FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	C 3-5-55, ETC		1
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FUNCTIONAL CLASS: INTERSTATE
DESIGN SPEED = 70 MPH
0003-05-055 ADT = 7819 (2020)
PROJECTED = 14190 (2040)
0441-09-049 ADT = 13830 (2020)
PROJECTED = 19362 (2024)

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

STATE PROJECT NO. C 3-5-55, ETC

COUNTY: REEVES
HIGHWAY: IH 20, ETC

NET LENGTH OF PROJECT: 80,434.44 FT = 15.233 MI

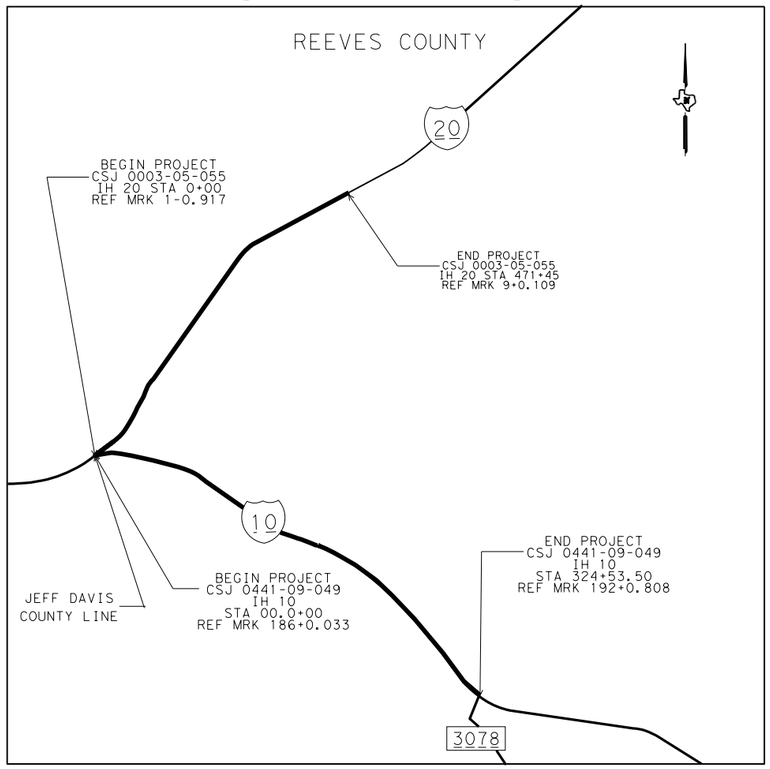
CONTROL	ROADWAY	BRIDGES	NET
IH 20 0003-05-055	45,912.84 FT = 8.696 MI	1227.00 FT = 0.232 MI	47,139.84 FT = 8.928 MI
IH 10 0441-09-049	32,709.60 FT = 6.585 MI	585.00FT = 0.117 MI	33,294.60 FT = 6.316 MI
TOTALS	78,619.44FT = 14.89 MI	1812.00FT = 0.34 MI	80,434.44FT = 15.233 MI

LIMITS: IH 10 TO 9MI EAST OF IH 10, ETC

FOR THE CONSTRUCTION OF REHABILITATION OF EXISTING ROAD

CONSISTING OF

Pavement Upgrade, Guard Rail Upgrades , Bridge Structure, Signs, and Pavement markings.



SCALE: NA

EXCEPTIONS: NA
EQUATIONS: NA
RR CROSSINGS: NA

INDEX OF SHEETS

SEE SHEET 2

FINAL PLANS

CONTRACTOR:

LETTING DATE:

DATE CONTRACTOR BEGAN WORK:

DATE WORK WAS COMPLETED:

DATE WORK WAS ACCEPTED:

FINAL CONTRACT COST: $

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING: 1/4/2023 20__

DocuSigned by: Ricardo C. Betancourt, P. E. A95D01005CA54E4... , P.E.
AREA ENGINEER

RECOMMENDED FOR LETTING: 1/4/2023 20__

DocuSigned by: [signature] , P.E.
DIRECTOR OF TRANSPORTATION
PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: 1/4/2023 20__

DocuSigned by: [signature] 9D2D0C440... , P.E.
DISTRICT ENGINEER

PRINTED DATE: XX/XX/XXXX

1	2	3	4	5	6	7	8	9	
10	11	12	13	14	15	61	17	18	
19	20	21	22	23	24	25	26	27	
28	29	30	31	32	33	34	35	36	
37	38	39	40	41	42	43	44	45	
46	47	48	49	50	51	52	53	54	
55	56	57	58	59	60	61	62	63	

COUNTY_____ PROJ. NO._____
HWY. NO._____ LETTING DATE_____
DATE ACCEPTED_____

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

FED08

ver. 2013.04.06

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SHEET NO.	DESCRIPTION
	GENERAL
1	TITLE SHEET
2	INDEX OF SHEETS
3-6	TYPICAL SECTIONS
7, 7A-7D	GENERAL NOTES
8, 8A	ESTIMATE & QUANTITY
9-11	CONSOLIDATED SUMMARY
	TRAFFIC CONTROL PLAN STANDARDS
12	ADVANCED PROJECT WARNING SIGNING
13-17	PHASE NARRATIVE
18-29	*BC (1)-21 THRU BC (12)-21
30	*TCP (1-5)-18
31	*TCP (2-6)-18
32-33	*TCP (3-2)-13, TCP (3-3)-14
34	*TCP (5-1)-18
35-39	*TCP(6-1)-12 THRU TCP(6-5)-12
40	*TCP(6-8)-14
41	*WZ(UL)-13
42	*WZ (STPM)-13
	ROADWAY ITEMS
43	TREATMENT FOR VARIOUS EDGE CONDITIONS
44-45	ALIGNMENT DATA SHEET
46	ROADWAY MISCELLANOUS DETAILS
47-52	RAMP DETAILS
	TRAFFIC ITEMS
53-54	*PM (1)-22, PM (2)-22
55-58	PAVEMENT MARKINGS DETAIL
59	GUARD RAIL DETAIL
60	*GF(31)-19
61	*GF(31) DAT-19
62-63	*GF (31)TR TL3-20
64	*SGT(10S)31-16
65	*SGT(11S)31-18
66	*SGT(12S)31-18
67	MBGF(MS)-17

SHEET NO.	DESCRIPTION
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93-125	BRIDGE REPAIR DETAILS
126-136	LARGE SIGN DETAILS
137-138	SMALL SIGN REMOVAL SUMMARY
139-140	LARGE SIGN REMOVAL SUMMARY
141-146	SUMMARY OF LARGE SIGNS
147-150	SUMMARY OF SMALL SIGNS
151	*SMD (GEN)-08
152	*SMD (SLIP-1)-08
153	*SMD (SLIP-2)-08
154	*SMD (SLIP-3)-08
155	*SMD (2-1)-08
156	*SMD (2-2)-08
157	*SMD (2-3)-08
158	*SMD (2-4)-08
159-162	*TSR(1)-13 THRU TSR (4)-13
163-165	*FPM(1)-12 THRU FPM(3)-12
166-169	*D&OM (1)-20 THRU D&OM(4)-20
170	*RS(1)-13
	ENVIRONMENTAL
171	SWP3 NOTES
172	SWP3 SIGN SHEET
173-180	SWP3 SITE PLAN
181-183	*EC(9)-16
184-185	EPIC

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

Ricardo C. Betancourt, P.E. , PE 01/04/22
DATE

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

INDEX OF SHEETS

Texas Department of Transportation

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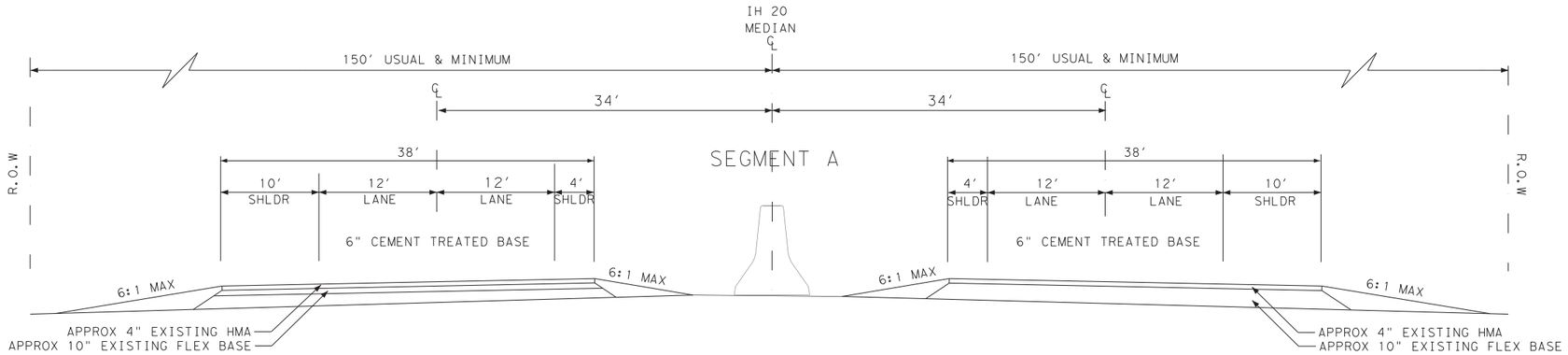
0003	05	055	IH 20, ETC

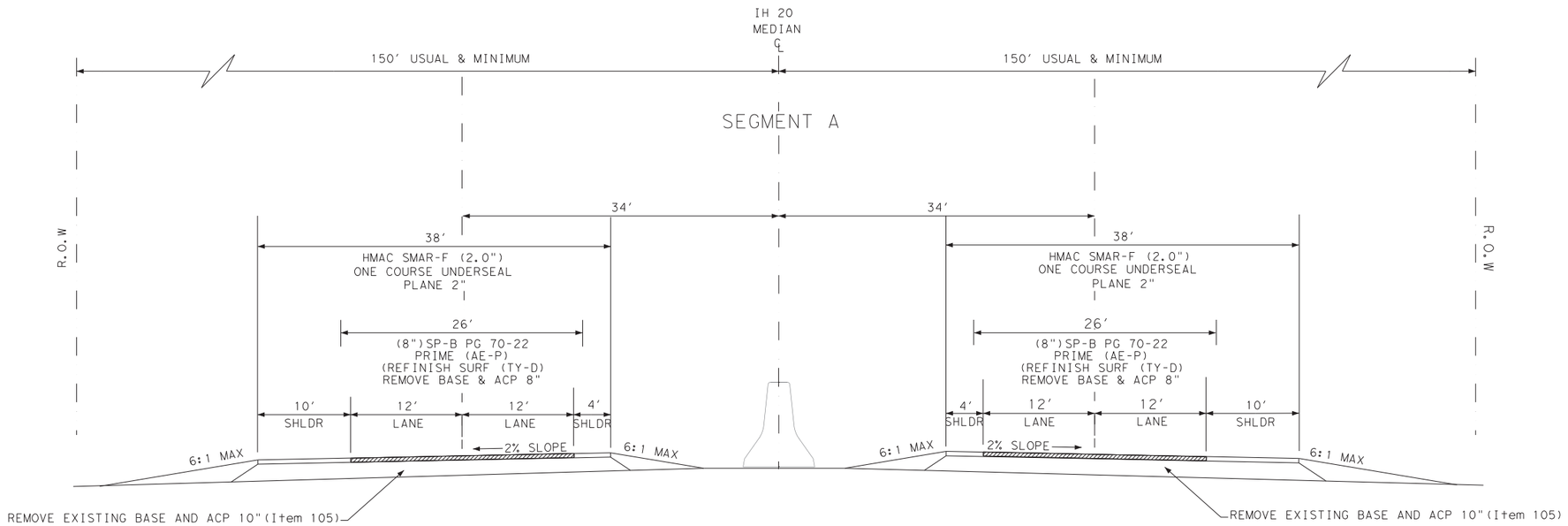
EXISTING AND PROPOSED TYPICAL SECTIONS (IH 20)
SEGMENT A

EXISTING TYPICAL SECTION



EXISTING WESTBOUND
STA. 0+00 TO 470+09 (LANE 1)
STA. 0+00 TO 470+09 (LANE 2)

EXISTING EASTBOUND
STA. 0+00 TO 470+09 (LANE 1)
STA. 0+00 TO 470+09 (LANE 2)



PROPOSED WESTBOUND
STA. 0+00 TO 470+09 (LANE 1)
STA. 0+00 TO 470+09 (LANE 2)

PROPOSED EASTBOUND
STA. 0+00 TO 470+09 (LANE 1)
STA. 0+00 TO 470+09 (LANE 2)

