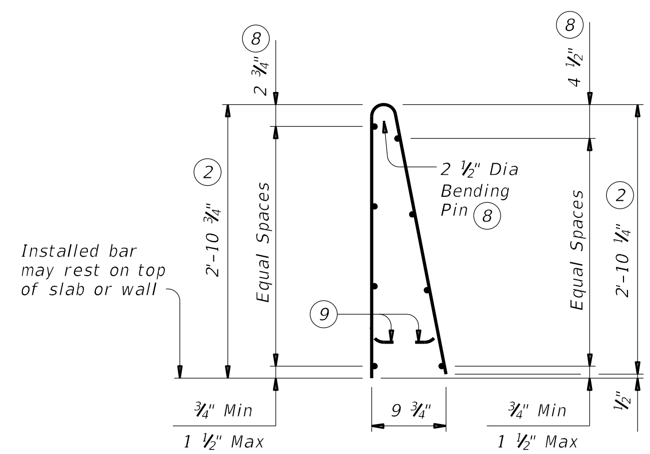
BARS S (#4)



BARS U (#4)

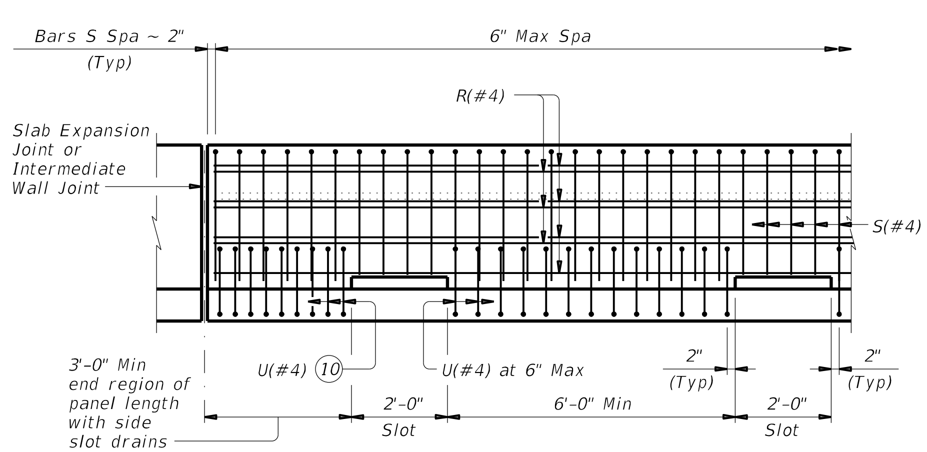


BARS WU (#4)



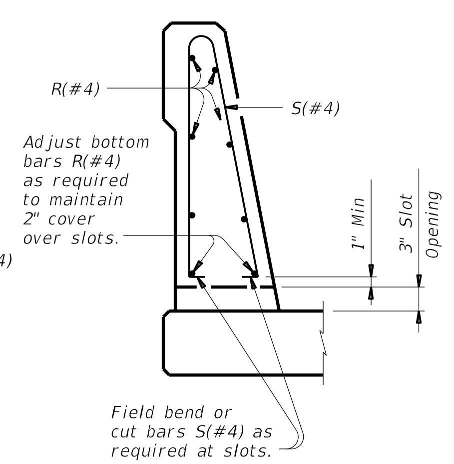
OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

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



OPTIONAL SIDE SLOT DRAIN DETAIL

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



SECTION THRU OPTIONAL SIDE SLOT DRAIN

(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.

CONSTRUCTION NOTES:

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

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

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

MATERIAL NOTES:

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

Provide Grade 60 reinforcing steel.

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

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

Provide bar laps, where required, as follows:
Uncoated or galvanized ~ #4 = 1'-7"
Epoxy coated ~ #4 = 2'-5"

GENERAL NOTES:

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

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

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

Shop drawings will not be required for this rail.

Average weight of railing with no overlay is 376 plf.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

Texas Department of Transportation — Bridge Division Standard

TRAFFIC RAIL SINGLE SLOPE

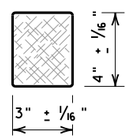
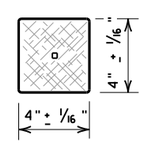
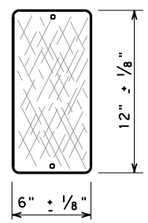
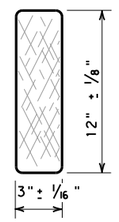
TYPE SSTR

FILE: rlstd014-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT 2374	SECT 03	JOB 091	HIGHWAY IH 20
REVISIONS	DIST DALLAS	COUNTY DALLAS		SHEET NO. 104

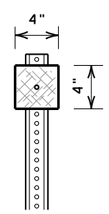
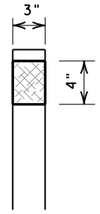
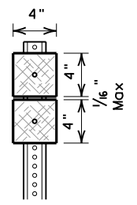
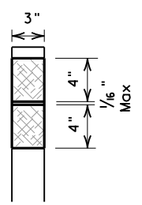
DATE: 12/29/2021 8:36:50 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\2374030091\Sheets\STNDXBRDG\rlstd014-19.dgn

DATE: 12/29/2021 8:36:52 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\1H20\2374030\PK\sheet\dom1-20.dgn

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

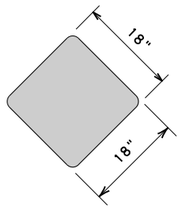
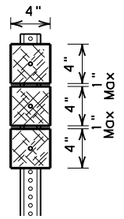
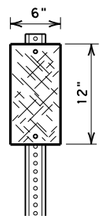
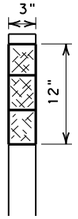
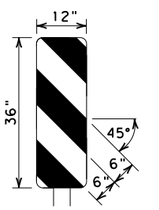
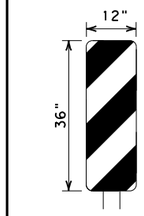
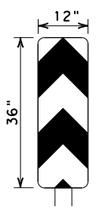
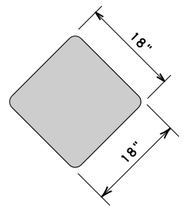
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

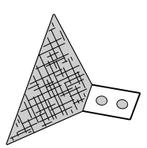
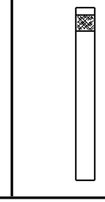
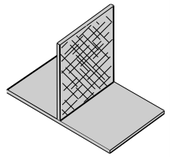
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

OBJECT MARKERS

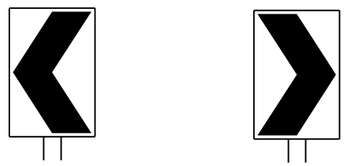
	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			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



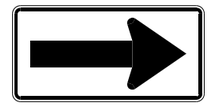
W1-8

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"	

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

NOTE:

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

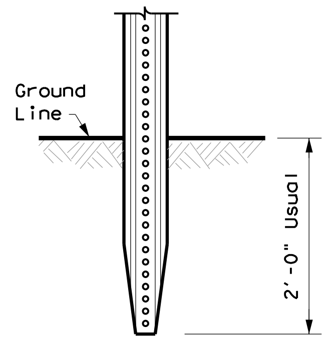
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	DALAS	DALLAS		105

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

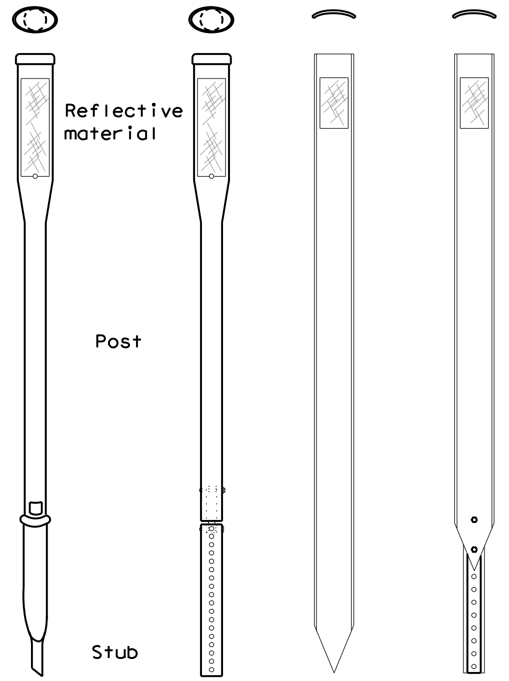


NOTES

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.

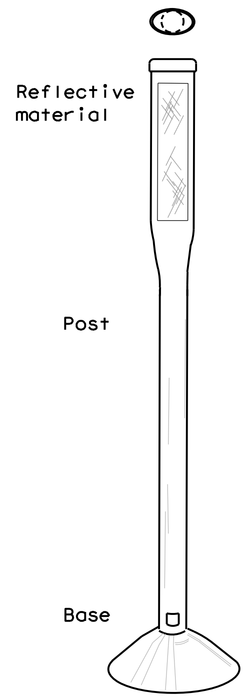
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



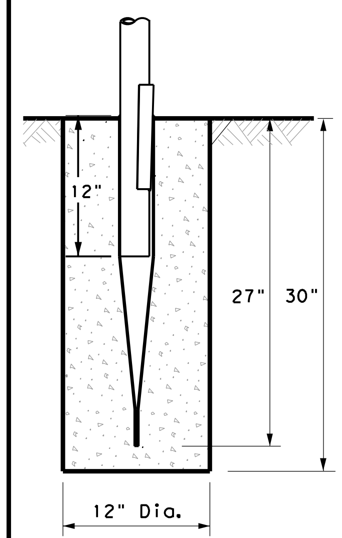
SURFACE MOUNT

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.

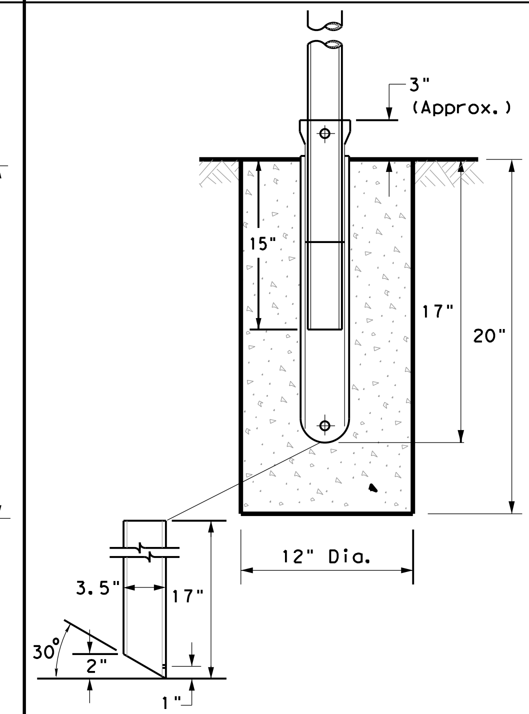
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

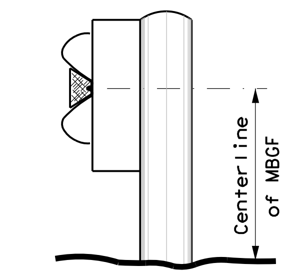
NOTE

1. Install per manufacturer's recommendations.

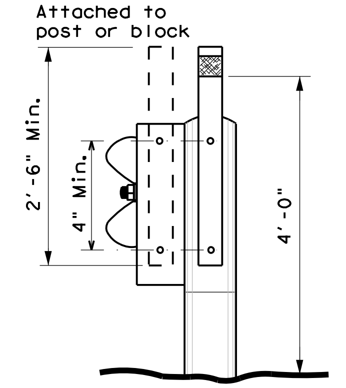
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

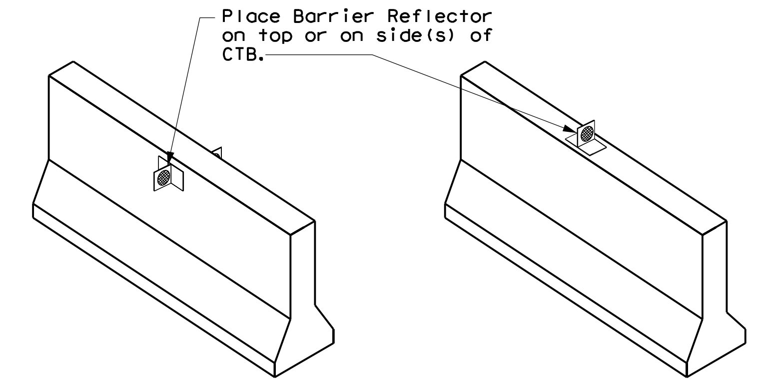
GF1



GF2



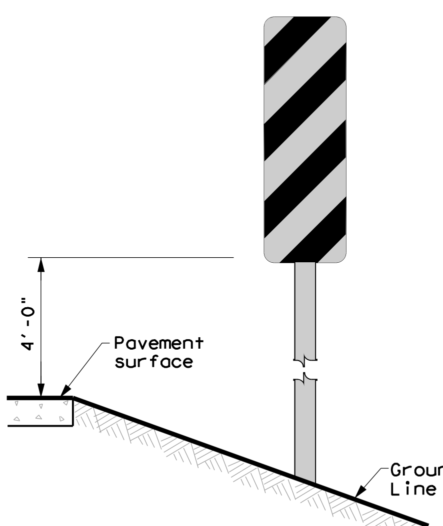
CONCRETE TRAFFIC BARRIER (CTB)



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.