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

IH 20 TYPICAL SECTIONS

SHEET 1 OF 4

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
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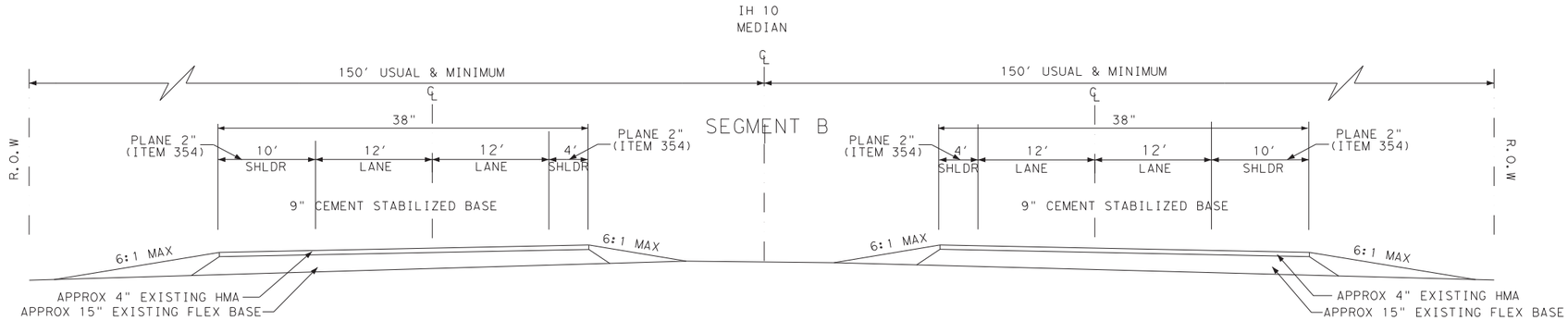
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	REEVES

EXISTING AND PROPOSED TYPICAL SECTIONS (IH 20)
SEGMENT B

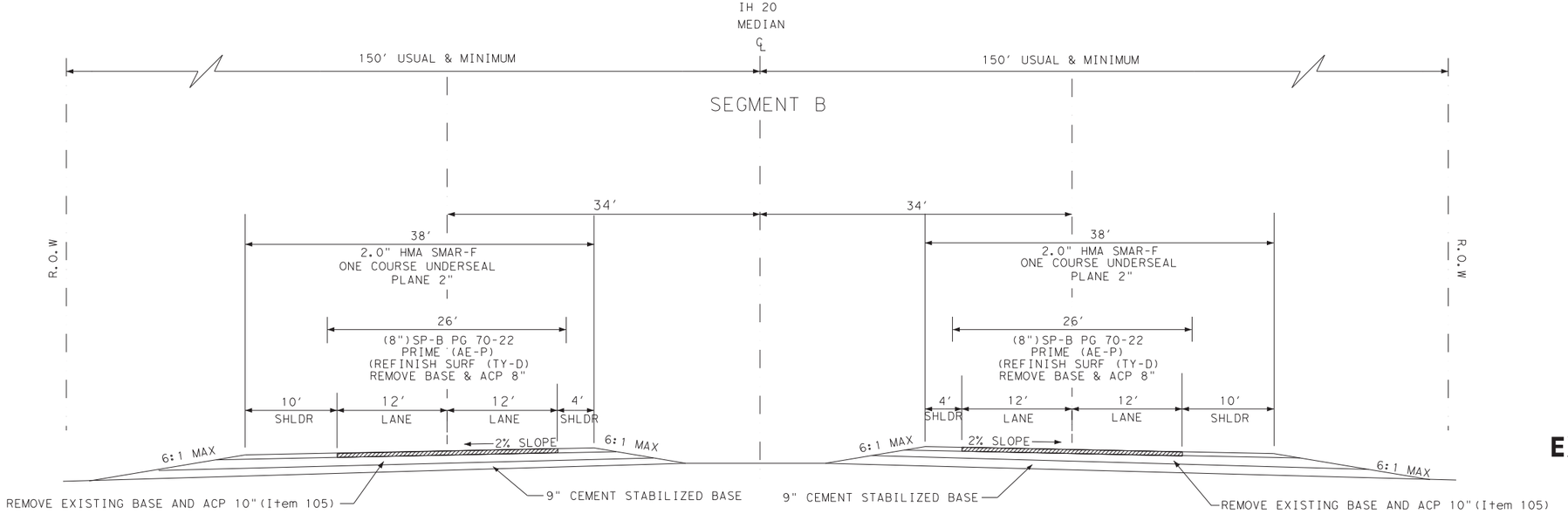


EXISTING WESTBOUND

STA. 47+59 TO 91+88 (LANE 4)(DRIVING & PASSING LANES)
STA. 91+88 TO 375+23 (LANE 4)(DRIVING LANE ONLY)
STA. 36+58 TO 99+85 (LANE 3)(DRIVING & PASSING LANES)
STA. 99+85 TO 375+23 (LANE 3)(DRIVING LANE ONLY)

EXISTING EASTBOUND

STA. 47+59 TO 91+88 (LANE 4)(DRIVING & PASSING LANES)
STA. 91+88 TO 375+23 (LANE 4)(DRIVING LANE ONLY)
STA. 36+58 TO 99+85 (LANE 3)(DRIVING & PASSING LANES)
STA. 99+85 TO 375+23 (LANE 3)(DRIVING LANE ONLY)



PROPOSED WESTBOUND

STA. 47+59 TO 91+88 (LANE 4)(DRIVING & PASSING LANES)
STA. 91+88 TO 375+23 (LANE 4)(DRIVING LANE ONLY)
STA. 36+58 TO 99+85 (LANE 3)(DRIVING & PASSING LANES)
STA. 99+85 TO 375+23 (LANE 3)(DRIVING LANE ONLY)

PROPOSED EASTBOUND

STA. 47+59 TO 91+88 (LANE 4)(DRIVING & PASSING LANES)
STA. 91+88 TO 375+23 (LANE 4)(DRIVING LANE ONLY)
STA. 36+58 TO 99+85 (LANE 3)(DRIVING & PASSING LANES)
STA. 99+85 TO 375+23 (LANE 3)(DRIVING LANE ONLY)

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

RICARDO C BETANCOURT, P.E. 12/19/22

EXISTING TYPICAL SECTIONS

SHEET 2 OF 4

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
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TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
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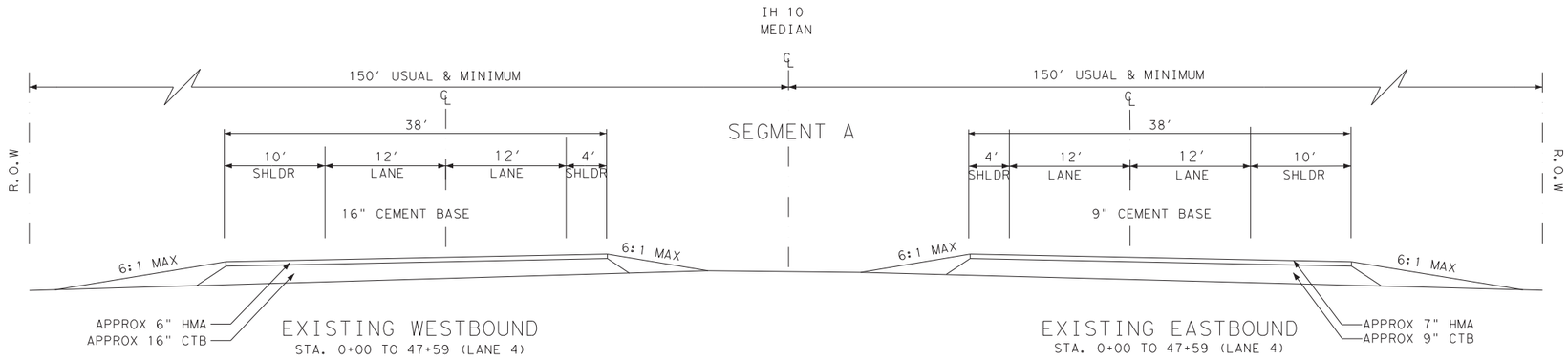
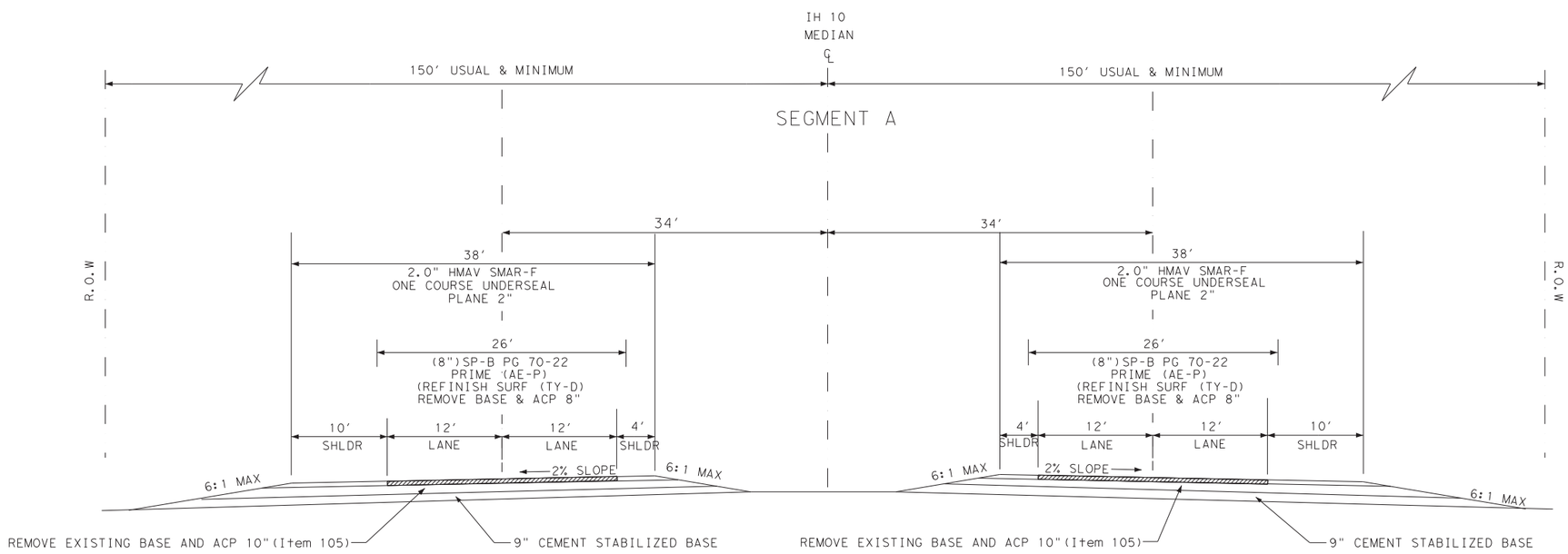
EXISTING AND PROPOSED TYPICAL SECTIONS (IH 10)
SEGMENT A





STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

IH 20 TYPICAL SECTIONS

SHEET 3 OF 4

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
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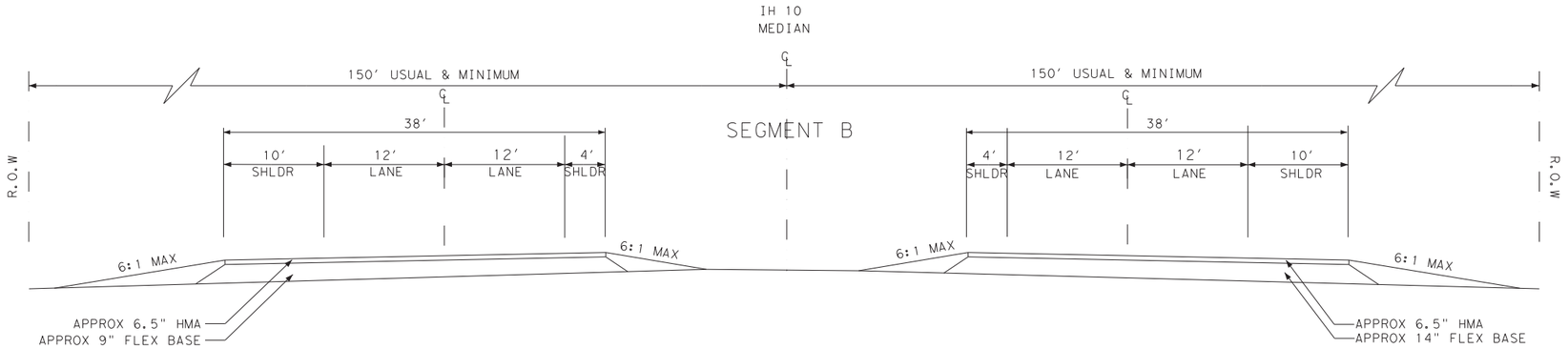
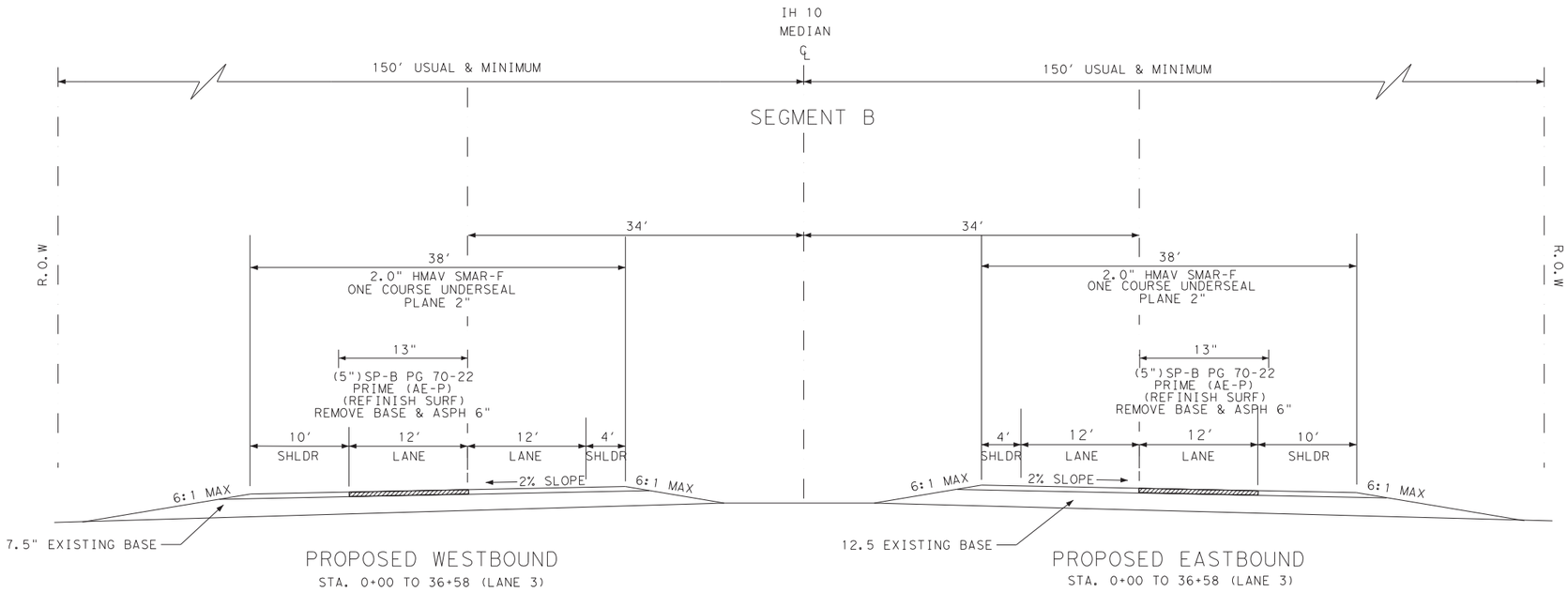
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	REEVES

EXISTING AND PROPOSED TYPICAL SECTIONS (IH 10)
SEGMENT B



EXISTING WESTBOUND
STA. 0+00 TO 36+58 (LANE 3)

EXISTING EASTBOUND
STA. 0+00 TO 36+58 (LANE 3)



PROPOSED WESTBOUND
STA. 0+00 TO 36+58 (LANE 3)

PROPOSED EASTBOUND
STA. 0+00 TO 36+58 (LANE 3)

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED PROFESSIONAL ENGINEER

Ricardo C Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

IH 20 TYPICAL SECTIONS

SHEET 4 OF 4

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			6
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	REEVES

Contractor questions on this project will be accepted through email at the following address:

- ODA-PreLettingQuestions@txdot.gov

All contractor questions will be reviewed by the Engineer. All questions and/or responses will be posted to TxDOT's Public FTP at the following Address:

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

The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

Item 5: Control of the Work

For any structures containing bird nests, schedule all work to complete the demolition of the existing structures identified in the plans between September 15, 2023 and March 15, 2025. Failure to complete this work during the specified timeframe may cause construction delays due to environmental regulations.

The existing alignment is the control for the Contractor staking. Establish reference points for the control prior to removing the existing surface.

Use Method C for construction surveying.

In the event the finished surface does not conform to the typical sections or does not meet the required IRI, rework the non-conforming area to the limits necessary and employ additional survey control as directed.

Item 6: Control of Materials

Restrict storage of equipment and materials to approved areas. The Engineer will not approve storage in any TxDOT yard.

Promptly and properly dispose of any waste generated from servicing equipment on the project.

Item 7: Legal Relations and Responsibilities

If access to the project is required through a new or unapproved driveway (i.e. Material source, stockpile location, field office, etc.), obtain an approved "Permit to Construct Access Driveway Facilities on Highway Right Of Way" (TxDOT Form 1058) before beginning any construction operations.

Utilities (public, private and TxDOT) exist throughout the project. Prior to any excavation, investigate to determine the utility locations within the project right of way. Contact the TxDOT Odessa Traffic Operations shop at 432-498-4690 to investigate and determine the location of any TxDOT utility that may exist within the project right of way. Exercise caution when excavating in areas where investigations have determined that utilities exist. The contractor is responsible for maintaining utility markings

No significant traffic generator events identified.

As an element of ensuring public safety and convenience under Article 7.2.4, the Contractor is hereby directed to open all closed lanes and shoulder and remove all traffic control devices from any areas where work is not being actively performed unless overnight traffic control is required and approved by the engineer. Removed devices must be stored outside of the clear zones near the right of way line or removed from the right of way line entirely.

At any time during construction that a previously installed crash cushion is damaged by the traveling public and is requested to be repaired by the Engineer, the repair will be paid at the same unit cost as the original installation.

Item 8: Prosecution and Progress

The following portions of the plans may affect the Contractor's planned construction sequencing. The Contractor's attention is directed to the appropriate plan sheet or standard sheet.

-Traffic Control Plan

-Storm Water Pollution Prevention Plan

-Environmental Permit, Issues And Commitments (EPIC)

-Railroad Exhibits and/or Notes

Maintain ingress and egress to the frontage roads at all times.

Working days will be computed and charged in accordance with Article 8. 3.1.4. "Standard Workweek."

Incentive for early contract completion shall be based on contract administrative liquidated damage rates.

The road-user cost liquidated damages for 0003-05-055 are $ 6,481 per day.

Excavate only the volume of material that can reasonably be replaced with new HMAC within 24 hours of removal based on anticipated production rates. The Engineer may halt further excavation if any excavated volumes have not been replaced with HMAC within 48 hours of excavation.

90 day lead time is needed to allow for sufficient time to obtain and produce materials needed for various bid items in this project.

Item 150: Blading

Use blading to construct and remove side road turnouts, rebuild existing dikes, ditch blocks, and other work as directed.

When directed, fill and grade low areas outside the embankment areas to drain.

Preserve the top 4" of topsoil outside of the work area. Preserve this material in windrows until topsoil can be replaced and seeded to stabilize all exposed terrain.

Item 216: Proof Rolling

Proof rolling will be required at locations as directed by the Engineer.

Item 354: Planing and Texturing Pavement

Variations in depth of +/- 1/2 inch are subsidiary to this item.

Item 429: Concrete Structure Repair

Field verify structural concrete repair locations and quantities. Immediately notify TxDot if any discrepancies are noted between the plans and actual conditions.

Item 502: Barricades, Signs, and Traffic Handling

Stop work immediately if any major traffic control element such as an advanced warning flashing panel or TMA or PCMS is not in good working order or control setup.

Use Shoulder Drop-Off (CW8-9A) signs during construction when shoulder drop-off conditions are 3 inches or greater or as directed. Placement shall be in accordance with the “Texas Manual on Uniform Traffic Control Devices”.

This project has a regulatory work zone speed reduction within the project limits. The work zone speed limit is reduced from 80 mph to 65 mph. Placement of speed reduction zone signs shall comply with BC (3)-21. Speed resumption sign(s) is required at the end of a speed reduction zone.

Place chevrons, at a minimum, on every other drum used for outsides of curves, merging tapers and shifting tapers.

Vertical panels shall be self-righting.

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

Item 504: Field Office and Laboratory

Provide a Type D structure (asphalt mix control laboratory) for the asphalt mix control laboratory for the Engineer's exclusive use. In addition to the requirements of Item 504, this structure will have a minimum height of 8 feet and provide a minimum of 400 square feet of gross floor area for permanently located asphalt plants, or 200 square feet for temporary located plants serving one project. The floor area will be partitioned into a minimum of two interconnected rooms, each room

furnished with an exterior door and a minimum of two windows. The floor will have sufficient strength to support the testing equipment and have an impervious covering.

Provide a Type D structure (asphalt mix control laboratory) adequately air conditioned and furnished with a minimum of one desk, three chairs, and one file cabinet. The structure will be provided with a 240 volt electrical service entrance. The service shall consist of a minimum of four 120 volt circuits with 20 amp breakers and no more than two grounded convenience outlets per circuit and provisions for a minimum of two 220 volt ovens with vents to the outside. The structure will have a minimum of two (2) convenience outlets per wall, and a utility sink with an adequate clean potable water supply for testing. Space heaters for heating the structure are unacceptable. Portable structures will be support blocked for stability and be tied down.

Item 506: Temporary Erosion, Sedimentation, and Environmental Controls

In accordance with the Construction General Permit (CGP), erosion control and stabilization measures should be initiated as soon as practicable to include (list what our stabilization measures are – for example, replacing topsoil from windrow, erosion control blankets, seeding, etc.)

-Biodegradable Erosion Control Logs

The total disturbed area for this project is 70.16 Acres. The disturbed area in this project, all project locations in the contract, and Contractor Project Specific Locations (PSLS), within 1 mile of the project limits, for the contract will further establish the authorization requirements for storm water discharges. The department will obtain an authorization to discharge storm water from the Texas Commission On Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain any required authorization from the TCEQ for any Contractor PSLS for construction support activities on or off the right of way. When the total area disturbed for all projects in the contract and PSLS within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLS on the right of way, to the Engineer (or to the appropriate MS4 operator when on an off-state system route).

Upon acceptance of the project, all SW3P devices will become property of the State and maintenance responsibility is transferred to the State until final stabilization is attained.

When applying cement for emulsion, asphalt treatment, or any other soil stabilization, sprinkle water as needed to control cement from blowing and contaminating adjacent vegetation and waters.

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

Item 540: Metal Beam Guard Fence

Provide steel post for this project.

Item 542: Removing Metal Beam Guard Fence

Do not salvage any existing metal beam guard fence as State property; retain ownership of all material requiring removal including steel posts, metal rail, and hardware, and remove from the project.

For removal of posts embedded in concrete, remove the posts and the concrete footings; payment for removal of concrete footings is subsidiary to Item 542.

Item 585: Ride Quality for Pavement Surfaces

Use surface test type "B" pay adjustment schedule "1" to evaluate ride quality of the driving lanes and pay adjustment schedule "3" to evaluate ride quality of the passing lanes in accordance with Item585, "Ride Quality for Pavement Surfaces."

Item 644: Small Roadside Sign Assemblies

All new sign supports for stop and yield signs will have a 12" red strip of Type C High Specific Intensity Reflective tape. Place the top of the tape 4' above the edge of the roadway. This work will not be paid for directly and will be subsidiary to the pertinent bid item.

For standard small sign details and dimensions, refer to the "Standard Highway Sign Designs for Texas (SHSD)"; a supplement to the Texas Manual on Uniform Traffic Control Devices (TMUTCD)".

Locate and mark existing reference marker(s) perpendicular to the road and along the right of way, or as directed, prior to removal. Erect new reference marker(s) at the original location, upon completion of construction.

Only bolt clamp style slip bases will be allowed for sign assemblies. Set screws will not be allowed.

Item 658: Delineator and Object Marker Assemblies

Delineator and object marker assembly posts shall be composed of post-consumer recycled materials. Embedded stub shall be perforated square tubing.

Item 662: Work Zone Pavement Markings

After permanent pavement markings are placed, pull tabs from hot mix surface and/or cut off tabs flush with the pavement on seal coat surface. Remove tabs from the project and dispose of properly.

Item 666 Retroreflectorized Pavement Markings

Type I markings shall meet the minimum retroreflectivity values defined by Article 4.4 Retroreflectivity Requirements.

This Contract totals more than 200,000 feet of pavement markings; use a mobile retroreflectometer for retroreflectivity measurements. Portable retroreflectometers may not be used for this Contract.

Item 677: Eliminating Existing Pavement Markings and Markers

Submit eliminating plan for approval by the Engineer in accordance with Item 677.

Item 3077: Superpave Mixtures

Binder:

Provide a binder that has a Performance Grade of 70-22 (PG 70-22) for the "SP-B" mix.

Aggregate quality:

Furnish Class B aggregate for the Type "SP-B" mix.

Furnish aggregates for the shoulders and/or ramps that meet project SAC requirements.

Magnesium sulfate soundness loss will not be greater than 20 percent when Class A aggregate is required.

Mixture design:

Design a mixture with a gradation that has stone on stone contact and passes below the reference zone.

Test method Tex-530-C (Boil Test) will not be required.

Placement:

Semi-trailer type vehicles are prohibited from dumping directly into the finishing machine for the finished surface unless the trailer is equipped with an auger slatted chain or another approved conveyor.

No more than 10% RAP will be allowed in non-surface courses.

No RAS will be allowed.

Mineral filler will not be allowed.

Lime will not be allowed as an anti-stripping agent.

Field sand will not be allowed.

Item 3080: Stone-Matrix Asphalt

Binder:

Furnish Type I asphalt-rubber binder containing Grade C rubber.

Aggregate quality:

Provide Class A aggregate.

Magnesium sulfate soundness loss will not be greater than 20 percent when Class A aggregate is required.

Mixture design:

Test method Tex-530-C (Boil Test) will not be required.

Placement:

Semi-trailer type vehicles are prohibited from dumping directly into the finishing machine for the finished surface unless the trailer is equipped with an auger slatted chain or another approved conveyor.

No RAP will be allowed in the surface course.

No RAS will be allowed.

Mineral filler will not be allowed.

Item 6001: Portable Changeable Message Sign

PCMS shall be placed in operation a minimum of one (1) week prior to construction. Location(s) and duration for PCMS shall be as directed by the Engineer;

Item 6079: Automated Portable Smart Traffic Monitoring System

Payment for the portable changeable message sign(s) configured for the Automated Portable Smart Traffic Monitoring System is subsidiary to Item 6079.