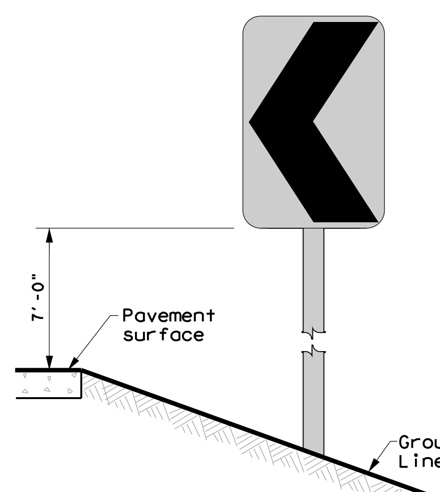
TYPES 1,3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

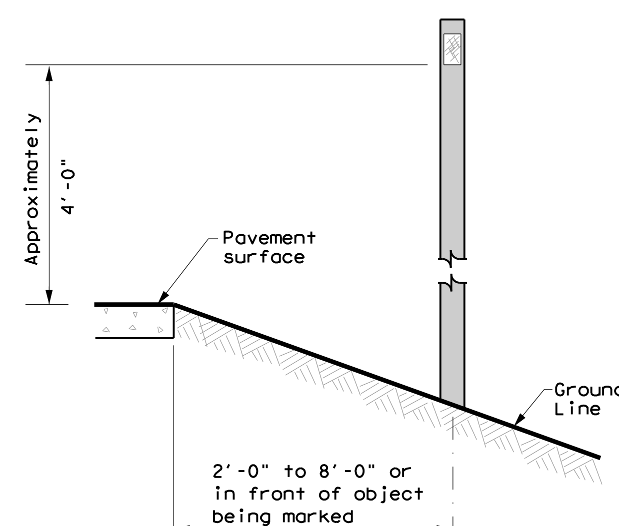
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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

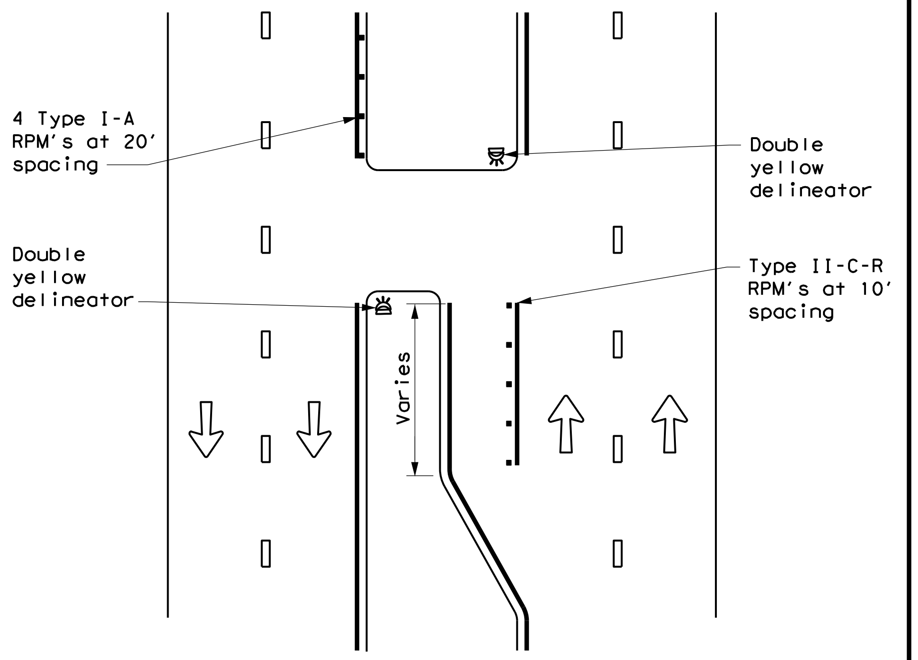
D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
10-09 3-15	DIST		COUNTY	SHEET NO.
4-10 7-20	DALLAS		DALLAS	106

20B

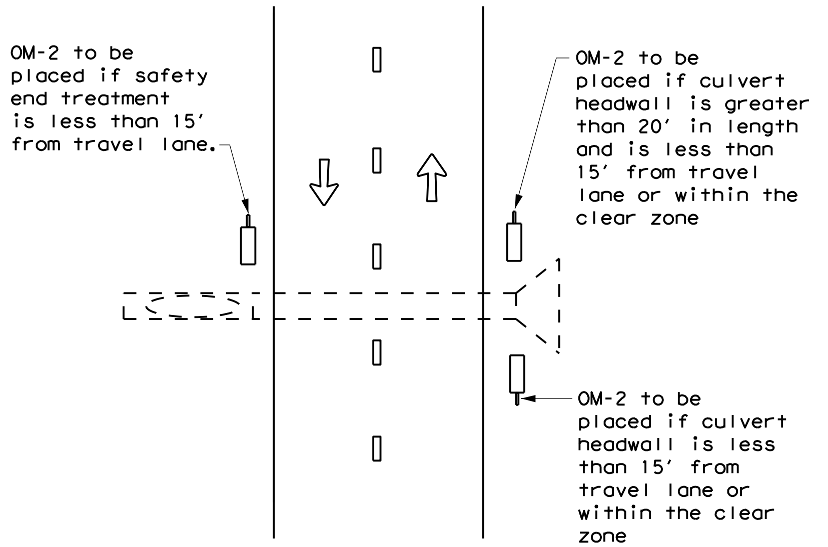
DATE: 12/29/2021 8:36:53 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\23740309\Sheets\STANDARDS\dom2-20.dgn

CROSSOVERS



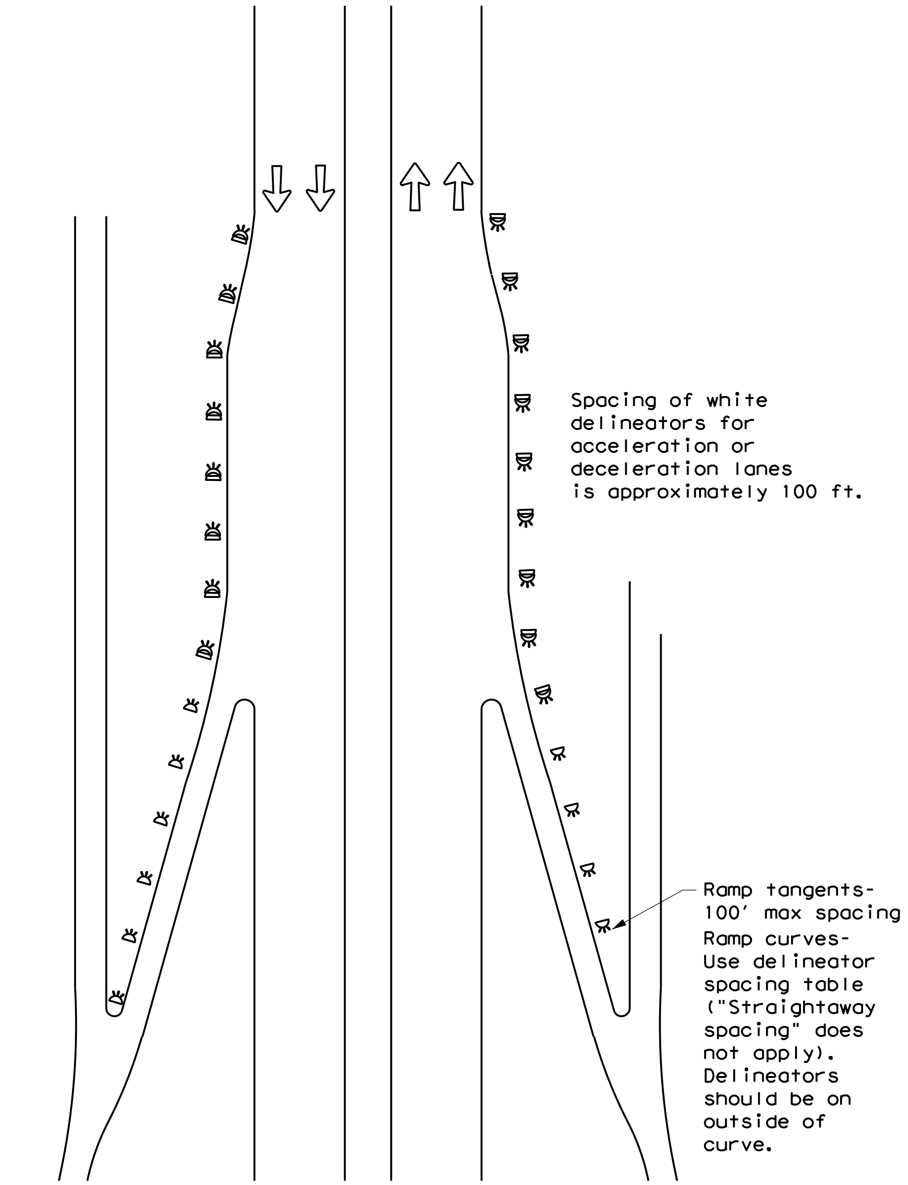
DETAIL 1

FOR CULVERTS WITHOUT MBGF



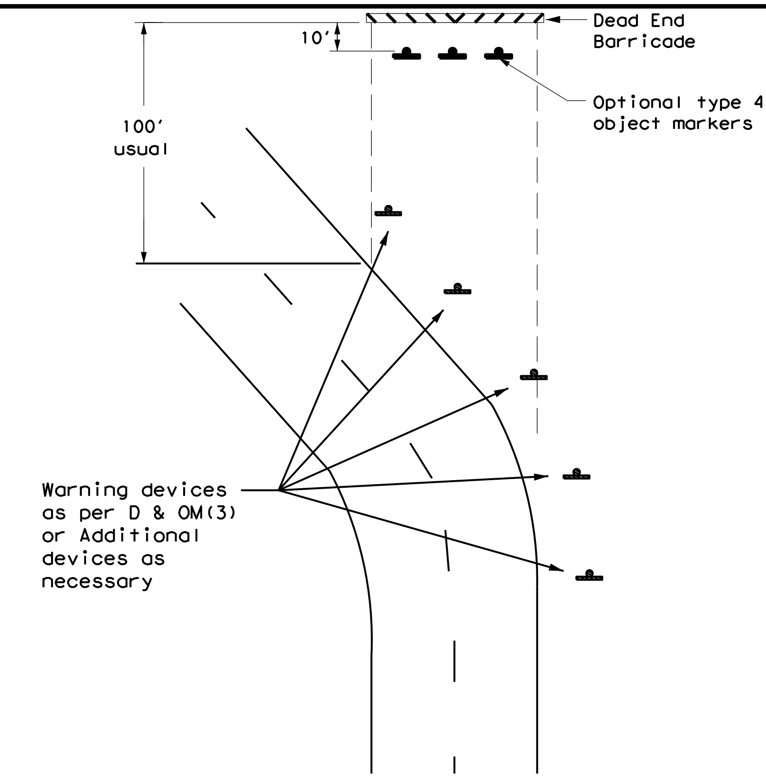
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



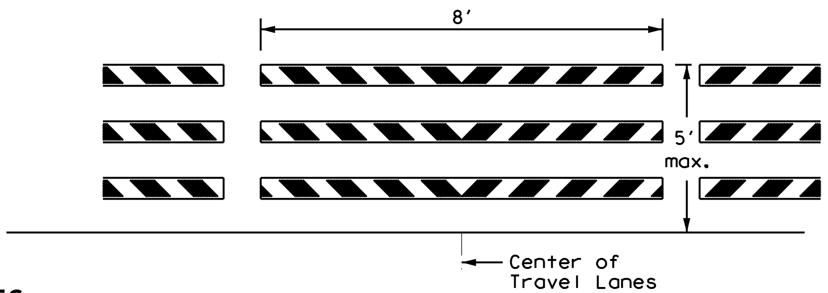
DETAIL 3

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

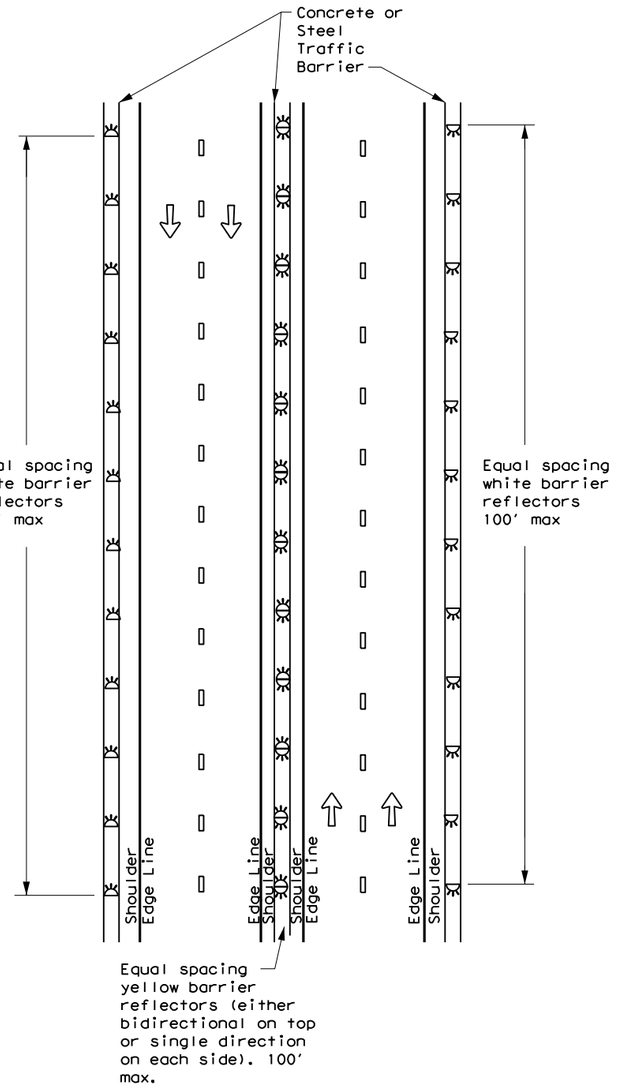
FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 3-15 7-20	2374	03	091	IH 20
	DIST		COUNTY	SHEET NO.
	DALLAS		DALLAS	107

20D

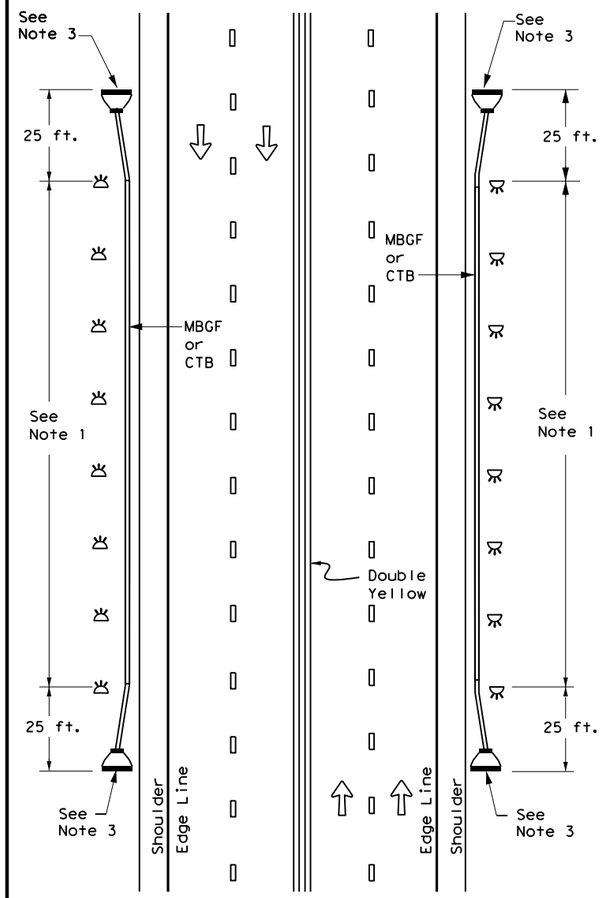
DATE: 12/29/2021 8:36:54 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\2374030091\Sheets\STND\TR\dom4-20.dgn

DATE: 12/29/2021 8:36:54 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\ON\IH20\237403091\Sheets\DOM6-20.dgn

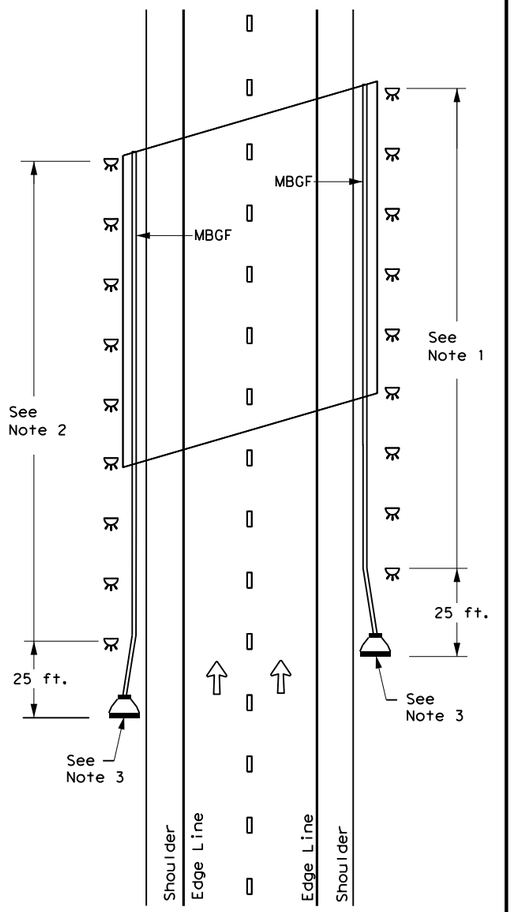
CONTINUOUS CONCRETE OR STEEL BARRIER



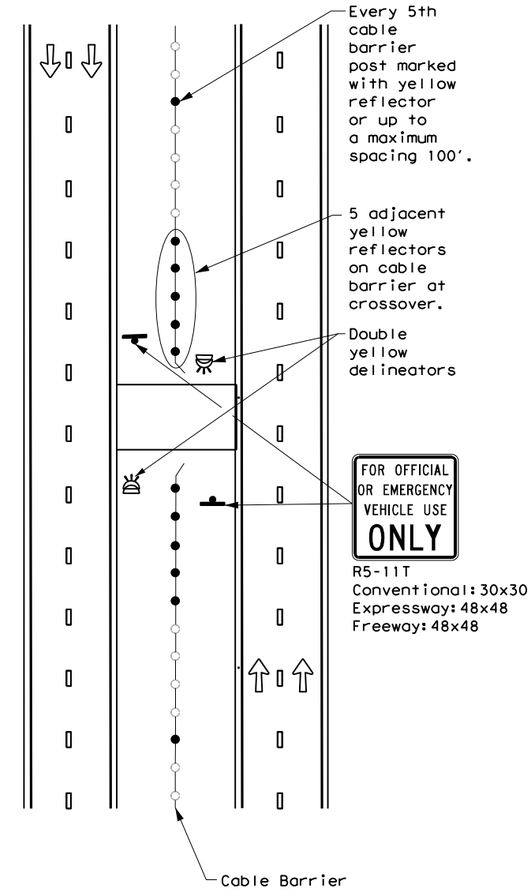
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

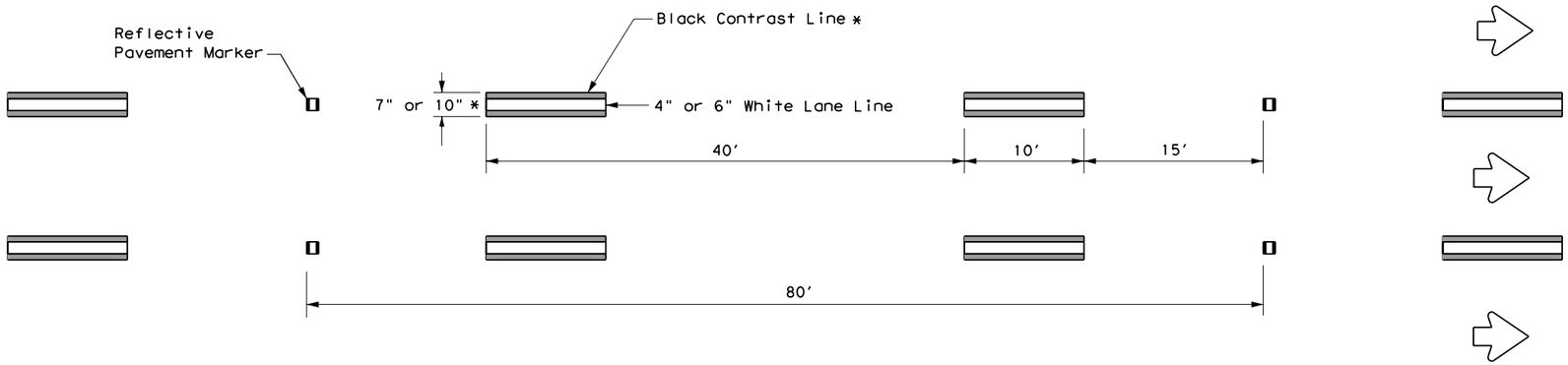
Traffic Safety Division Standard

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
REVISIONS	2374	03	091	IH 20
7-20	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		108

DATE: 12/29/2021 8:36:55 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheet Files\CPM1(1)14.dgn



CONTRAST LANE LINE DESIGN

* See contrast line dimensions table for width of black line.

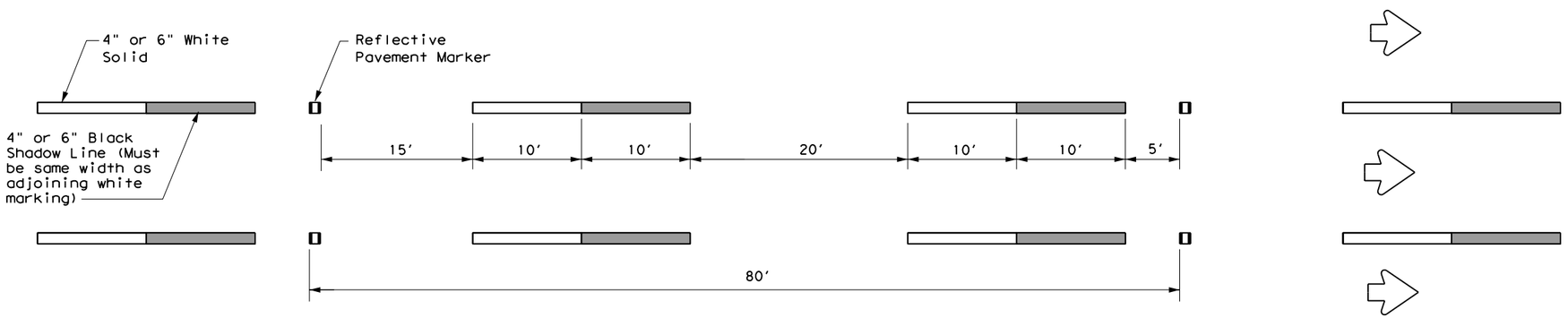
CONTRAST LINE DIMENSIONS		
White	Black (per side)	Total Width
4"	1.5"	7"
6"	2"	10"

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.



SHADOW LANE LINE DESIGN

Texas Department of Transportation

Traffic Operations Division Standard

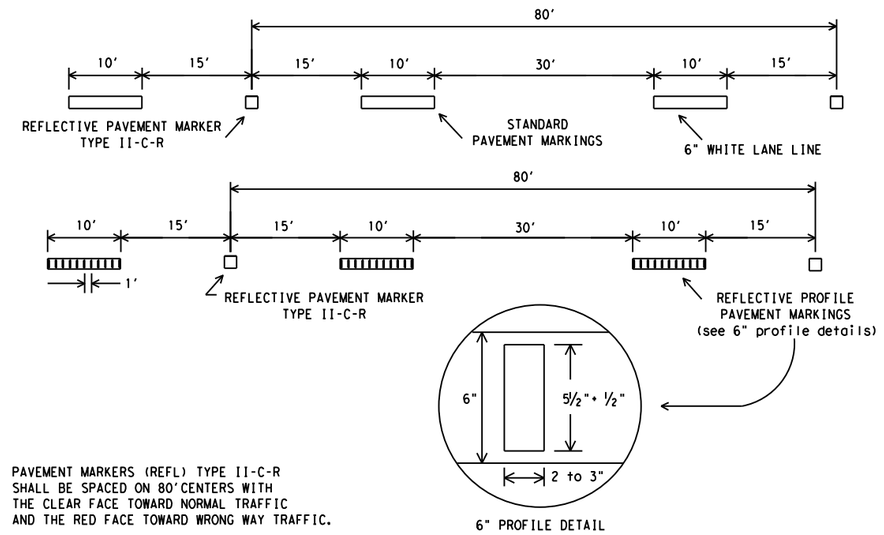
CONTRAST AND SHADOW PAVEMENT MARKINGS

CPM(1)-14

FILE: CPM(1)14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		109

22N

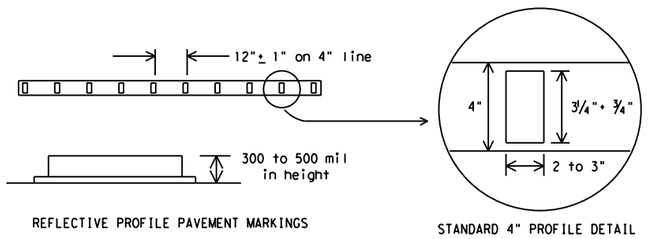
DATE: 12/29/2021 8:36:56 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\STND\TRF\fpm1-12(DAL).dgn



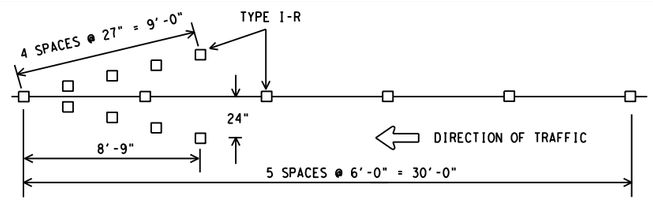
PAVEMENT MARKERS (REFL) TYPE II-C-R SHALL BE SPACED ON 80'CENTERS WITH THE CLEAR FACE TOWARD NORMAL TRAFFIC AND THE RED FACE TOWARD WRONG WAY TRAFFIC.

TRAFFIC LANE LINES PAVEMENT MARKING DETAILS

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



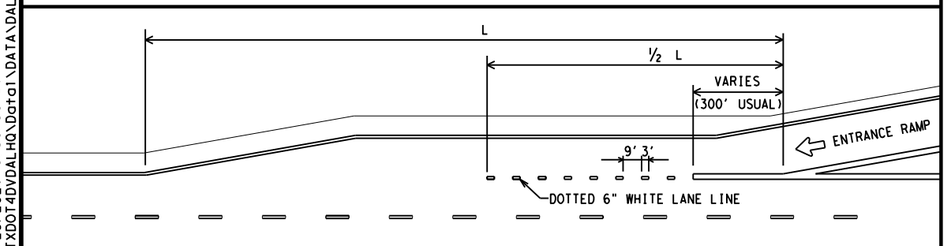
EDGELINE PAVEMENT MARKINGS



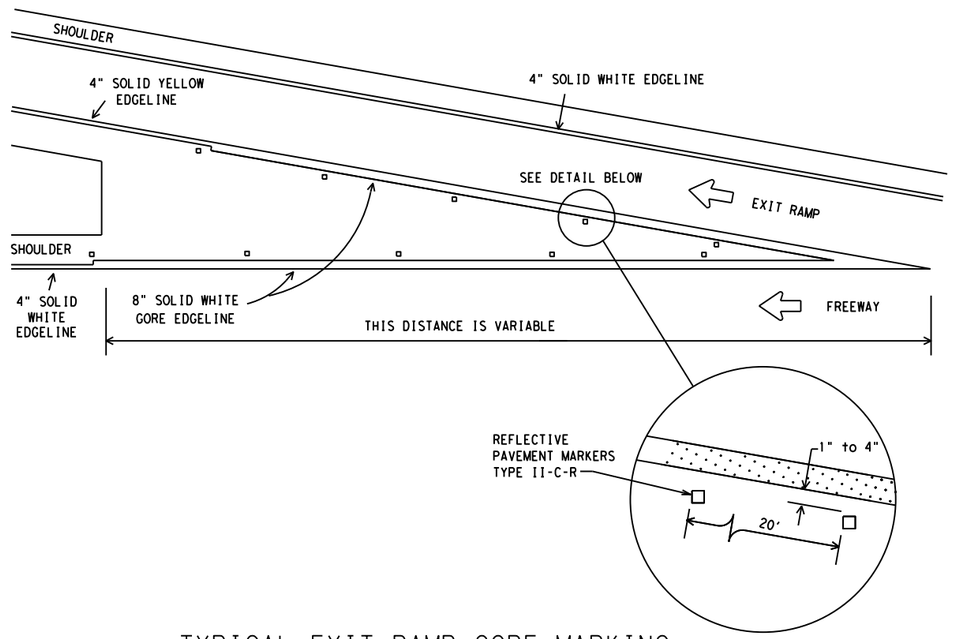
ALL RAISED MARKERS IN THE WRONG WAY ARROW SHALL BE TYPE I-R REFLECTORIZED PAVEMENT MARKERS WITH THE REFLECTORIZED SURFACE FACING THE WRONG WAY TRAFFIC. TYPE II-C-R SHALL NOT BE USED.