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

General Note 5 of TCP (1-5)-18 provides for additional shadow vehicle(s) with truck mounted attenuator (TMA); one (1) additional shadow vehicle with TMA is included in the basis of estimate for this operation. The shadow vehicle(s) with TMA specified on the traffic control plan as "required" plus the 'additional shadow vehicle' is the quantity that has been estimated for this operation.

General Note 7 of TCP (2-6)-18 provides for additional shadow vehicle(s) with truck mounted attenuator (TMA); one (1) additional shadow vehicle with TMA is included in the basis of estimate for this operation. The shadow vehicle(s) with TMA specified on the traffic control plan as "required" plus the 'additional shadow vehicle' is the quantity that has been estimated for this operation.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (5-1)-18; the shadow vehicle(s) with TMA specified on the traffic control plan as "required" is the quantity that has been estimated for this operation.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-1)-12; the shadow vehicle(s) with TMA specified on the traffic control plan as "required" is the quantity that has been estimated for this operation.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-2)-12; the shadow vehicle(s) with TMA specified on the traffic control plan as "required" is the quantity that has been estimated for this operation.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-3)-12; the shadow vehicle(s) with TMA specified on the traffic control plan as "required" is the quantity that has been estimated for this operation.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-4)-12; the shadow vehicle(s) with TMA specified on the traffic control plan as "required" is the quantity that has been estimated for this operation.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-5)-12; the shadow vehicle(s) with TMA specified on the traffic control plan as "required" is the quantity that has been estimated for this operation.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (6-8)-14; the shadow vehicle(s) with TMA specified on the traffic control plan as "required" is the quantity that has been estimated for this operation.

Basis of Estimate for Stationary TMAs			
Standard	TMA (Stationary)		
	Required	Optional	Total
TCP(1-5)-18	1	1	2
TCP(2-6)-18	1	1	2
TCP(5-1)-18	1	0	1
TCP(6-1)-12	1	0	1
TCP(6-2)-12	1	0	1
TCP(6-4)-12	1	0	1
TCP(6-5)-12	2	0	1
TCP(6-8)-14	1	0	1

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (3-2)-13; the shadow vehicle(s) with TMA specified on the traffic control plan as "required" is the quantity that has been estimated for this operation.

There are no General Notes for additional shadow vehicle(s) with truck mounted attenuator (TMA) on TCP (3-3)-14; the shadow vehicle(s) with TMA specified on the traffic control plan as "required" is the quantity that has been estimated for this operation.

Basis of Estimate for Mobile TMAs			
Standard	TMA (Mobile)		
	Required	Optional	Total
TCP(3-2)-13	2	0	3
TCP(3-3)-14	2	0	3

The Contractor will be responsible for determining if one or more operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0003-05-055 **DISTRICT** Odessa **COUNTY** Reeves
HIGHWAY IH 10, IH 20

ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL
	105-6008	REMOVING STAB BASE AND ASPH PAV (6")	SY	87,131.000	
	105-6041	REMOVING STAB BASE AND ASPH PAV(8")	SY	624,583.000	
	134-6002	BACKFILL (TY B)	STA	926.000	
	150-6002	BLADING	HR	130.000	
	216-6001	PROOF ROLLING	HR	130.000	
	251-6079	REWORK BS MTL (TY D)(SURF)(ORD COMP)	SY	411,243.000	
	310-6005	PRIME COAT (AE-P)	GAL	80,459.000	
	316-6017	ASPH (AC-20-5TR)	GAL	338,700.000	
	316-6126	AGGR(TY-PB GR-4 SAC-A)	CY	8,118.000	
	354-6030	PLANE ASPH CONC PAV(0" TO 8")	SY	377,275.000	
	354-6045	PLANE ASPH CONC PAV (2")	SY	711,714.000	
	416-6016	DRILL SHAFT (SIGN MTS) (12 IN)	LF	144.000	
	416-6018	DRILL SHAFT (SIGN MTS) (24 IN)	LF	120.000	
	429-6008	CONC STR REPR(RAPID VERT AND OVERHEAD)	SF	2,233.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	600.000	
	438-6002	CLEANING AND SEALING EXIST JOINTS(CL3)	LF	1,091.000	
	451-6025	RETROFIT RAIL (TY SSTR)(HPC)	LF	7,558.000	
	454-6009	JOINT SEALANT	LF	3,420.000	
	500-6001	MOBILIZATION	LS	1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	24.000	
	506-6042	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	10,000.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	10,000.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	337,364.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF	11,012.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	58.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	32.000	
	540-6018	MTL BM GD FEN TRANS (NON - SYM)	EA	2.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	11,012.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA	40.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	44.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	40.000	
	636-6002	ALUMINUM SIGNS (TY G)	SF	1,870.000	
	636-6003	ALUMINUM SIGNS (TY O)	SF	1,347.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	66.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	44.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	110.000	
	647-6001	INSTALL LRSS (STRUCT STEEL)	LB	13,314.000	
	647-6003	REMOVE LRSA	EA	40.000	
	658-6015	INSTL DEL ASSM (D-SW)SZ (BRF)GF1	EA	73.000	
	658-6028	INSTL DEL ASSM (D-SY)SZ (BRF)GF1	EA	60.000	
	658-6060	REMOVE DELIN & OBJECT MARKER ASSMS	EA	913.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0003-05-055 **DISTRICT** Odessa **COUNTY** Reeves
HIGHWAY IH 10, IH 20

ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL
	658-6080	INSTL DEL ASSM (D-SW)SZ 1(WFLX)GND	EA	350.000	
	658-6086	INSTL DEL ASSM (D-SY)SZ 1(YFLX)GND	EA	238.000	
	658-6092	INSTL DEL ASSM (D-DW)SZ 1(WFLX)GND	EA	158.000	
	658-6099	INSTL OM ASSM (OM-2Z)(WFLX)GND	EA	48.000	
	662-6060	WK ZN PAV MRK REMOV (W)4"(BRK)	LF	42,200.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	168,682.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	168,682.000	
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	12,654.000	
	666-6033	REFL PAV MRK TY I (W)8"(LNDP)(100MIL)	LF	1,400.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	16,994.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	171.000	
	666-6102	REF PAV MRK TY I(W)36"(YLD TRI)(100MIL)	EA	21.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	45,993.000	
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	192,588.000	
	666-6318	RE PM W/RET REQ TY I (Y)6"(BRK)(100MIL)	LF	127.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	1,067,689.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	63.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	2,395.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	365,458.000	
	677-6003	ELIM EXT PAV MRK & MRKS (8")	LF	18,394.000	
	738-6010	CLEANING / SWEEPING (SPOT)	MI	6.000	
	780-6002	CNC CRACK REPAIR (DISCRETE)(INJECT)	LF	182.000	
	784-6010	REP STL BRIDGE MEMBER (BEARINGS)	EA	2.000	
	3077-6007	SP MIXESSP-BSAC-B PG70-22	TON	168,409.000	
	3077-6075	TACK COAT	GAL	40,230.000	
	3080-6021	STONE-MTRX-ASPH SMAR-F SAC-A	TON	62,146.000	
	3084-6001	BONDING COURSE	GAL	56,495.000	
	4211-6001	STEEL BRIDGE ZONE PAINTING REF STR 1	EA	3.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	4.000	
	6079-6002	AUTO PORT SMRT TRF MONITOR SYS (PLAN 1)	DAY	1,404.000	
	6158-6001	TMSP RADAR SPEED CONTROL MONITOR	EA	4.000	
	6185-6002	TMA (STATIONARY)	DAY	476.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	3,408.000	
	08	CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)	LS	1.000	
		CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING)	LS	1.000	

BRIDGE ITEMS (0003-05-055)

BRIDGE	NBI#	NUMBER OF BRIDGE JOINTS EA	LENGTH FT	DECK WIDTH	0429 6008 CONC STR REPR(RAPID VERT AND OVERHEAD) SF	0451 6025 RETROFIT RAIL (TY SSTR)(HPC) LF	0438 6002 CLEANING AND SEALING EXIST LF	0780 6002 CNC CRACK REPAIR (DISCRETE)(INJECT) LF	0784 6010 REP STL BRIDGE MEMBER (BEARINGS) EA	4211 6001 STEEL BRIDGE ZONE PAINTING REF STR 1 EA
COLD SPRINGS DRAW	06-195-0-0003-05-087	3	83	43	20		83			
NINE MILE DRAW	06-195-0-0003-05-089	4	250	43	100	540	250	10	1	1
STOCKS RD	06-195-0-0003-05-126	4	195	43	0	442	195			
STOCKS RD	06-195-0-0003-05-125	4	195	43	0	442	195			
COWAN DRAW	06-195-0-0003-05-130	8	184	40	270	390	184			
COWAN DRAW	06-195-0-0003-05-129	8	184	40	270	390	184	13		
COWAN DRAW WB	06-195-0-0003-05-088	5	137	43	300	280	137	15		
(0003-05-055) TOTALS					960	2,484	1,091	38	1	1

BRIDGE ITEMS (0441-09-049)

BRIDGE	NBI#	NUMBER OF BRIDGE JOINTS EA	LENGTH FT	DECK WIDTH	0429 6008 CONC STR REPR(RAPID VERT AND SF	0451 6025 RETROFIT RAIL (TY SSTR)(HPC) LF	0454 6009 JOINT SEALANT LF	0780 6002 CNC CRACK REPAIR (DISCRETE) LF	0784 6010 REP STL BRIDGE MEMBER EA	4211 6001 STEEL BRIDGE ZONE EA
IH 10 WB (COWAN DRAW)	06-195-0-0441-09-058	2	210	40	100	480	210	12		1
W. COWAN DRAW	06-195-0-0441-09-056	3	300	50	100	665	300	12		
E. COWAN DRAW	06-195-0-0441-09-057	5	175	54	100	390	175	10		
IH 10 WB (IH 20 EB & COLD SPRINGS	06-195-0-0441-09-176	5	250	43	80	547	250	12	1	1
COLD SPRINGS DRAW	06-195-0-0441-09-060	4	120	43	100	290	120	13		
GIFFIN RD.	06-195-0-0441-09-061	6	280	30	100	600	280	20		
IH 10 WB	06-195-0-0441-09-064	4	112	43	100	224	112	14		
IH 10 EB	06-195-0-0441-09-063	4	112	43	100	224	112	15		
JONES DRAW WB	06-195-0-0441-09-068	5	210	43	100	456	210	10		
JONES DRAW EB	06-195-0-0441-09-067	6	255	43	100	544	255	12		
FM 3078	06-195-0-0441-09-069	5	305	30	293	654	305	14		
(0441-09-049) TOTALS					1,273	5,074	2,329	144	1	2
PROJECT TOTALS					2,233	7,558	3,420	182	2	3

MBGF SUMMARY

IH 10 (0441-09-049)

Locations	NBI #	REMOVAL 0542 6001 REMOVE METAL BEAM GUARD FENCE LF	REMOVAL 0542 6002 REMOVE TERMINAL ANCHOR SECTION EA	REMOVAL 0544 6003 GUARDRAIL END TREATMENT (REMOVE) EA	PROPOSED 0540 6002 MTL W-BEAM GD FEN (STEEL POST) LF	PROPOSED 0540 6006 MTL BEAM GD FEN TRANS (THRIE-BEAM) EA	PROPOSED 0540 6016 DOWNSTREAM ANCHOR TERMINAL SECTION EA	PROPOSED 0540 6018 MTL BM GD FEN TRANS (NON - SYM) EA	PROPOSED 0544 6001 GUARDRAIL END TREATMENT (INSTALL) EA	PROPOSED 0658 6015 INSTL DEL ASSM (D-SW)SZ (BRF)GF1 EA	PROPOSED 0658 6028 INSTL DEL ASSM (D-SY)SZ (BRF)GF1 EA	PROPOSED 0658 6099 INSTL OM ASSM (OM-2Z)(WFLX)GND EA	PROPOSED 0432 6045 RIPRAP (MOW STRIP)(4 IN) CY
W. Cowan Draw	06-195-0-0441-09-058	455		2	455	4			2	3	3	2	51
E. Cowan Draw	06-195-0-0441-09-056	790	2		790	4	2			3	3		49
W. Cold Springs Draw	06-195-0-0441-09-057	213	1	1	213	2	1		1	3	3		16
E. Cold Springs Draw	06-195-0-0441-09-176	162	1	1	162	2	1		1	3	3		14
W. Cowan Draw-Cold Spring	06-195-0-0441-09-060	2488	2	2	2488	8	2		2	9	15	8	
W. Giffin Draw	06-195-0-0441-09-061	476	2		476	2	2		2	4		2	19
E. Giffin Draw		425	2		425	2	2		2	4		2	19
W. MM 189	06-195-0-0441-09-064	187	2	2	187	2	1		2	3			13
		288	2	2	288	2	1		2		3		18
E. MM 189	06-195-0-0441-09-063	208	2	2	208	2	1		2	3			13
		273	2	2	273	2	1		2		3	3	34
W. Jones Draw	06-195-0-0441-09-068	187	2	2	187	2	1		2		3	3	34
		388	2	2	388	2	1		2	3		3	34
E. Jones Draw	06-195-0-0441-09-067	813	2	2	813	2	1		2	8		3	34
		187	2	2	187	2	1		2		3		34
W. FM 3078	06-195-0-0441-09-069	290	2	2	290	2	2		2	3		2	
E. FM 3078		382	2	2	382	2	2		2	3		2	31
SHEET TOTAL		8,212	30	26	8,212	44	22	0	30	52	39	30	413