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

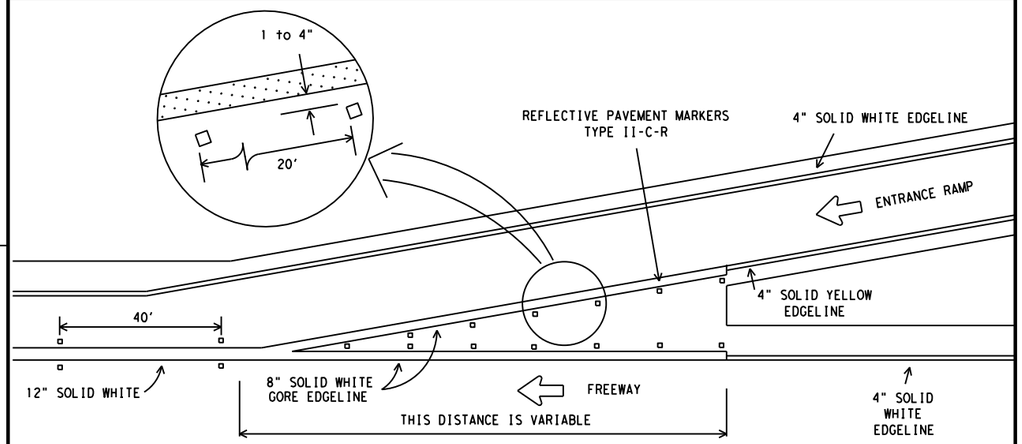
WRONG WAY ARROW DETAIL



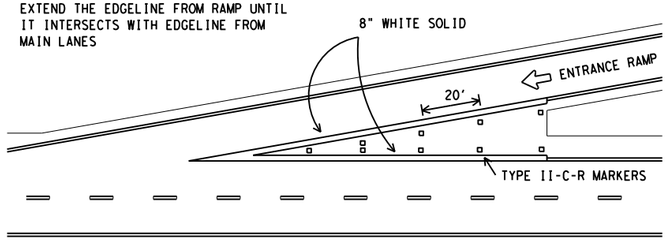
PARALLEL ACCELERATION LANE



TYPICAL EXIT RAMP GORE MARKING



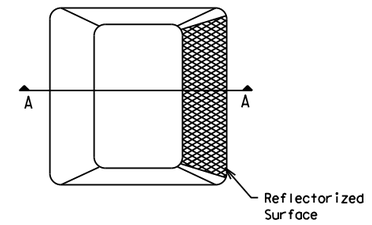
TYPICAL ENTRANCE RAMP GORE MARKING



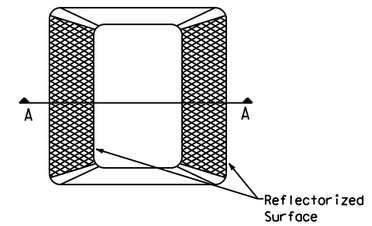
TAPERED ACCELERATION LANE

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

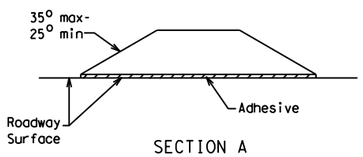
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation
DALLAS DISTRICT

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS

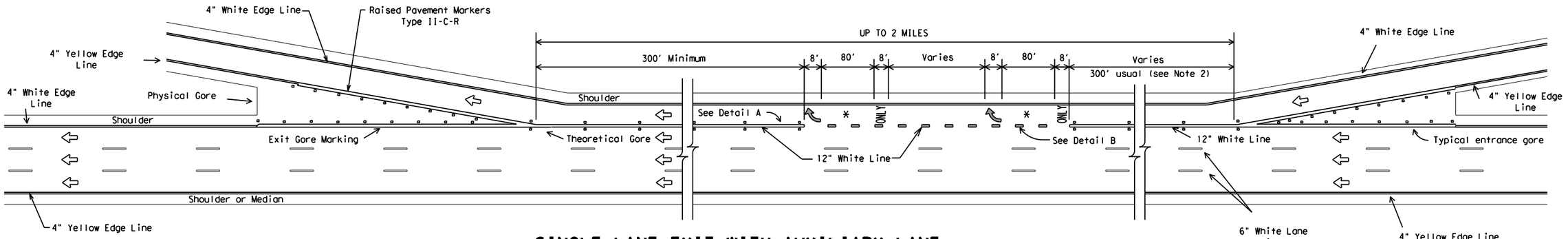
FPM(1)-12(DAL)

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

REVISIONS
10-17. CHANGED LANE LINE WIDTH TO 6 INCHES.

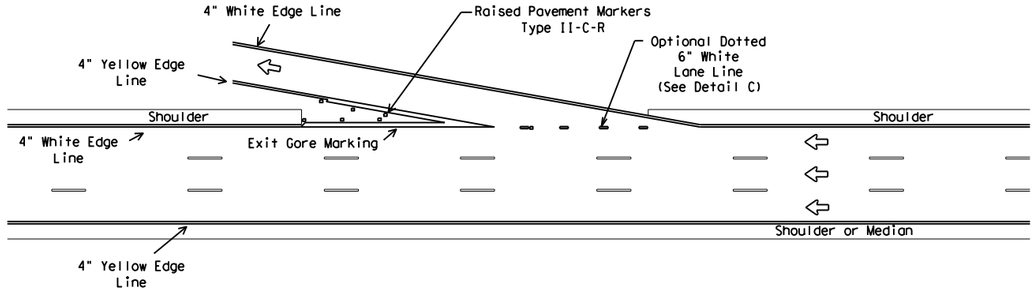
CONT	SECT	JOB	HIGHWAY
2374	03	091	IH 20
DIST	COUNTY		SHEET NO.
DALLAS	DALLAS		110

DATE: 12/29/2021 8:36:57 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\23740309\Sheets\STND\TRF\fpm2-12(DAL).dgn

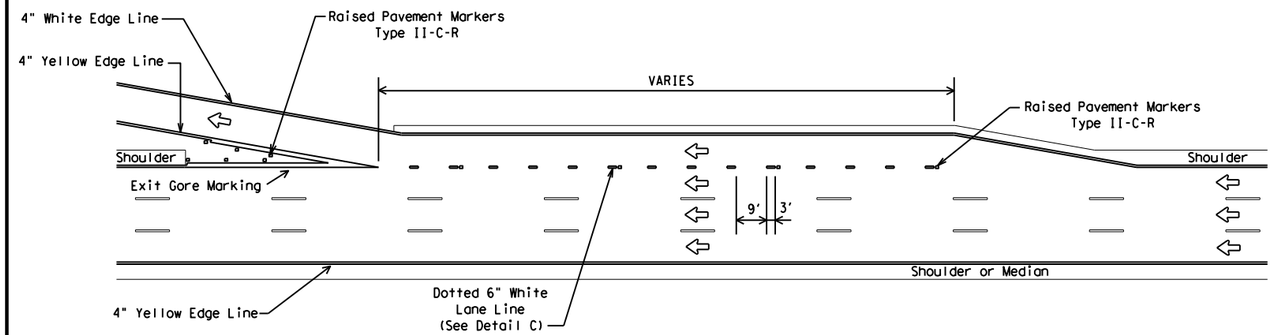


SINGLE LANE EXIT WITH AUXILIARY LANE

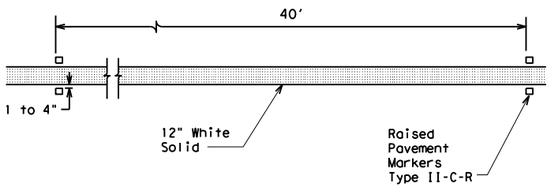
(See Note 2)



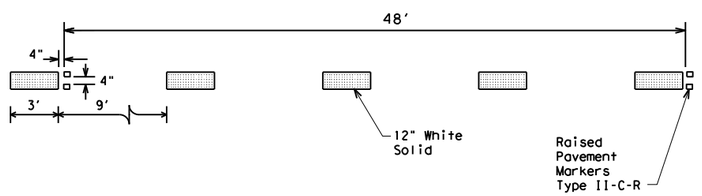
TAPERED DECELERATION LANE



PARALLEL DECELERATION LANE

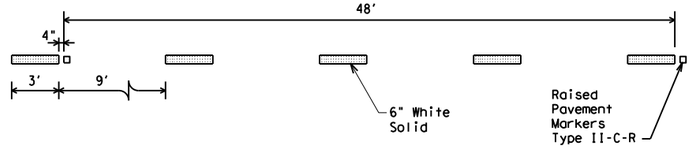


DETAIL A



DETAIL B

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



DETAIL C

Normal (6") Dotted Lane Line (See Note 4)

GENERAL NOTES

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") Dotted Lane Line (See Detail B) is used to separate a through lane from a lane drop at normal exit ramp and from an auxiliary lane between an entrance and exit ramp.
4. Normal (6") Dotted Lane Line (See Detail C) is used at parallel acceleration and deceleration lanes.

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

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

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

Texas Department of Transportation

DALLAS DISTRICT

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMPS

FPM(2)-12(DAL)

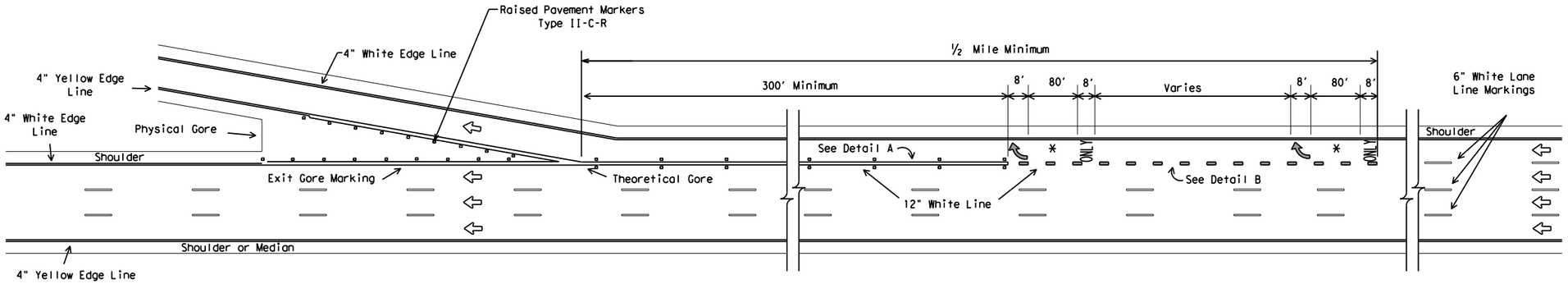
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
10-17. CHANGED LANE LINE WIDTH TO 6 INCHES.

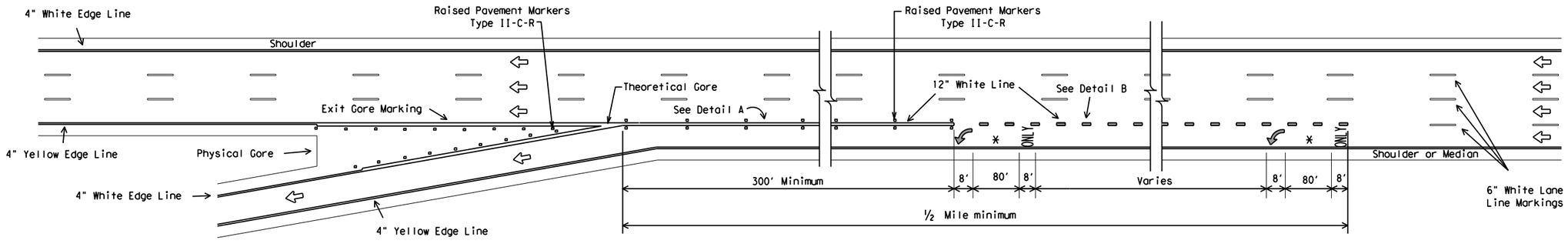
CONT	SECT	JOB	HIGHWAY
2374	03	091	IH 20

DIST	COUNTY	SHEET NO.
DALLAS	DALLAS	111

DATE: 12/29/2021 8:36:58 AM
FILE: \\TXDOT40VDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\SIND\TRF\fpm3-12(DAL).dgn



SINGLE LANE EXIT - LANE DROP OR EXIT ONLY

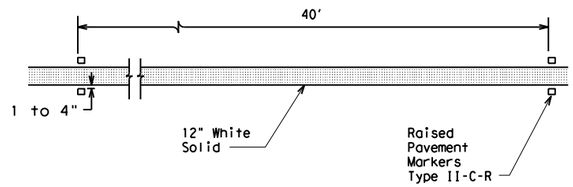


SINGLE LANE EXIT - LANE DROP OR EXIT ONLY (LEFTHAND)

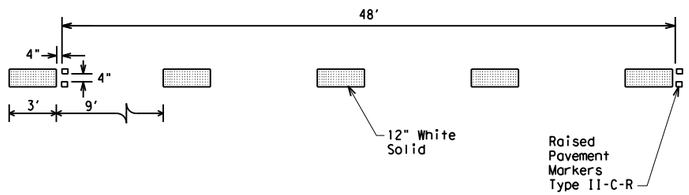
LEGEND	
⇦	Denotes direction of traffic.
↱	Pavement marking arrows (white)
*	Arrow markings are optional, however "ONLY" is required if arrow is used

GENERAL NOTES

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



DETAIL A



DETAIL B

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

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

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

Texas Department of Transportation

DALLAS DISTRICT

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

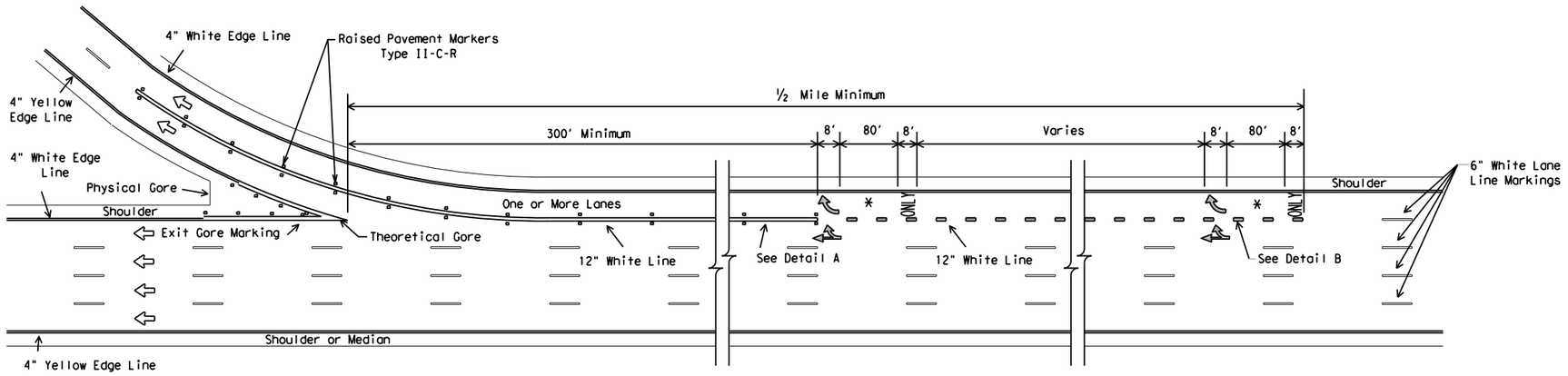
FPM(3)-12(DAL)

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

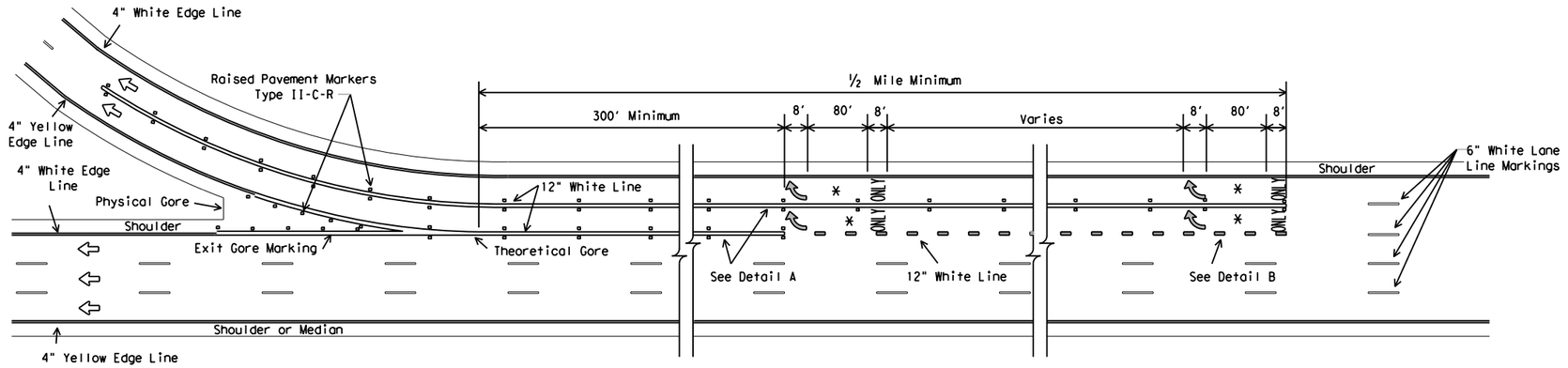
REVISIONS
10-17. CHANGED LANE LINE WIDTH TO 6 INCHES.

CONT	SECT	JOB	HIGHWAY
2374	03	091	IH 20
DIST	COUNTY		SHEET NO.
DALLAS	DALLAS		112

23C



MULTIPLE LANE EXIT - EXIT ONLY WITH OPTION LANE

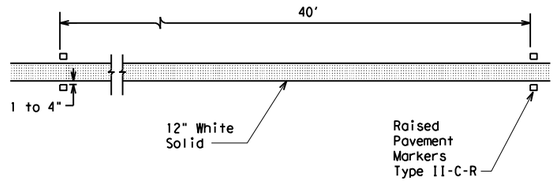


MULTIPLE LANE EXIT ONLY

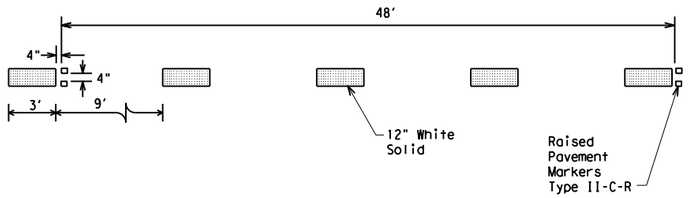
LEGEND	
⇦	Denotes direction of traffic
	Pavement marking arrow (white)
	Optional Pavement Marking Arrows (white)
✳	Arrow markings are optional, however "ONLY" is required if arrow is used

GENERAL NOTES

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



DETAIL A



DETAIL B

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

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

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

Texas Department of Transportation

DALLAS DISTRICT

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

FPM(4)-12(DAL)

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

REVISIONS
10-17. CHANGED LANE LINE WIDTH TO 6 INCHES.

CONT	SECT	JOB	HIGHWAY
2374	03	091	IH 20

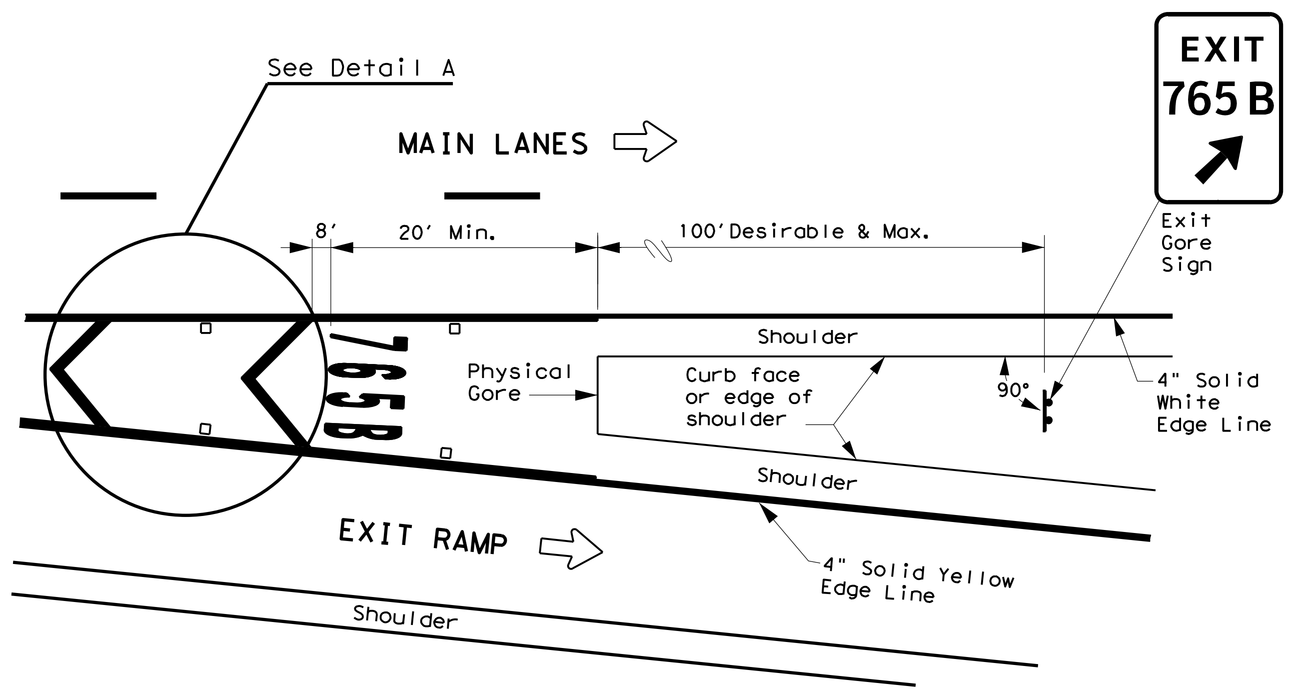
DIST	COUNTY	SHEET NO.
DALLAS	DALLAS	113

DATE: 12/29/2021 8:36:58 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\ON\IH20\23740309 1\Sheets\STND\TRF\fpm4-12(DAL).dgn

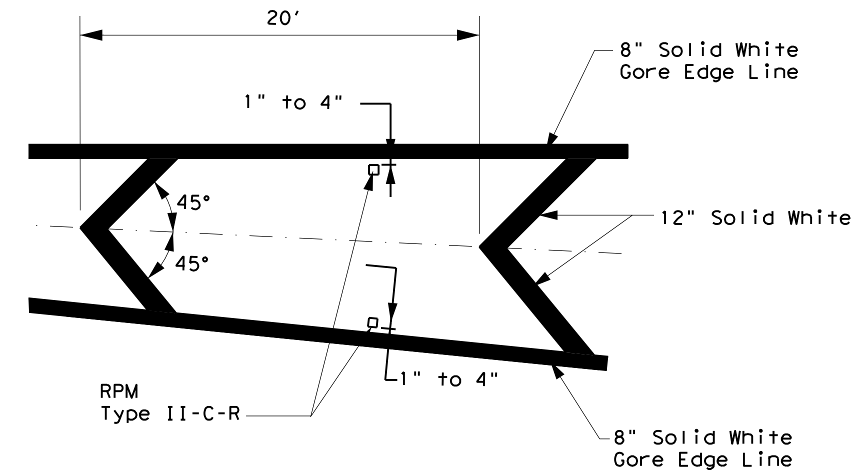
DATE: 12/29/2021 8:36:59 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\2374030\Sheets\STNDS\TR\fpm5-19.dgn

EXIT NUMBER PAVEMENT MARKING NOTES

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



MARKINGS WITH EXIT NUMBER



NOTES

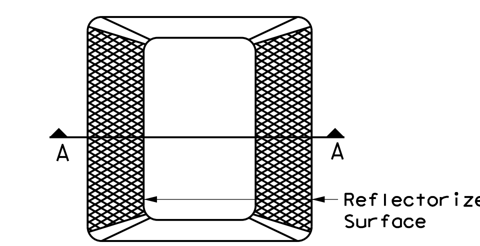
1. Raised pavement markers shall be centered between chevron or gore lines.
2. For more information, see Reflectorized Raised Pavement Marker Detail.

DETAIL A

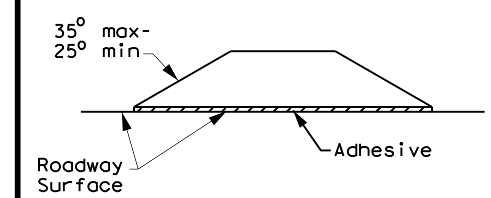
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

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

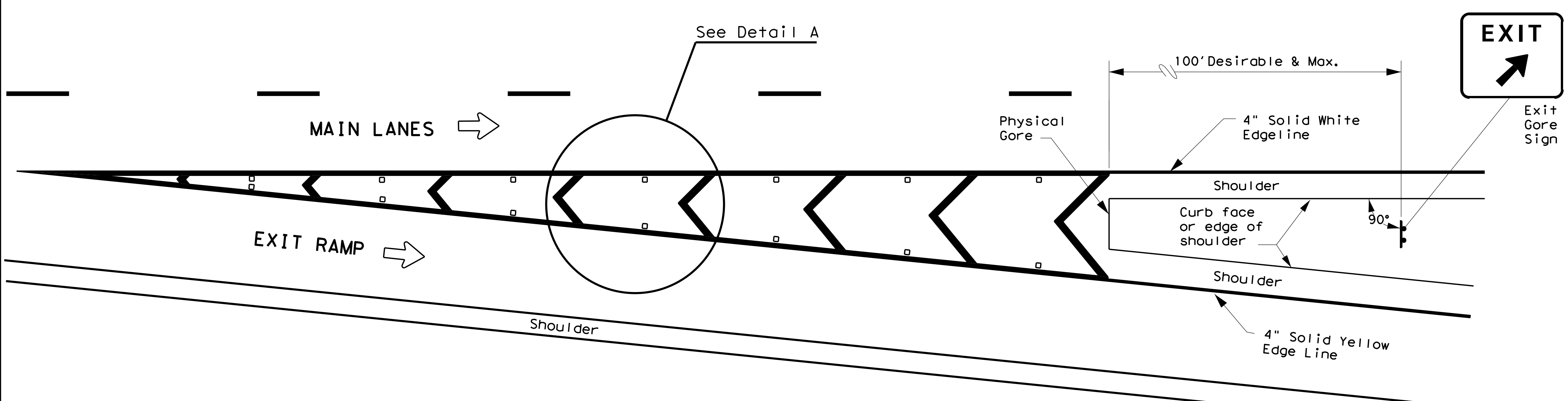


Type II (Top View)



SECTION A

REFLECTORIZED RAISED PAVEMENT MARKER (RPM)



MARKINGS WITHOUT EXIT NUMBER

Texas Department of Transportation

Traffic Safety Division Standard

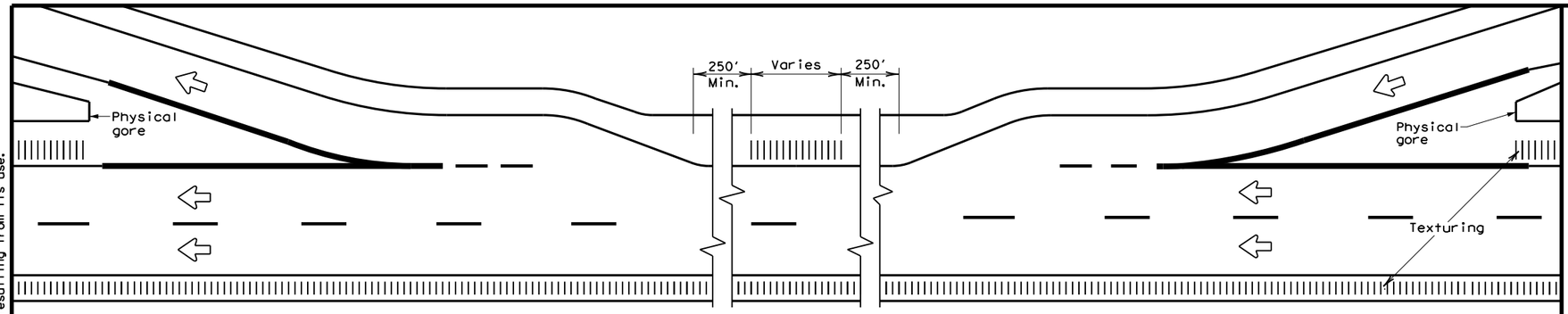
EXIT GORE PAVEMENT MARKINGS

FPM(5)-19

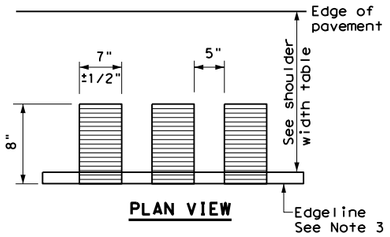
FILE: fpm(5)-19.dgn	DN:	CK:	DW:	CK:
© TxDOT September 2019	CONT 2374	SECT 03	JOB 091	HIGHWAY IH 20
REVISIONS	DIST DALLAS		COUNTY DALLAS	SHEET NO. 114