IH 20 (0003-05-055)

Locations	NBI #	REMOVAL 0542 6001 REMOVE METAL BEAM GUARD FENCE LF	REMOVAL 0542 6002 REMOVE TERMINAL ANCHOR SECTION EA	REMOVAL 0544 6003 GUARDRAIL END TREATMENT (REMOVE) EA	PROPOSED 0540 6002 MTL W-BEAM GD FEN (STEEL POST) LF	PROPOSED 0540 6006 MTL BEAM GD FEN TRANS (THRIE-BEAM) EA	PROPOSED 0540 6016 DOWNSTREAM ANCHOR TERMINAL SECTION EA	PROPOSED 0540 6018 MTL BM GD FEN TRANS (NON - SYM) EA	PROPOSED 0544 6001 GUARDRAIL END TREATMENT (INSTALL) EA	PROPOSED 0658 6015 INSTL DEL ASSM (D-SW)SZ (BRF)GF1 EA	PROPOSED 0658 6028 INSTL DEL ASSM (D-SY)SZ (BRF)GF1 EA	PROPOSED 0658 6099 INSTL OM ASSM (OM-2Z)(WFLX)GND EA	PROPOSED 0432 6045 RIPRAP (MOW STRIP)(4 IN) CY
Cold Springs Draw	06-195-0-0003-05-087	213	1	1	213	1	1	1	1	3		2	10
		162	1	1	162	1	1	1	1		3	2	9
Ninemile Draw	06-195-0-0003-05-089	177	1	1	177	1	1	0	1	3		2	20
		248	1	1	248	1	1	0	1		3	2	23
Stocks Rd EB	06-195-0-0003-05-126	370	0	1	370	1	0	0	1	3		2	17
		170	0	1	170	1	0	0	1		3		9
Stocks Rd WB	06-195-0-0003-05-125	278	0	1	278	1	0	0	1		3	2	13
		170	0	1	170	1	0	0	1	3		0	9
Cowan Draw EB (MM 5)	06-195-0-0003-05-130	170	1	1	170	1	1	0	1	3		2	16
		145	1	1	145	1	1	0	1		3	2	15
Cowan Draw WB (MM 5)	06-195-0-0003-05-129	138	1	1	138	1	1	0	1	3		0	15
		162	1	1	162	1	1	0	1		3	0	16
Cowan Draw WB	06-195-0-0003-05-088	192	1	1	192	1	1	0	1	3		2	15
		213	1	1	213	1	1	0	1		3	2	16
SHEET TOTAL		2,800	10	14	2,800	14	10	2	14	21	21	18	187

Locations	STA.	TO	STA.	REMOVAL 0542 6001 REMOVE METAL BEAM GUARD FENCE LF	REMOVAL 0542 6002 REMOVE TERMINAL ANCHOR SECTION EA	REMOVAL 0544 6003 GUARDRAIL END TREATMENT (REMOVE) EA	PROPOSED 0540 6002 MTL W-BEAM GD FEN (STEEL POST) LF	PROPOSED 0540 6006 MTL BEAM GD FEN TRANS (THRIE-BEAM) EA	PROPOSED 0540 6016 DOWNSTREAM ANCHOR TERMINAL SECTION EA	PROPOSED 0540 6018 MTL BM GD FEN TRANS (NON - SYM) EA	PROPOSED 0544 6001 GUARDRAIL END TREATMENT (INSTALL) EA	PROPOSED 0658 6015 INSTL DEL ASSM (D-SW)SZ (BRF)GF1 EA	PROPOSED 0658 6028 INSTL DEL ASSM (D-SY)SZ (BRF)GF1 EA	PROPOSED 0658 6099 INSTL OM ASSM (OM-2Z)(WFLX)GND EA	PROPOSED 0432 6045 RIPRAP (MOW STRIP)(4 IN) CY
0003-05-055 TOTALS	0+00		375+23	2,800	10	14	2,800	14	10	2	14	21	21	18	187
0441-09-049 TOTALS	0+00		468+18	8,212	30	26	8,212	44	22		30	52	39	30	413
PROJECT TOTALS				11,012	40	40	11,012	58	32	2	44	73	60	48	600

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

RICARDO C BETANCOURT, P.E. 12/19/22

CONSOLIDATED SUMMARY

SHEET 1 OF 3

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
6		9

STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

PAVEMENT MARKING SUMMARY

DESCRIPTION	STA	o	STA	LENGTH(MI)	LENGTH	0533 6001 RUMBLE STRIPS (SHOULDER)	0666 6102 REF PAV MRK TY (W)36" (YLD TR) (100MIL)	0666 6033 REFL PAV MRK TY I (W)8" (LNDP)(100MIL)	0666 6036 REFL PAV MRK TY I (W)8" (SLD)(100MIL)	666 6048 REFL PAV MRK TY (W)24" (SLD)(100MIL)	0666 6306 RE PM W/RET REQ TY I (W)6" (BRK)(100MIL)	0666 6309 RE PM W/RET REQ TY I (W)6" (SLD)(100MIL)	0666 6318 RE ON W/ RET REQ TY I (Y)6" (BRK)(100MIL)	0666 6321 RE PM W/RET REQ TY I (Y)6" (SLD)(100MIL)	0672 6009 REFL PAV MRKR TY II-A-A	0672 6010 REFL PAV MRKR TY II-C-R	0677 6001 ELIM EXT PAV MRK & MRKS (4")	0677 6003 ELIM EXT PAV MRK & MRKS (8")
						LF	EA	LF	LF	LF	LF	LF	LF	LF		EA	LF	LF
IH 10 (Mainlanes)																		
WESTBOUND	0+00		375+23	7.11	37,523	75,046		1,400	6388		9,650	38,585		32,621		470	80,856	7,788
EASTBOUND	0+00		375+23	7.11	37,523	75,046			153.33		9,380	37,510		34,162		470	81,052	153
RAMPS (OFF) (ON)									4,944	121	490	9,730		7,129				4,944
IH 20 (Mainlains)																		
WESTBOUND	0+00		468+18	8.87	46,818	93,636					11,190	44,101		46,679		560	101,970	
EASTBOUND	0+00		468+18	8.87	46,818	93,636					11,760	42,775		47,045		589	101,580	
RAMPS (OFF) (ON)							21		5509	50	3,523	19,887	127	5,653	63	306		5,509
PROJECT TOTAL						337,364	21	1,400	16,994	171	45,993	192,588	127	173,289	63	2,395	365,458	18,394

TRAFFIC CONTROL SUMMARY

DESCRIPTION	STA	o	STA	LENGTH	0662 6060 WK ZN PAV MRK REMOV (W)4" (BRK)	0662 6063 WK ZN PAV MRK REMOV (W)4" (SLD)	0662 6095 WK ZN PAV MRK REMOV (Y)4" (SLD)	0662 6109 WK ZN PAV MRK SHT TERM (TAB)TY W	6001 6002 PORTABLE CHANGEABLE MESSAGE SIGN	6158 6001 TMSP RADAR SPEED CONTROL MONITOR	6079 6002 AUTO PORT SMRT TRF MONITOR SYS	6185 6002 TMA (STATIONARY)	6185 6003 TMA (MOBILE OPERATION)
					LF	LF	LF	EA	EA	EA	DAY	DAY	HR
IH 20													
MAINLANES													
WESTBOUND	0+00		468+18	46,818	11,710	46,818	46,818	3,512			351	238	1704
EASTBOUND	0+00		468+18	46,818	11,710	46,818	46,818	3,512	2	2	351		
IH 10													
MAINLANES													
WESTBOUND	0+00		375+23	37,523	9,390	37,523	37,523	2,815			351	238	1704
EASTBOUND	0+00		375+23	37,523	9,390	37,523	37,523	2,815	2	2	351		
PROJECT TOTAL					42,200	168,682	168,682	12,654	4	4	1,404	476	3,408

EROSION CONTROL ITEMS

DESCRIPTION	STA	to	STA	LENGTH (FT)	0506 6042 BIODEG EROSN CONT LOGS (INSTL) (18")	0506 6043 BIODEG EROSN CONT LOGS (REMOVE)
MAINLANES					LF	LF
IH 20 WESTBOUND	0+00		468+18	46,818	5,000	5,000
IH 20 EASTBOUND	0+00		468+18	46,818		
(0003-05-055) TOTAL					5,000	5,000
IH 10 WESTBOUND	0+00		375+23	37,523	5,000	5,000
IH 10 EASTBOUND	0+00		375+23	37,523		
(0441-09-049) TOTAL					5,000	5,000
PROJECT TOTALS					10,000	10,000

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

CONSOLIDATED SUMMARY

SHEET 2 OF 3

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			10
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

ROADWAY ITEMS

	DESCRIPTION	STA	to	STA	Length (FT)	Width (FT)	SURFACE AREA (SY)	0105 6008 REMOVING STAB BASE AND ASPH PAV(6") SY	0105 6041 REMOVING STAB BASE AND ASPH PAV(8") SY	0134 6002 BACKFILL (TY B) STA	0150 6002 BLADING HR	0216 6001 PROOF ROLLING HR	0251 6079 REWORK BS MTL (TY D)(SURF)(ORD COMP) SY	0310 6005 PRIME COAT (AE-P) GAL/SY	316 6017 ASPH (AC-20-5TR) GAL/SY	316 6126 AGGR (TY-PB GR-4 SAC-A) 110 SY/CY CY	0354 6045 PLANE ASPH CONC PAV (2") 110 2 IN SY	354 6030 PLANE ASPH CON PAV (0" TO 8") LBS/SY-IN 8IN SY	3077 6007 SP MIXES SP-B SAC-B PG70-22 LBS/SY-IN 8.0 IN TON	3077 6075 TACK COAT GAL/SY GAL	3080 6021 STONE-MTRX-ASPH SMAR-F SAC-A LBS/SY-IN 2 IN TON	3084 6001 BONDING COURSE GAL/SY GAL
														0.2	0.38	110	110	110	110	0.1	110	0.1
CSJ 0003-05-055 (IH 20)	IH 20 MAINLANES	0+00		468+18	46,818	48	249,696		249,696	468	50	50	249,696	49,940	94,884	2,270	249,696	249,696	109,867	24,970.00	27,467	24,970
	IH 20 SHOULDERS	0+00		468+18	46,818	28	145,656		145,656						55,349	1,324	145,656				16,023	14,566
	IH 20 RAMPS						42,027								15,970	382						
	TOTAL								395,352	468	50	50	249,696	49,940	166,204	3,976	395,352	249,696	109,867	24,970	43,490	39,536
CSJ 0441-09-049 (IH 10-SEGMENT A)	IH 10 MAINLANES	0+00		47+59		48	6,480		6,480	47	50	50	6,480	1,296	2,462	59	6,480	6,480	2,852	648	713	648
	IH10/IH20 MAINLANES	0+00		36+58		72	33,968		33,968	36			33,968	6,794	12,908	309	33,968	33,968	14,946	3,397	3,737	3,397
	IH 10 RAMPS	0+00		47+59		28	16,987			47					6,455	170					1,869	1,699
	TOTAL								40,448	130	50	50	40,448	8,090	21,825	538	40,448	40,448	17,798	4,045	6,319	5,744
CSJ 0441-09-049 (IH 10-SEGMENT B)	IH 10 DRIVING LANE	47+59		375+23		24	87,131	87,131		328	30	30	87,131	15,635	33,110	792	87,131	87,131	25,798	7,818	8,600	7,818
	IH10 PASSING/SHOULDERS	47+59		375+23		52	188,783		188,783				33,968	6,794	71,738	1,716	188,783		14,946	3,397	3,737	3,397
	IH 10 RAMPS						120,589								45,824	1,096						
	TOTAL							87,131	229,231	458	80	80	161,547	30,519	172,496	4,142	316,362	127,579	58,542	11,215	12,337	11,215
	PROJECT TOTALS							87,131	624,583	926	130	130	411,243	80,459	338,700	8,118	711,714	377,275	168,409	40,230	62,146	56,495

TRAFFIC SIGNS SUMMARY

	0416 6016 DRILL SHAFT (SIGN MTS) (12 IN) LF	0416 6018 DRILL SHAFT (SIGN MTS) (24 IN) LF	0636 6002 ALUMINUM SIGNS (TY G) SF	0636 6003 ALUMINUM SIGNS (TY O) SF	0644 6001 IN SM RD SN SUP&AM TY10BWG(1)SA(P) EA	0644 6004 IN SM RD SN SUP&AM TY10BWG(1)SA(T) EA	0644 6076 REMOVE SM RD SN SUP&AM EA	0647 6001 INSTALL LRSS (STRUCT STEEL) LB	0647 6003 REMOVE LRSA EA
IH 20 TOTALS	48	48	713	585	35	23	58	6044	15
IH 10 TOTALS	96	72	1157	762	31	21	52	7270	25
PROJECT TOTAL	144	120	1,870	1,347	66	44	110	13,314	40