23F

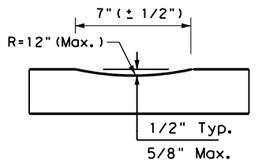
DATE: 12/29/2021 8:37:00 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\ON\IH20\237403091\Sheet\RS(1)-13.dgn



TYPICAL RUMBLE STRIP PLACEMENT AT EXIT AND ENTRANCE RAMPS

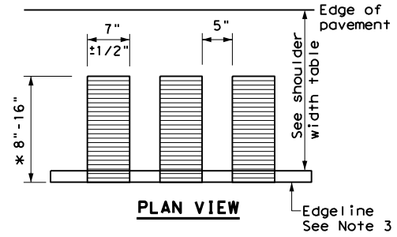


PLAN VIEW



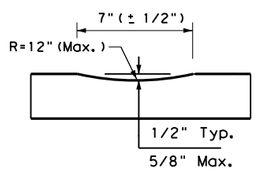
PROFILE VIEW
OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



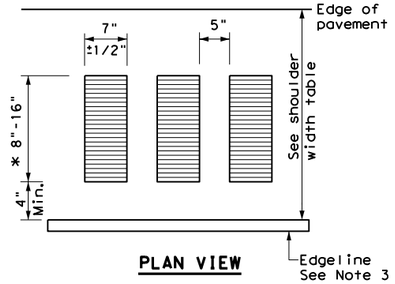
PLAN VIEW

* This distance may vary based on width of shoulder



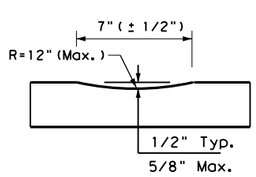
PROFILE VIEW
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



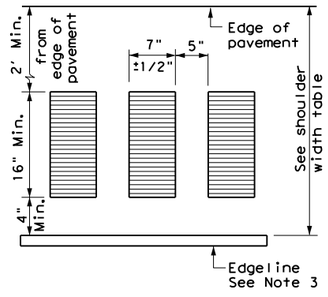
PLAN VIEW

* This distance may vary based on width of shoulder

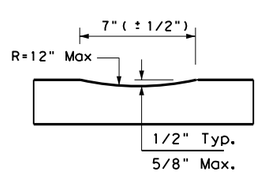


PROFILE VIEW
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

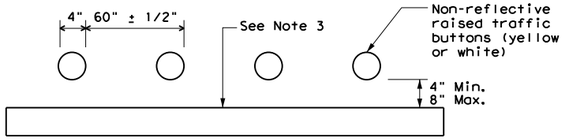


PLAN VIEW



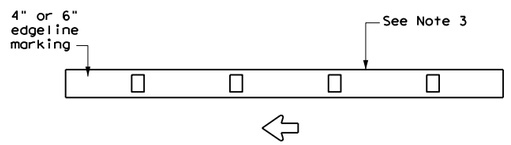
PROFILE VIEW
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW
OPTION 5

RAISED EDGELINE RUMBLE STRIPS



PLAN VIEW
OPTION 6

PROFILE EDGELINE MARKINGS

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 Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the table below for determining what options may be used for edgeline rumble strips.

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

5. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
6. Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble stripe.
7. Breaks in edgeline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks when installed on conventional highways.
8. Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
9. Consideration should be given to noise levels when edgeline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inches depth of milled rumble strip may be considered in these areas.
10. On roadways with high bicycle activity, consideration should be given before the installation of edgeline rumble strips. Things to consider include size of rumble strips, rumble strip material and location of rumble strips on the shoulder. If the designer determines that gaps are needed in the rumble strips due to bicycle use of the road, then follow the requirement shown in FHWA Technical Advisory T5040.39, or latest version. A detail of the spacing shall be included in the plans.

WHEN INSTALLING RAISED OR PROFILE EDGELINE 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 edgeline when used as a rumble strip. The color of the button should match the color of the adjacent edgeline 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. Breaks in edgeline rumble strips using raised traffic buttons shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks when installed on conventional highways.
15. The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
16. Raised profile thermoplastic markings used as edgelines 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 Operations Division Standard

EDGELINE RUMBLE STRIPS ON FREEWAYS AND DIVIDED HIGHWAYS
RS(1)-13

FILE: rs(1)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-10 10-13	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		115

A. GENERAL SITE DATA

1. PROJECT LIMITS: *IH 20 FROM IH 35E TO IH 45*

Begin Project Coordinates : Latitude (N): 32.6421924 *Longitude (W):* --96.8241428

End Project Coordinates : Latitude (N): 32.6620576 *Longitude (W):* - -96.7259862

2. PROJECT SITE MAPS:

- *Project Location Map: The Title Sheet*
- *Drainage Patterns: Drainage Area Maps NOT APPLICABLE*
- *Slopes Anticipated After Major Gradings or Areas of Soil Disturbance: Typical Sections NOT APPLICABLE*
- *Location of Erosion and Sediment Controls: SW3P Site Maps PLAN LAYOUT SHEET 53, 54*
- *Surface Waters and Discharge Locations: Drainage and Culvert Layouts NOT APPLICABLE*
- *Project Specific Location(s) (PSL): To be determined by the project Construction Personnel. Location(s) shown on SW3P Site Map (if PSL location(s) is within one mile of project) and information located in project SW3P Binder (Reference Item #10 below).*

3. PROJECT DESCRIPTION:
PLANING, CONCRETE FULL DEPTH REPAIR, OVERLAY, PAVEMENT MARKINGS

4. MAJOR SOIL DISTURBING ACTIVITIES:
INSTALLING CONCRETE MOW STRIP

5. EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:
ADJACENT TO WORK AREA, EXISTING SOIL TYPES ARE AUSTIN SILTY CLAY AND HOUSTON BLACK CLAY. THE EXISTING VEGETATION CONSISTS PRIMARILY OF GRASS WITH SPARSE TREES AND SHRUBS.

6. TOTAL PROJECT AREA: *130.14* Acres

7. TOTAL AREA TO BE DISTURBED: *0.82* Acres *(0.63 %)*

8. WEIGHTED RUNOFF COEFFICIENT

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

9. NAME OF RECEIVING WATERS:
PARRISH BRANCH, RUNYON SPRING BRANCH AND IT'S TRIBUTARIES
BARNEY BRANCH, SANTA ROSE BRANCH
NEWTON CREEK, WHITES BRANCH
ALL WATERS FLOW TO FIVEMILE CREEK (SEGMENT 0805D), NO WATER QUALITY IMPAIRMENTS

10. PROJECT SW3P Binder:

A. For projects disturbing one to five acres, TxDOT will maintain a SW3P Binder at the project field office (if there is not a project field office, should be kept at the Area Office) which contains the following: Index Sheet, TCEQ Signature Authority, TxDOT's and Contractor's Small Construction Site Notice, SW3P Inspector Qualification Statements, EPIC Sheet, SW3P Sheet, Site Location Maps, Inspection and Maintenance Reports (Form 2118), Construction Stage Gate Checklist(s) (CSGC), Stored Material Lists specifying associated control measures and the Appendix which contains the TPDES Construction General Permit, TxDOT and Contractor MS4 Operator Notification(s) and the Construction PSL Permits per all applicable requirements.

B. For projects disturbing 5 acres or more, TxDOT will follow the actions listed in (10.A.) above with the addition of the following: TxDOT and Contractor Notice Of Intent (N.O.I.) and Fee Payment Form, TxDOT and Contractor Large Construction Site Notice (to be used instead of Small Site Notice), and TPDES Permit Coverage Notice.

C. For projects disturbing less than one acre, actions described in (10.A.) and (10.B.) above are not required. Acreage is calculated by adding Total Area To Be Disturbed Acres on project (See #7 above) and the PSL(s) acreage located within one mile of project.

B. EROSION AND SEDIMENT CONTROLS

1. SOIL STABILIZATION PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

____ TEMPORARY SEEDING
____ MULCHING (Hay or Straw)
____ BUFFER ZONES
____ PLANTING
____ SEEDING
____ SODDING
P PRESERVATION OF NATURAL RESOURCES
____ FLEXIBLE CHANNEL LINER
____ RIGID CHANNEL LINER
____ SOIL RETENTION BLANKET
____ COMPOST MANUFACTURED TOPSOIL
____ VERTICAL TRACKING
____ OTHER: *NONE*

2. STRUCTURAL PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

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

NOTE: TOP OF BMP'S SHOULD NOT BE HIGHER THAN ROADWAY ELEVATION AS NOT TO FLOOD ROADWAY UNLESS PRIOR APPROVAL FROM ENGINEER IS OBTAINED.

3. STORM WATER MANAGEMENT:

A. STORM WATER DRAINAGE WILL BE PROVIDED BY DITCHES, INLETS, AND STORM WATER SYSTEMS WHICH CARRY DRAINAGE WITHIN THE R.O.W. TO THE LAWS WITHIN THE ROADWAY AND PROJECT SITE WHICH DRAINS TO NATURAL FACILITIES.

B. DO NOT STAGE PORTABLE SANITARY UNITS, CONCRETE WASHOUT PIT OR CHEMICAL STORAGE WITH 50 FEET UPGRADIENT OF A STORMWATER DRAINAGE FEATURE OR RECEIVING WATER WITHOUT APPROPRIATE STORMWATER QUALITY CONTROLS

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

1) FOR DETAIL CONSTRUCTION ACTIVITIES SEE TRAFFIC CONTROL PLAN PHASE NARRATIVE.

2) PRIOR TO THE START OF CONSTRUCTION ACTIVITIES IN THEIR CONTROL AREA, INSTALL SW3P CONTROL DEVICES AS APPROPRIATE TO PROTECT ADJACENT AND DOWNSLOPE STORMWATER FEATURES AND RECEIVING WATERS, AND ACTIVE ROADWAYS AND PEDESTRIAN FACILITIES. INSTALL IN ACCORDANCE WITH THE APPLICABLE STANDARDS, AS DIRECTED BY THE ENGINEER.

3) CAPTURE SAW-CUTTING DEBRIS AND SLURRY FOR PROPER DISPOSAL, AND PROTECT PROXIMAL DOWNGRADIENT STORMWATER DRAINAGE FEATURES.

4) WHEN ALL CONSTRUCTION ACTIVITIES ARE COMPLETE AND THE SITE IS STABILIZED AND APPROVED BY THE PROJECT ENGINEER, REMOVE ALL TEMPORARY STORMWATER QUALITY CONTROL MEASURES.

5. NON-STORM WATER DISCHARGES:
Filter non-storm water discharges, or hold in retention basins, before being allowed to mix with storm water. These discharges consist of, but not limited to, non-polluted ground water, spring water, foundation or footing drain water, water used for dust control or pavement washing and vehicle washwater containing no detergents.

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:
Maintain all erosion and sediment controls in good working order. Perform any necessary cleaning/repairs/replacements at the earliest possible date prior to next rain event, but no later than 7 calendar days. Ensure the surrounding ground has dried sufficiently to prevent damage from equipment. "Too Wet" is the only reason for not adhering to timeframes described. When construction activities permanently or temporarily cease and are not expected to resume for 14 or more days on a disturbed portion of the site, stabilization measures must be initiated immediately.

2. INSPECTION:
A TxDOT Inspector will perform a regularly scheduled SW3P inspection every 7 calendar days. An Inspection and Maintenance Report, signed by the TxDOT Inspector and the Contractor, will be filed for each inspection. Revise/clean/repair/replace each BMP control device in accordance with the current Field Inspection and Maintenance Report (Form 2118) and Item 1 (Maintenance) above.

3. WASTE MATERIALS:
On a daily basis, or as may be directed, collect all waste materials, trash and debris from the construction site and deposit into a metal dumpster having a secure cover and which meets all state and local city solid waste management requirements. Empty the dumpster as required by regulation, or as may be directed, at a local approved landfill site. Do not bury construction waste on the construction project site.

4. HAZARDOUS WASTE & SPILL REPORTING:
As a minimum, any products in the following categories are considered to be hazardous: Paints, Acids, Solvents, Fuels, Asphalt Products, Chemical Additives for Soil Stabilization, and Concrete Curing Compounds or Additives. When storing hazardous material on the project site, or at a Project Specific Location, take all practicable precaution to prevent and/or contain any spillage of these materials. In the event of a spill, contact the spill coordinator immediately.

5. SANITARY WASTE:
Use a licensed sanitary waste management contractor to collect all sanitary waste from portable units as may be required by local regulation, or as directed.

6. CONSTRUCTION VEHICLE TRACKING:
On a regular basis, or as may be directed, dampen haul roads for dust control and construct construction entrances/exits. Provide for a motorized broom or vacuum type sweeper to be available on a daily basis, or as may be directed, to remove sediment from paved roadways on project, abutting and traversing the project site.

7. MANAGEMENT PRACTICES:
A. Construct disposal areas, stockpiles, haul roads and PSL's in a manner that will minimize and control the amount of sediment that may enter receiving waters. Do not locate disposal areas in any wetland, waterbody or streambed.
B. Locate construction staging areas, vehicle maintenance and PSL's areas in a manner to minimize the runoff of pollutants.
C. When working in or near a wetland, install and maintain operating soil erosion and sediment controls at all times during construction and isolate the work from the wetland.
D. Clear all waterways as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.
E. Procedures and/or practices should be taken to control dust.
F. Sediment to be removed from roadways daily or when work begins after weather events if construction activities have ceased due to weather event.

STATE OF TEXAS
DUNG HUY NGUYEN
128595
LICENSED PROFESSIONAL ENGINEER

Dung Nguyen, P.E. 12/29/2021
Signature of Registrant & Date

Texas Department of Transportation

DALLAS DISTRICT ENVIRONMENTAL

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

TEMPLATE REVISION DATE: 02/07/18

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
CB	6	SEE TITLE SHEET		IH 20
GRAPHICS CB	STATE	DISTRICT	COUNTY	SHEET NO.
CHECK DN	TEXAS	DALLAS	DALLAS	116
CHECK AM	CONTROL 2374	SECTION 03	JOB 091	

FILE NAME
DATE
DESIGNER

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.

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.

☐ 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.

2.

3.

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

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

Obtain and keep on-site 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:

SEE SHEET 2 of 2

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) - Sheet 1 of 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		IH 20
STATE	DISTRICT	COUNTY	
TEXAS	DALLAS	Dallas	
CONTROL	SECTION	JOB	SHEET NO.
2374	03	091	117

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

Action Number:

1. Asbestos Containing Materials (ACM) and lead-based paint (LBP) were identified on specific components on the following bridges requiring repair/renovation for this project.

IH 20 EBML over Houston School Road (NBI# 18-057-0-2374-03-146), STA 172+00: ACMs in concrete coatings on abutments, columns, barriers, and guardrails. LCP on steel girders.

IH 20 WBML over Houston School Road (NBI# 18-057-0-2374-03-147), STA 172+00: ACMs in concrete coatings on abutments, columns, barriers, and guardrails. LCP on steel girders.

SH 342 W U-turn over IH 20 (NBI# 18-057-0-2374-03-149), STA 249+75: ACMs in concrete coatings on beams, abutments, caps, columns, barriers, and guardrails.

SH 342 (Lancaster Rd) over IH 20 (NBI# 18-057-0-2374-03-144), STA 250+25: ACMs in concrete coatings on beams, abutments, caps, columns, barriers, and guardrails. LCP on steel girders.

IH 20 EB over Newton Creek (NBI# 18-057-0-2374-03-140), STA 367+50: ACMs in concrete coatings on beams, abutments, caps, columns, barriers, and guardrails.

IH 20 WB over Newton Creek (NBI# 18-057-0-2374-03-141), STA 367+50: ACMs in concrete coatings on beams, abutments, caps, columns, barriers, and guardrails.

IH 20 EB over BNSF RR (NBI# 18-057-0-2374-03-138), STA 376+00: ACMs in concrete coatings on beams, abutments, caps, columns, barriers, and guardrails.

IH 20 WB over BNSF RR (NBI# 18-057-0-2374-03-139), STA 376+00: ACMs in concrete coatings on beams, abutments, caps, columns, barriers, and guardrails.

IH 20 EB over Whites Branch (NBI# 18-057-0-2374-03-136), STA 383+00: ACMs in concrete coatings on beams, abutments, caps, columns, barriers, and guardrails.

IH 20 WB over Whites Branch (NBI# 18-057-0-2374-03-137), STA 383+00: ACMs in concrete coatings on beams, abutments, caps, columns, barriers, and guardrails.

JJ Lemmon Rd over IH 20 (NBI# 18-057-0-2374-03-308), STA 414+00: ACMs in concrete coatings on beams, abutments, caps, columns, barriers, and guardrails.

IH 20 EBML over IH 45 (NBI# 18-057-0-2374-03-306), STA 427+00: ACMs in concrete coatings on beams, abutments, caps, columns, barriers, and guardrails. LBP on steel girders.

IH 20 WBML over IH 45 (NBI# 18-057-0-2374-03-307), STA 427+00: ACMs in concrete coatings on beams, abutments, caps, columns, barriers, and guardrails.

Abatement of ACM and LBP will be required prior to construction. TxDOT will abate the ACM and LBP prior to construction.

LIST OF ABBREVIATIONS

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

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.

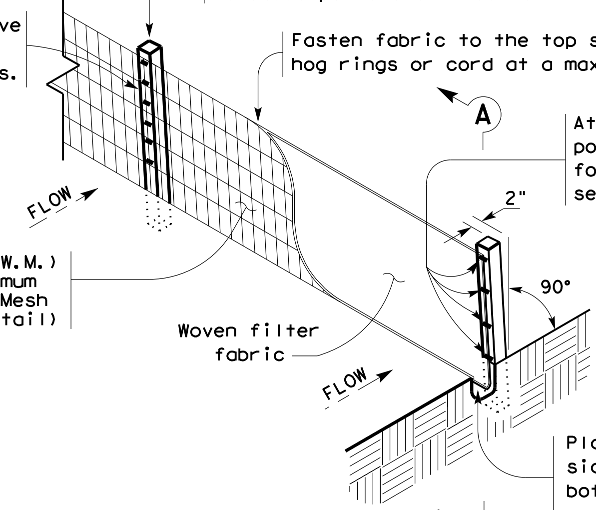
LAST REVISION: 1/15/15

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC) - Sheet 2 of 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		IH 20
STATE	DISTRICT	COUNTY	
TEXAS	DALLAS	Dallas	
CONTROL	SECTION	JOB	SHEET NO.
2374	03	091	118

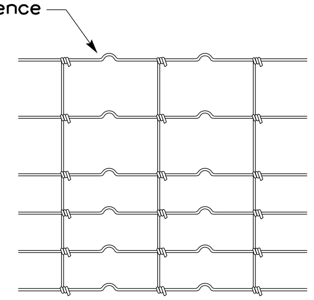
Notes To Designer:
1. *Do not alter Sheet Design or Font style, size or weight - match text attributes.*
2. *If additional space is needed for a numbered section, fence and adjust sections up or down as needed for proportioning and readability but do not relocate from its relative position.*
3. *All 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



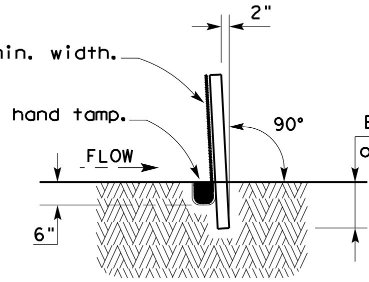
TEMPORARY SEDIMENT CONTROL FENCE

SCF



HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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



SECTION A-A

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

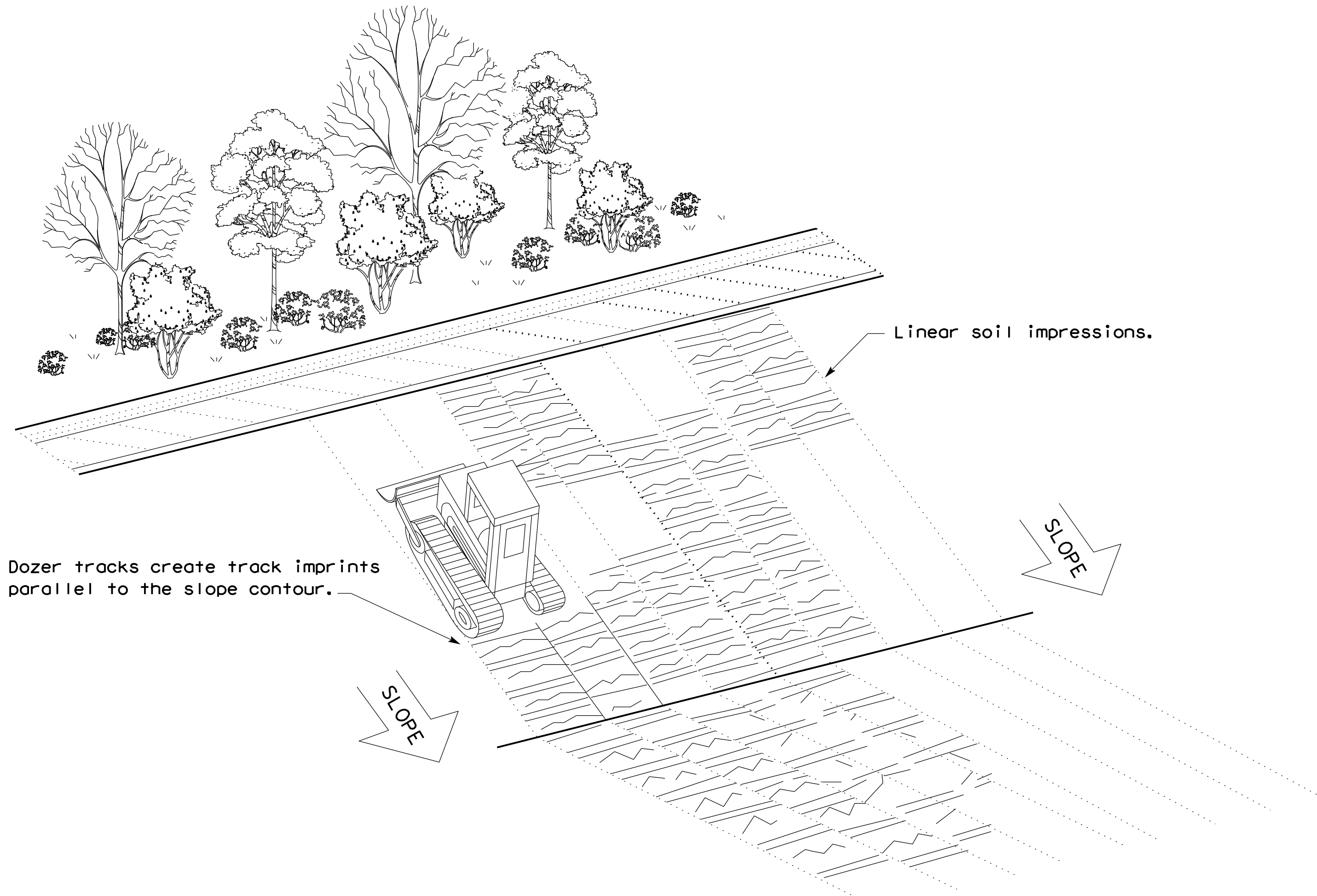
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

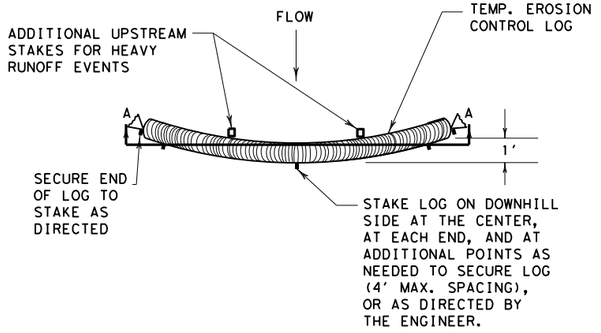
FENCE & VERTICAL TRACKING

EC(1)-16

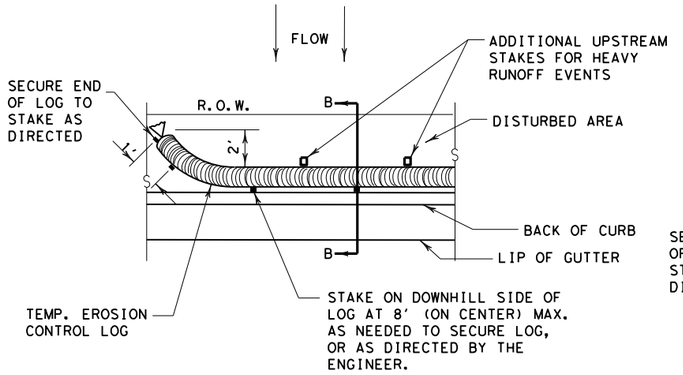
FILE: ec116	DN: TxDOT		CK: KM	DW: VP	DN/CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	2374	03	091		IH 20	
	DIST		COUNTY		SHEET NO.	
	DALLAS		DALLAS		119	

10/28/2021
\K:\TxDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\2374030911\Sheets\SW3P\ec116.dgn

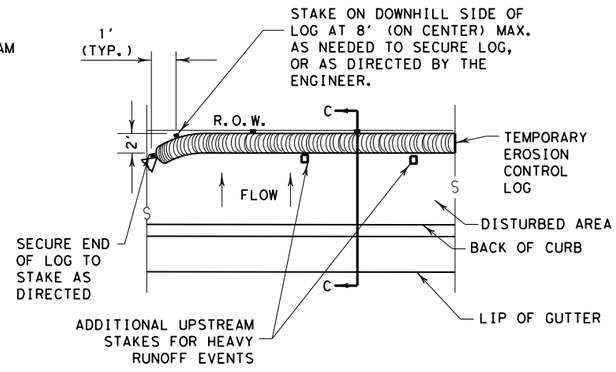
DATE: 12/29/2021
FILE: \\TXDOT4DVDALHQ\Data\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\STND\SW3P\ec916.dgn



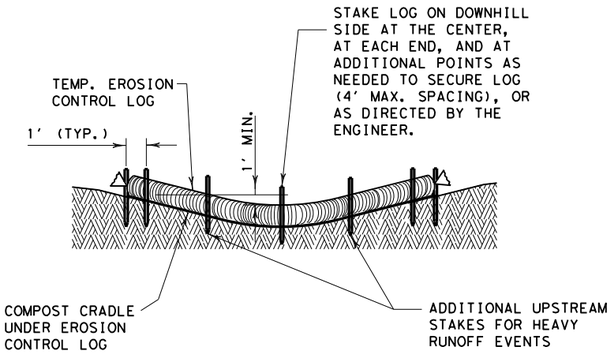
PLAN VIEW



PLAN VIEW



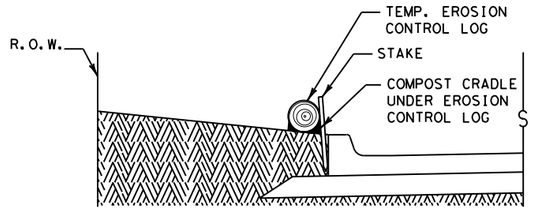
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

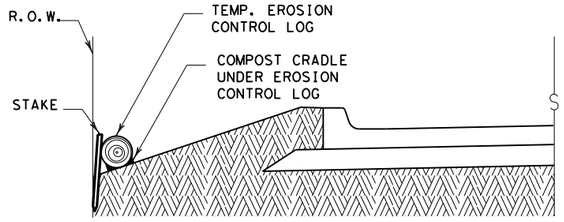
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