	0658 6080 INSTL DEL ASSM (D-SW) SZ1(WFLX)GND EA	0658 6086 INSTL DEL ASSM (S-SY)SZ 1(YFLX)GND EA	0658 6092 INSTL DEL ASSM (D-DW)SZ 1 (WFLX)GND EA	0658 6060 REMOVE DELIN & OBJECT MARKER ASSMS EA
IH 20 TOTALS	77	35	84	196
IH 10 TOTALS	273	203	74	550
PROJECT TOTAL	350	238	158	746

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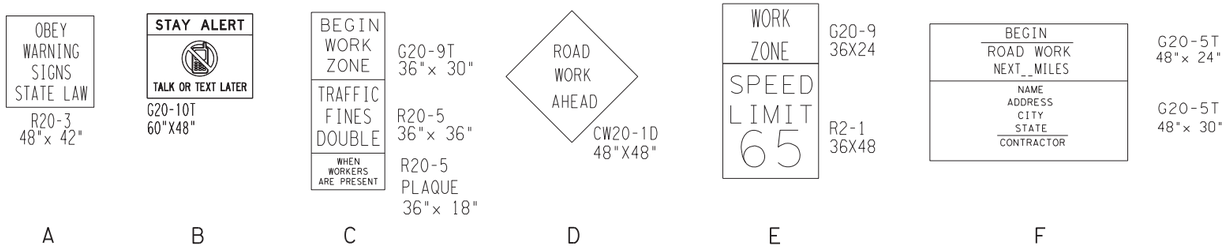
CONSOLIDATED SUMMARY

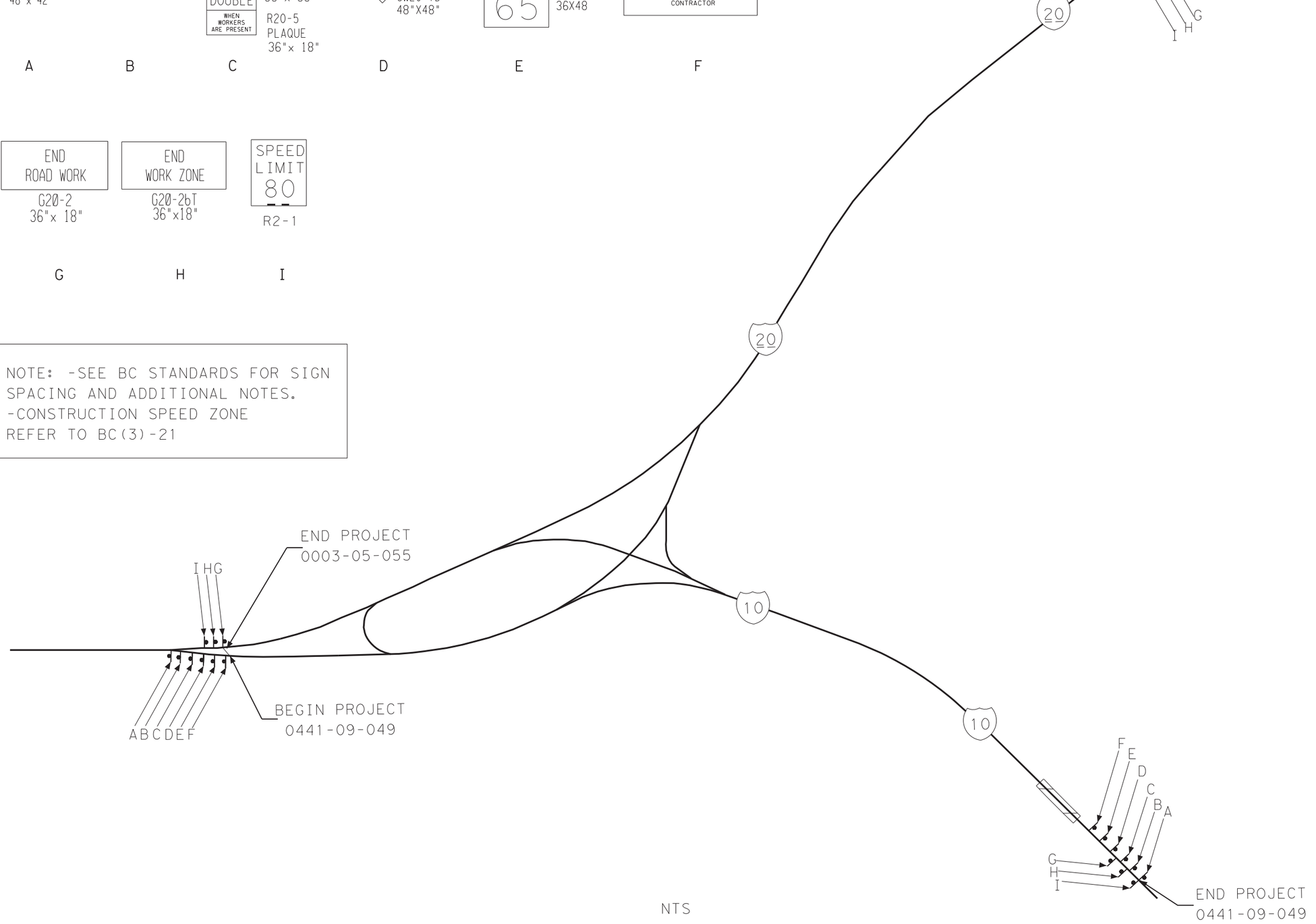
SHEET 3 OF 3

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			11
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



NOTE: -SEE BC STANDARDS FOR SIGN SPACING AND ADDITIONAL NOTES.
-CONSTRUCTION SPEED ZONE
REFER TO BC(3)-21



NTS

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

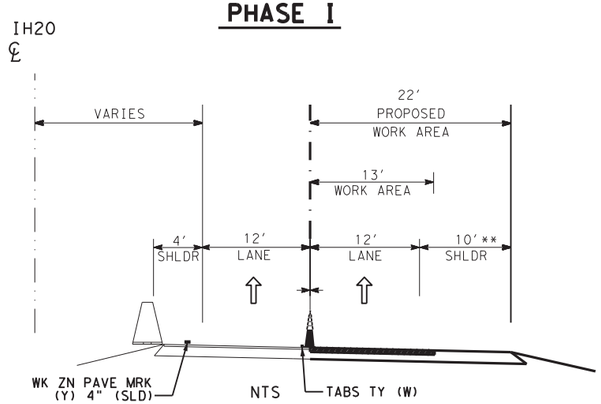
RICARDO C BETANCOURT, P.E. 12/19/22

ADVANCED PROJECT WARNING SIGNING

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			12
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

PHASE I



1. CONTRACTOR TO SUBMIT WORKPLAN FOR LENGTH OF WORKZONE, MUST BE APPROVED BY ENGINEER PRIOR TO CONSTRUCTION.

   - MORE THAN ONE NON ADJACENT WORK AREA CAN BE CONSTRUCTED WITH MULTIPLE TRAFFIC CONTROL SET-UPS.

**2. FOR REQUIRED RAMP CLOSURES UTILIZE PCMS DEVICES AS SHOWN WITH TCP STANDARDS 6-3b & 6-4a AS DIRECTED BY ENGINEER.

3. PLACE ADVANCE WARNING SIGNS AND TRAFFIC CONTROL DEVICES.

4. PLACE WORK ZONE TABS/STRIPING.

5. REMOVE STABILIZED BASE AND EXISTING ACP IN DRIVING LANE IN ACCORDANCE WITH TYPICAL SECTIONS.

6. SWEEP AND REFINISH BASE, PRIME AE-P.

7. SHALL BE PLACED IN ORDER TO COVER EXISTING BASE

8. SAFETY SLOPE AT END OF EACH WORKING DAY WHEN EDGE CONDITIONS REQUIRE IT (SEE TREATMENT FOR VARIOUS EDGE CONDITIONS).

9. PLACE SUPERPAVE B IN TWO EQUAL LIFTS.

10. CONTINUE UNTIL ALL SP-B IS PLACED.

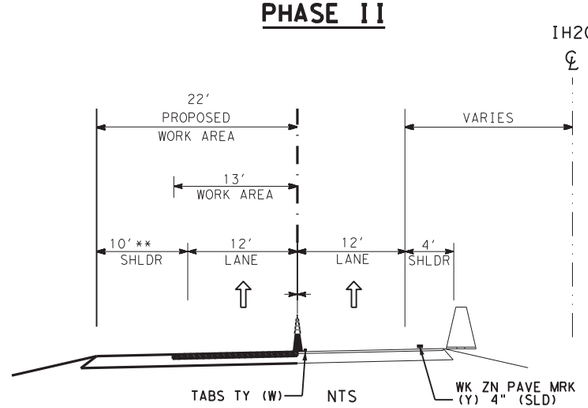
LEGEND

-- WORK ZONE PAVEMENT MARKINGS AND MARKERS

CHANNELIZING DEVICES

MODIFIED TRAFFIC

PHASE II



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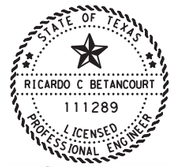


RICARDO C BETANCOURT, P.E. 12/19/22

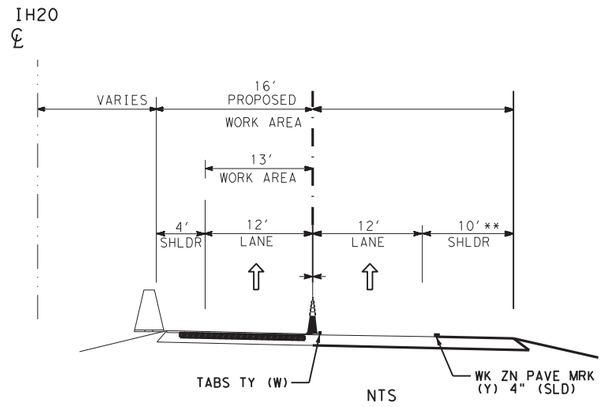
IH 20 PHASE NARRATIVE

SHEET 1 OF 5

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			13
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

PHASE III



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9. PLACE SUPERPAVE B IN TWO EQUAL LIFTS.

10. CONTINUE UNTIL ALL SP-B IS PLACED.

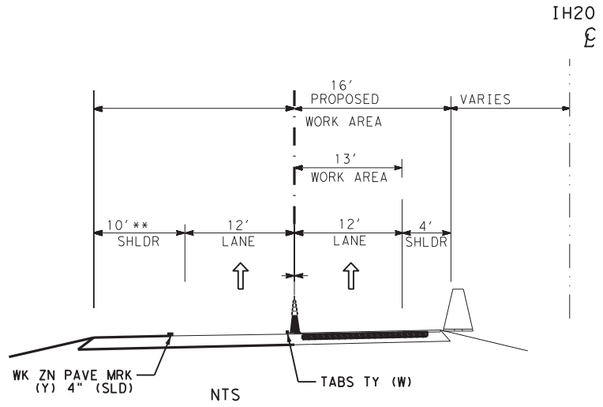
LEGEND

-- WORK ZONE PAVEMENT MARKINGS AND MARKERS

CHANNELIZING DEVICES

MODIFIED TRAFFIC

PHASE IV



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STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

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RICARDO C BETANCOURT, P.E. 12/19/22

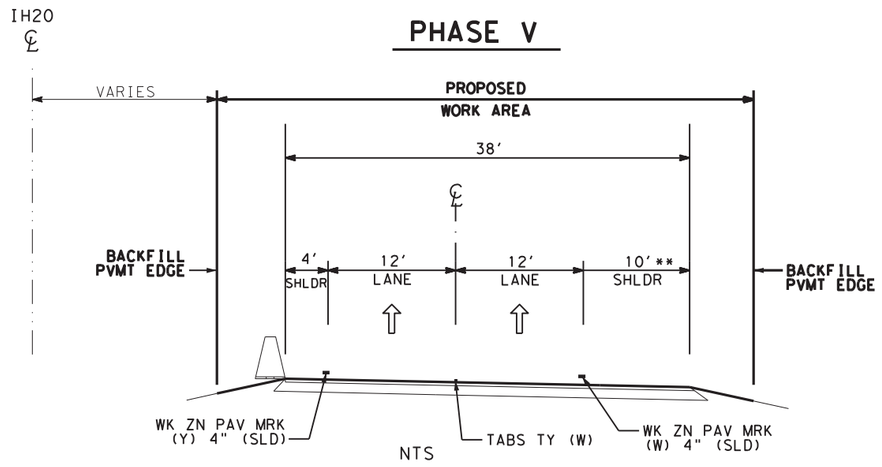
IH 20 PHASE NARRATIVE

SHEET 2 OF 5

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			14
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

PHASE V



NTS

1. PLACE WORK ZONE TABS/STRIPING.
2. MOVE TRAFFIC INTO THE TRAVEL LANES.
3. LIMIT WORK AREA TO 2 MILE SECTIONS IN EACH DIRECTION.

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6. PLACE 2.0" SMAR-F HOTMIX PAVEMENT:
   - FIRST IN DRIVING LANE AND OUTSIDE SHOULDER
   - THEN PLACE IN PASSING LANE AND OUTSIDE SHOULDER
7. CONTINUE UNTIL ALL SMAR-F IS PLACED.

PHASE IV

1. PLACE FINAL PAVEMENT MARKINGS.
2. REMOVE AND REPLACE GUARDFENCE ELEMENTS.
3. INSTALL DELINEATORS & OBJECT MARKERS.
4. INSTALL SIGNS.
5. FINAL CLEAN UP.

STATE OF TEXAS
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RICARDO C BETANCOURT, P.E. 12/19/22

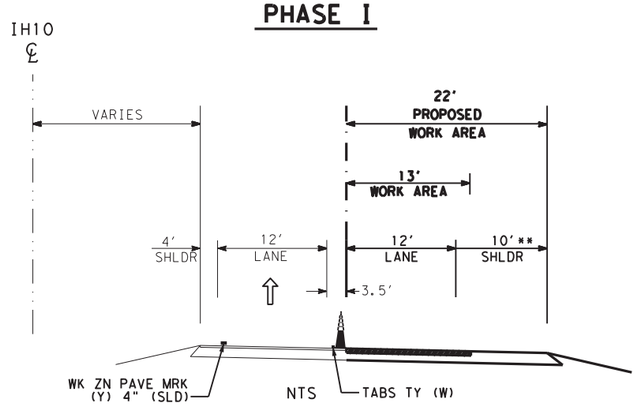
IH 20 PHASE NARRATIVE

SHEET 3 OF 5

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			15
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

PHASE I



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8. SAFETY SLOPE AT END OF EACH WORKING DAY WHEN EDGE CONDITIONS REQUIRE IT (SEE TREATMENT FOR VARIOUS EDGE CONDITIONS).

9. PLACE SUPERPAVE B IN TWO EQUAL LIFTS.

10. CONTINUE UNTIL ALL SP-B IS PLACED.

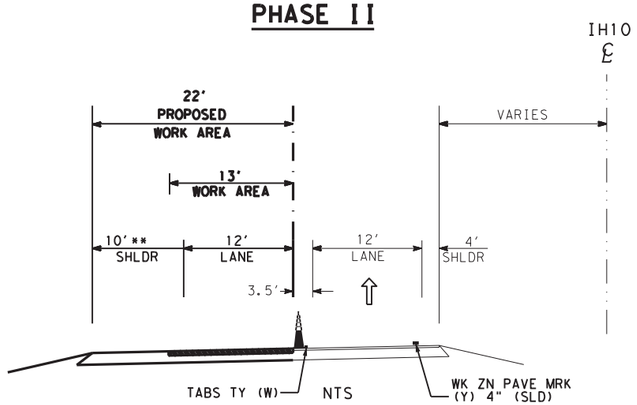
LEGEND

-- WORK ZONE PAVEMENT MARKINGS AND MARKERS

CHANNELIZING DEVICES

MODIFIED TRAFFIC

PHASE II



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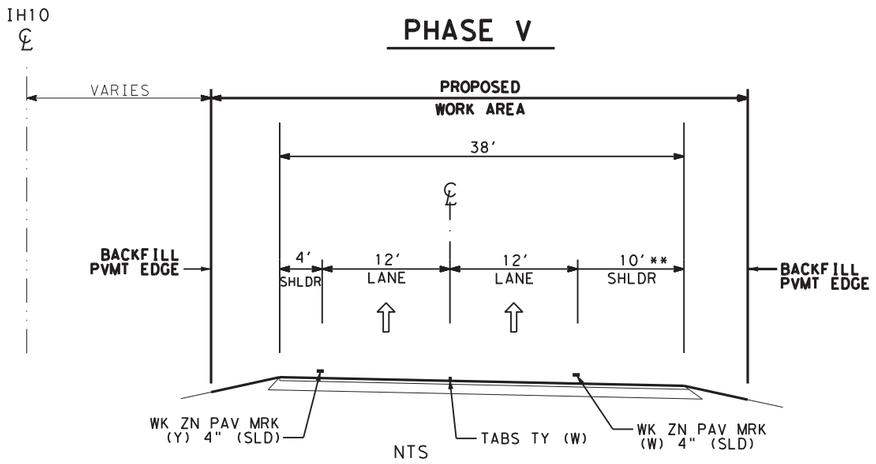
IH 10 PHASE NARRATIVE

SHEET 4 OF 5

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			16
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

PHASE V



NTS

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PHASE IV

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3. INSTALL DELINEATORS & OBJECT MARKERS.
4. INSTALL SIGNS.
5. FINAL CLEAN UP.

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IH 10 PHASE NARRATIVE

SHEET 5 OF 5

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			17
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

DATE: 12/22/2022 11:09:55 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/06 - ODA/Design Projects/0003055/4 - Design/Plan Set/1. General/TCP & PVM MARKINGS STANDARDS/015-026 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

SHEET 1 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

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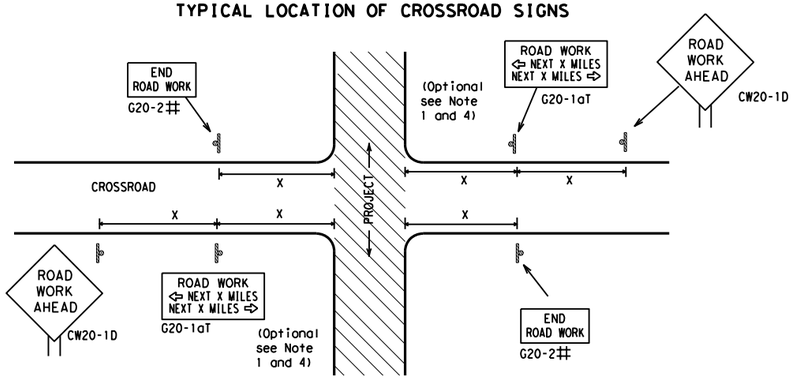
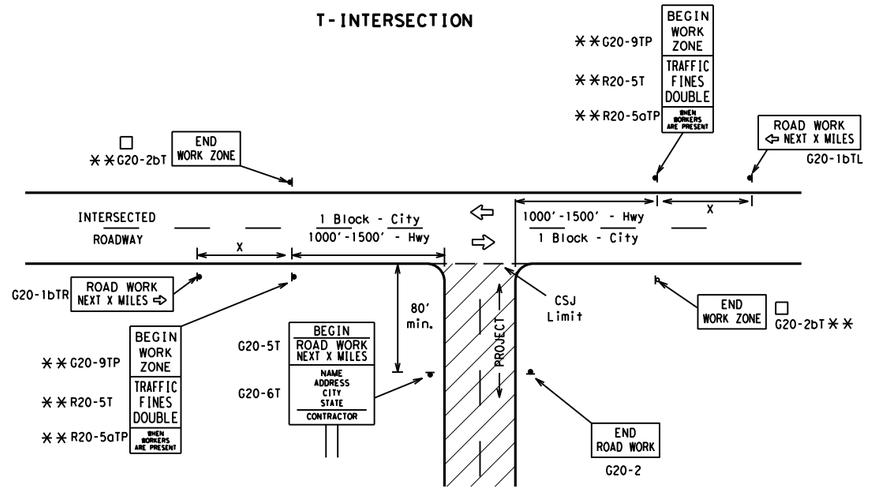
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

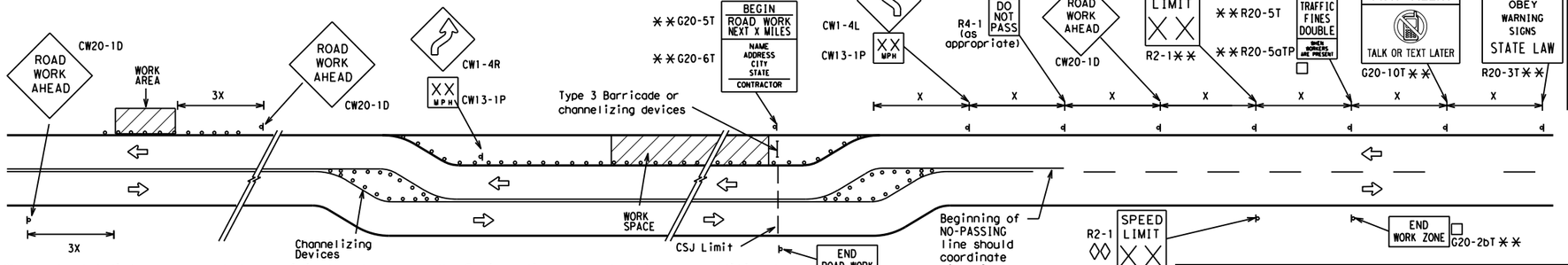
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

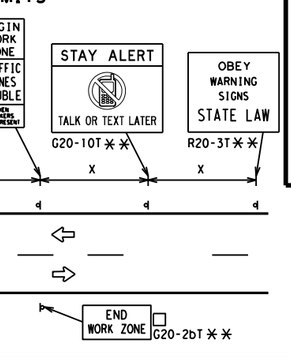
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

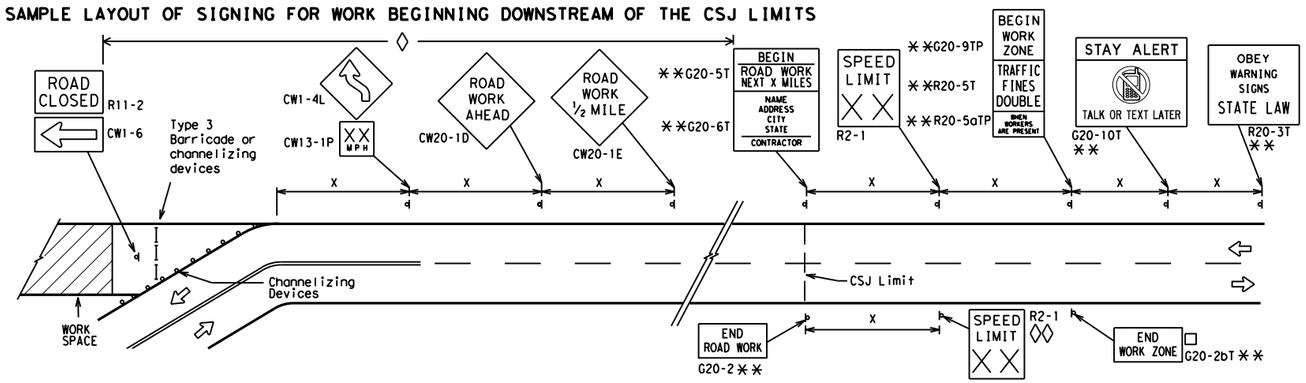


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING 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.

SHEET 2 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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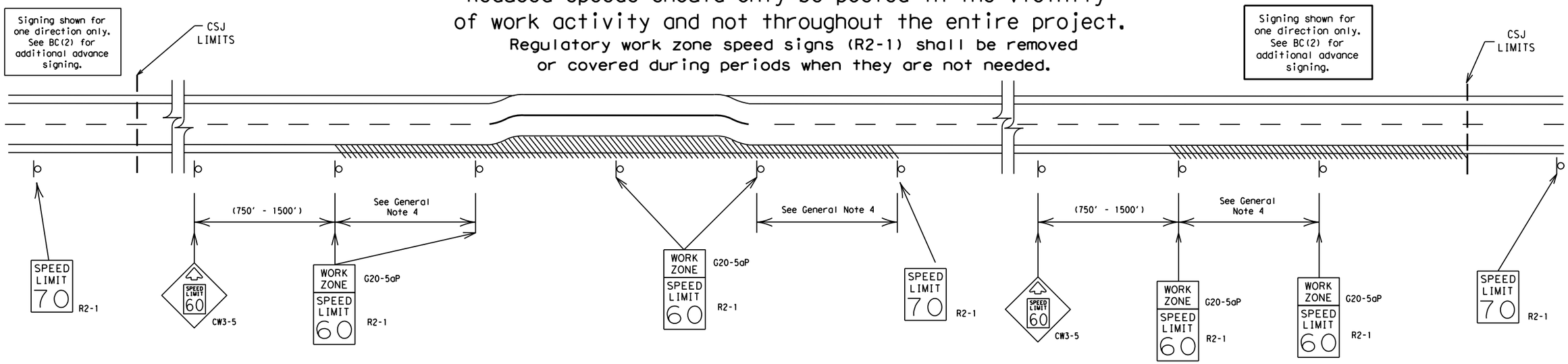
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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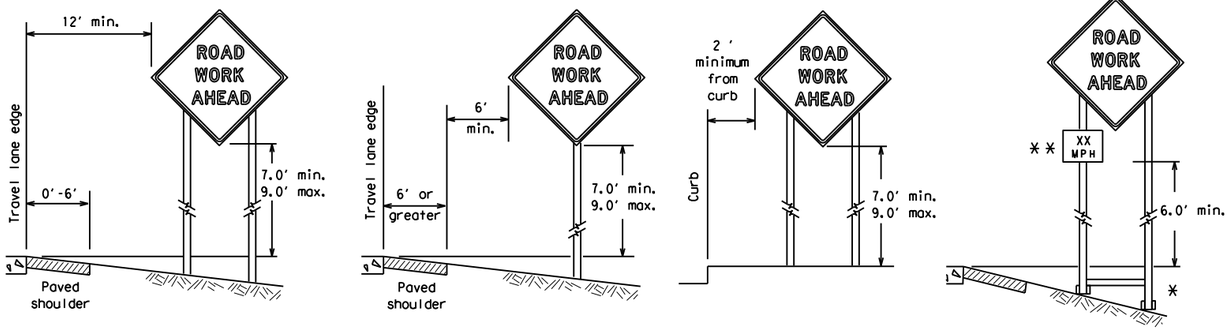
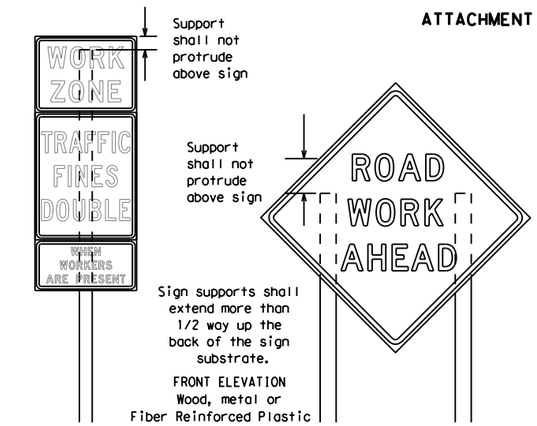
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