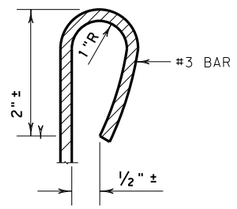
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

LEGEND

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



REBAR STAKE DETAIL

GENERAL NOTES:

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

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

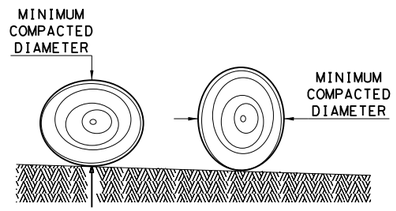
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

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

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

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



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

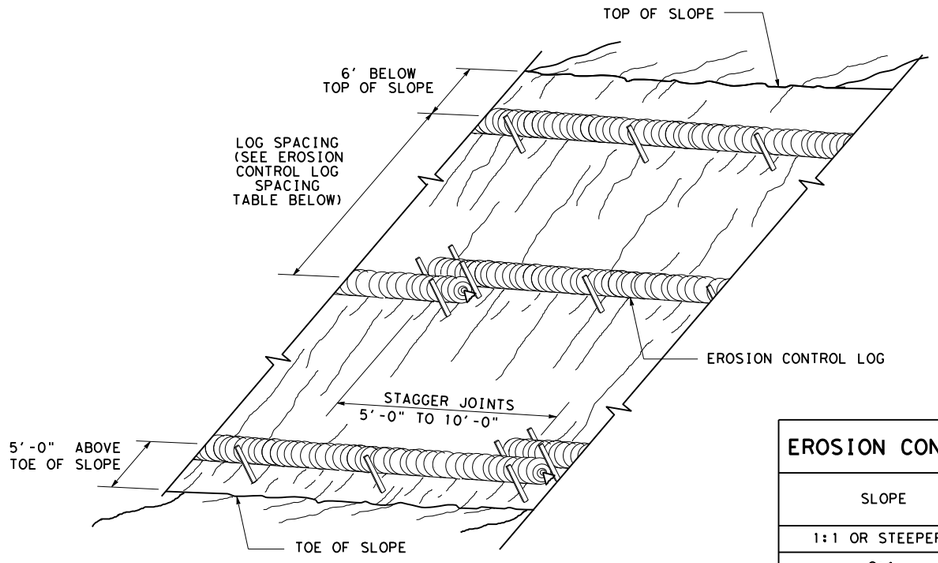
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

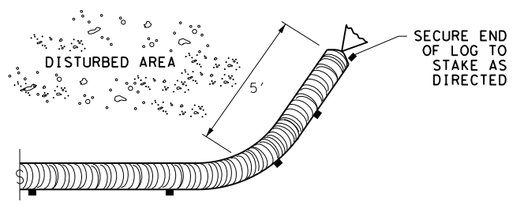
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		120

DATE: 12/29/2021
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\STIND\SW3P\ec916.dgn



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

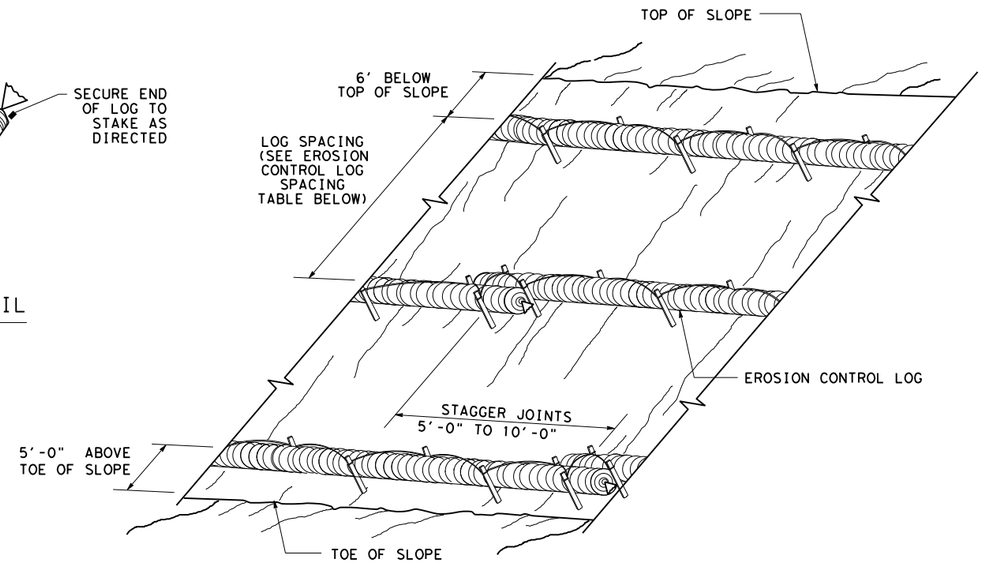
CL-SST



END SECTION RAP DETAIL

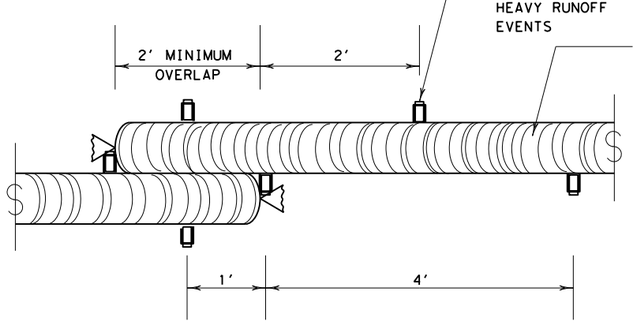
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

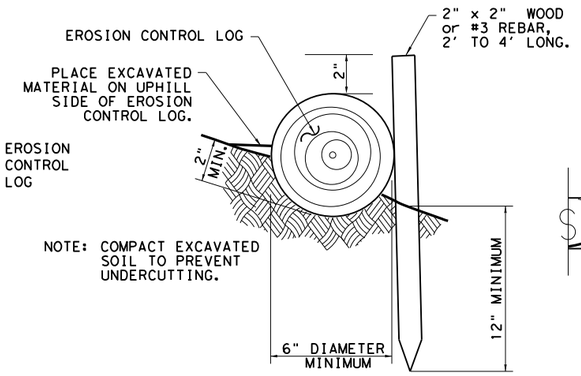
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

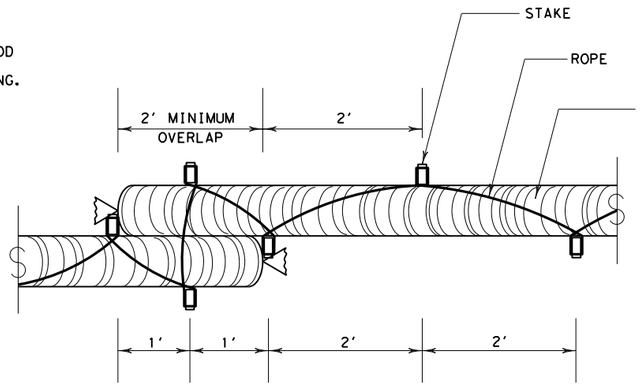


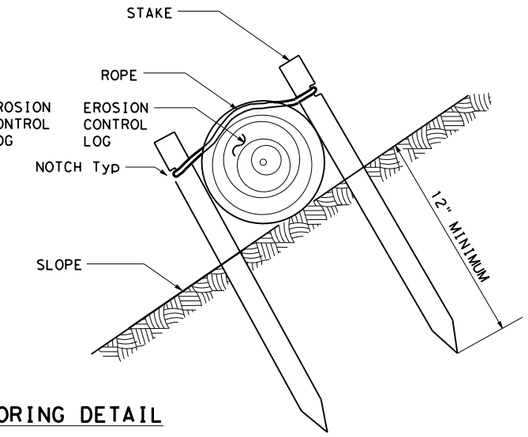


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

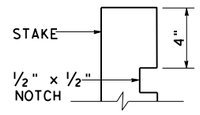
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



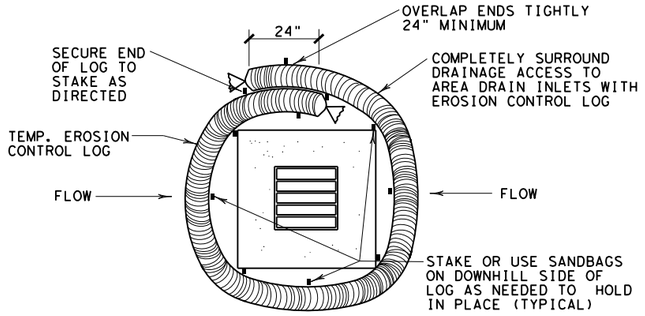
STAKE NOTCH DETAIL

Texas Department of Transportation | Design Division Standard

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

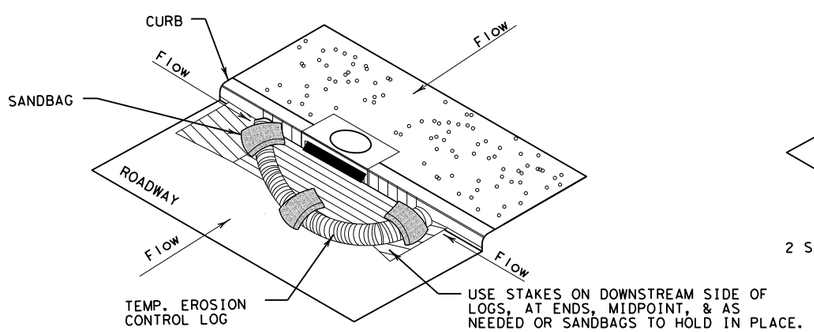
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		121

DATE: 12/29/2021
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\237403091\Sheets\STND\SW3P\ec916.dgn



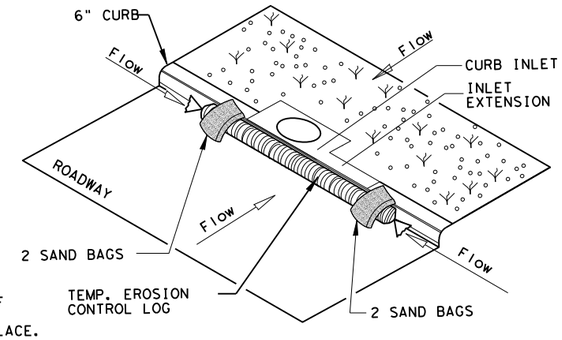
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

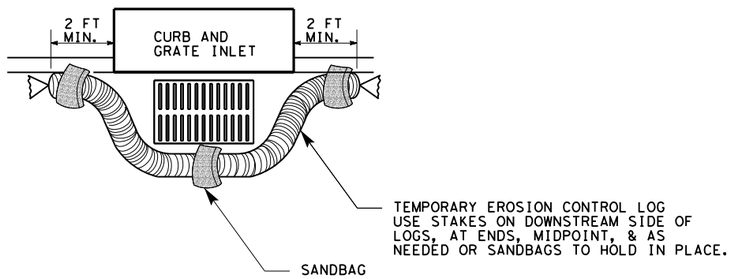
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

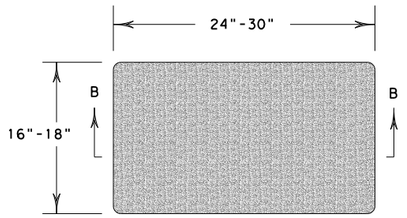
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		122

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

DOT #: See table
Crossing Type:** See table
RR Company Owning Track at Crossing: BNSF
Operating RR Company at Track: BNSF
RR MP: See table
RR Subdivision: See table
City: See table
County: See table
CSJ at this Crossing: See table
Highway/Roadway name crossing the railroad: See table
# of regularly scheduled trains per day at this crossing: See table
# of switching movements per day at this crossing: See table
% 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 concrete structure repair, full-depth concrete repair, planing, overlay and pavement markings work within the RR ROW.

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

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

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

None

III. FLAGGING & INSPECTION

of Days of Railroad Flagging Expected: 6

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 Railpros Inc. - John Green
949-402-5027
John.Green@railpros.com

Contractor must incorporate Construction Inspection into anticipated construction schedule.

☒ Not Required

☐ Required: Contact Information for Construction Inspection:

IV. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

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

☐ Required
☒ Not Required

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

V. RAILROAD INSURANCE REQUIREMENTS

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

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

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

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

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

DOT NO.	675144U	415313N	675145B
Crossing Type	RR UNDER	RR UNDER	RR UNDER
RR Company	BNSF	BNSF	BNSF
Operating RR Co	BNSF	BNSF	BNSF
RR MP	777.050	777.100	777.150
RR Sub	DFW	DFW	DFW
City	DALLAS	DALLAS	DALLAS
County	DALLAS	DALLAS	DALLAS
CSJ	2374-03-091	2374-03-091	2374-03-091
Highway	IH20	IH20	IH20
Trains per day	4	4	4
Switches per day	0	0	0

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

On this project, an ROE agreement is:

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

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

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

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

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

VII. RAILROAD COORDINATION MEETING

On this project, a Railroad Coordination Meeting is:

☒ Not Required
☐ Required

See Item 5, Article 8.1 for more details.

VIII. SUBCONTRACTORS

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

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call BNSF
Railroad Emergency Line at 800-832-5452
Location: DOT See table
RR Milepost See table
Subdivision See table

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	091	IH20	
3/2020	DIST	COUNTY		SHEET NO.	
	18	DALLAS		123	

DATE:
FILE:

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	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		124

DATE: 12/30/2021 8:37:52 AM
FILE: \\TXDOT4DVDALHQ\Data1\DATA\DAL\GROUPS\DALAO\PROJECTS\On\IH20\23740309 1\Sheets\STND\RR\non-bridge-projects 3-20.dgn

3.09 MAINTENANCE OF RAILROAD FACILITIES

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

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

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

3.10 SITE INSPECTIONS BY RAILROAD's DESIGNATED REPRESENTATIVE

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

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

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

3.11 RAILROAD REPRESENTATIVES

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

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

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

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

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

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

3.12 COMMUNICATIONS AND SIGNAL LINES

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

3.13 TRAFFIC CONTROL

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

3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK

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

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

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

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

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

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

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

3.15 RAILROAD FLAGGING

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

3.16 CLEANING OF RIGHT-OF-WAY

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

Texas Department of Transportation — Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	2374	03	091	IH 20
	DIST	COUNTY		SHEET NO.
	DALLAS	DALLAS		125