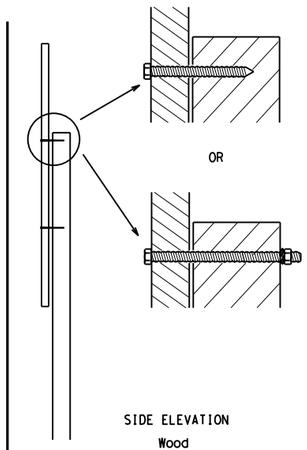


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





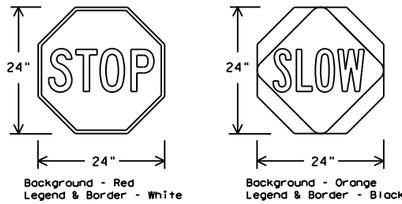
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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
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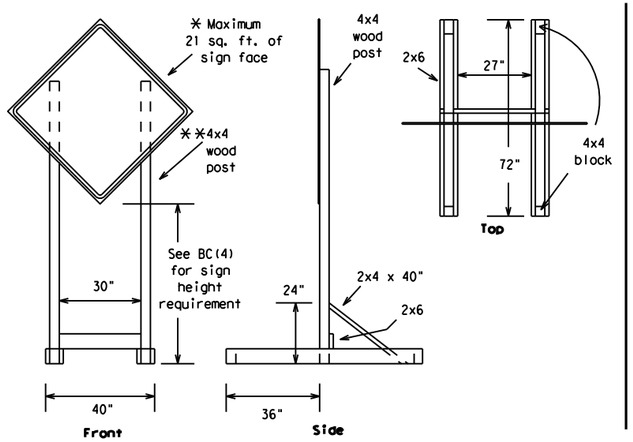
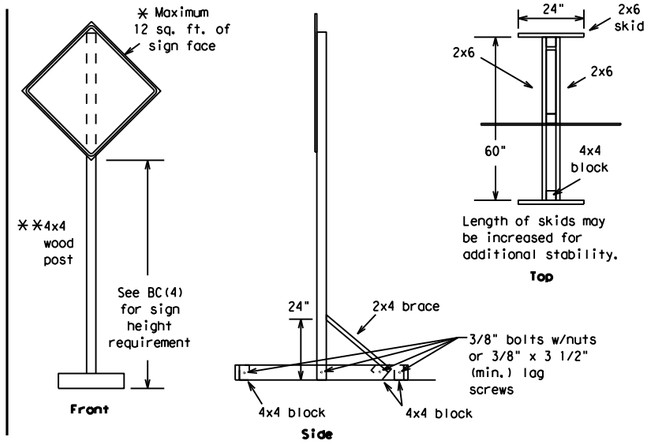
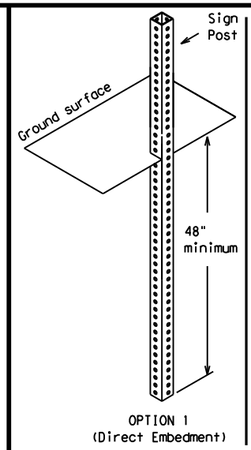
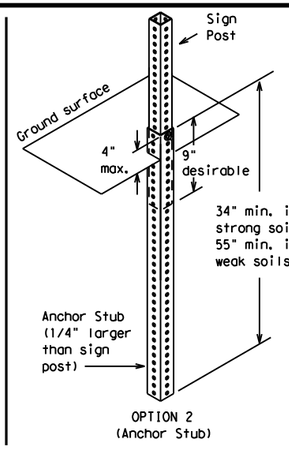


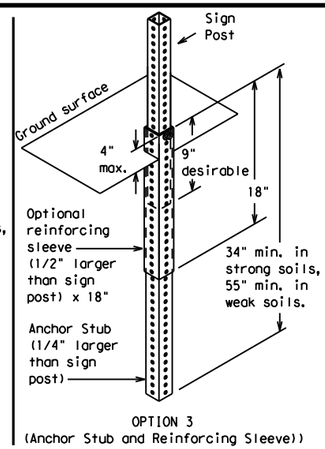


SKID MOUNTED WOOD SIGN SUPPORTS

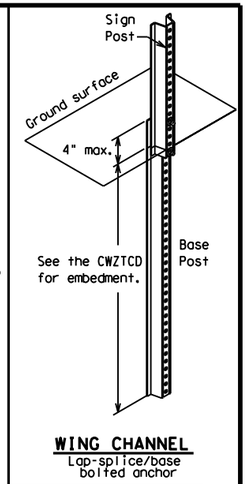
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







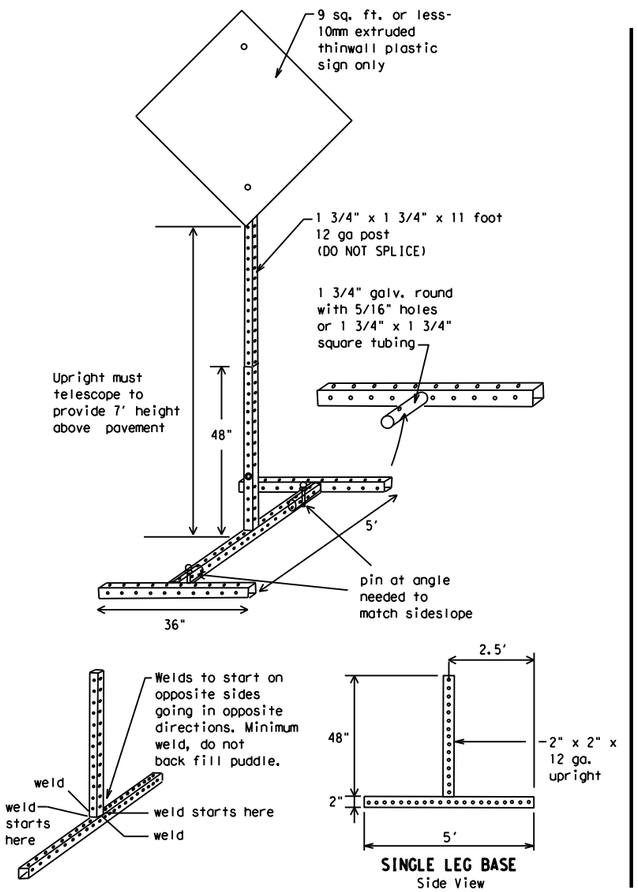
PERFORATED SQUARE METAL TUBING

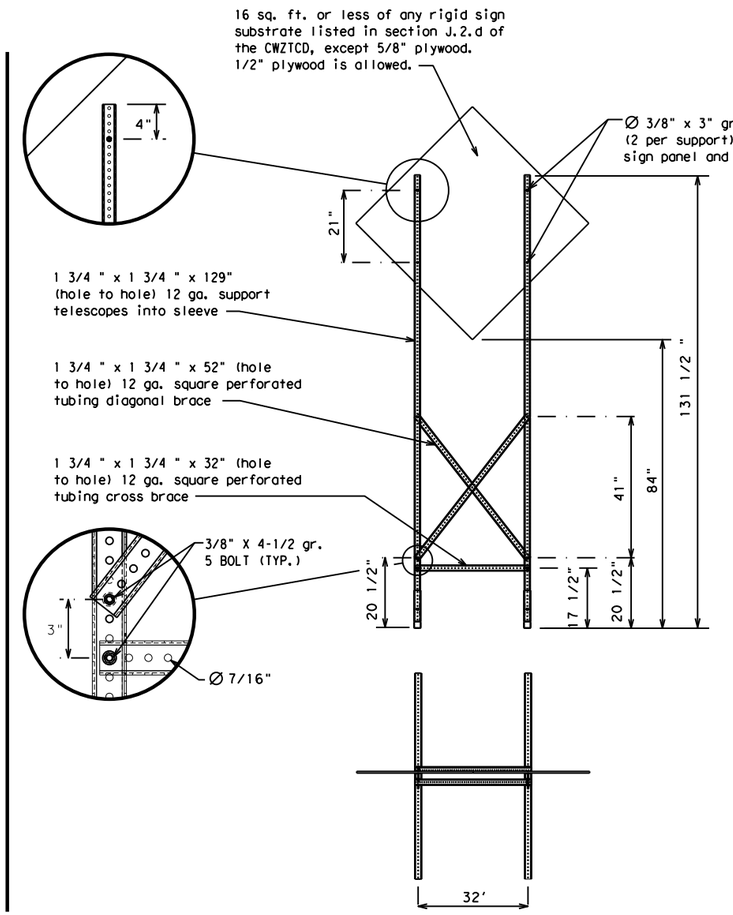


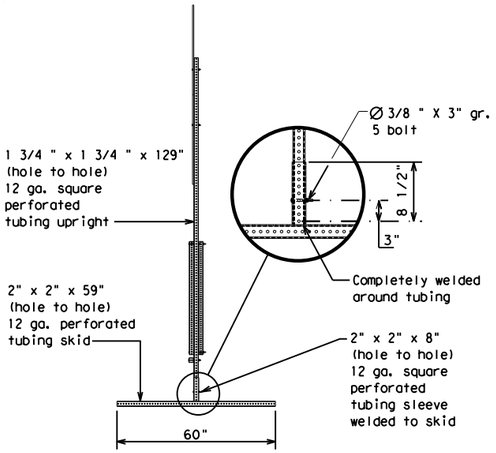
WING CHANNEL
Lap-splice/base bolted anchor

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.

SHEET 5 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH 20, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ODA	REEVES		22

DATE: 12/22/2022 11:09:57 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/06 - ODA/Design Projects/000305054 - Design/Plan Set/1. General/TCP & PVM MARKINGS STANDARDS/015-026 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	0003	05	055	IH 20, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ODA	REEVES		23

100

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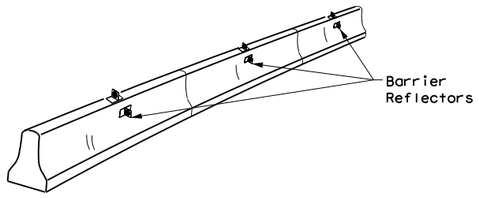
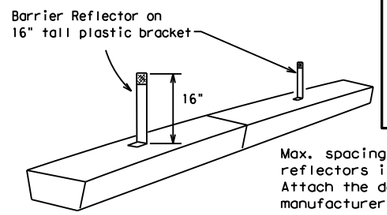
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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



CONCRETE TRAFFIC BARRIER (CTB)

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

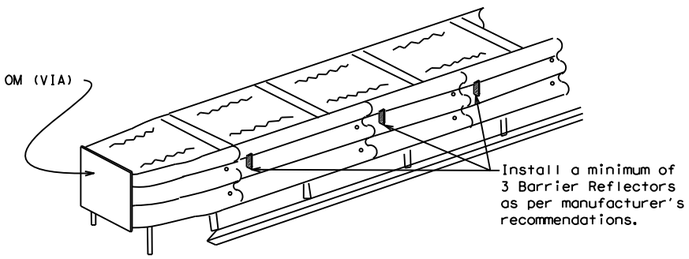


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

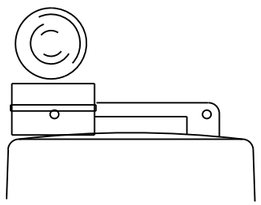


DELINEATION OF END TREATMENTS

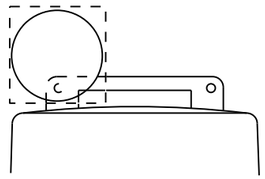
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

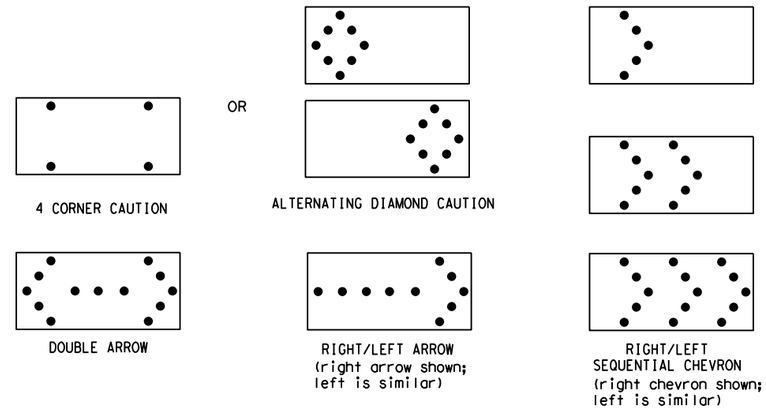
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH 20, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ODA	REEVES		24

101

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

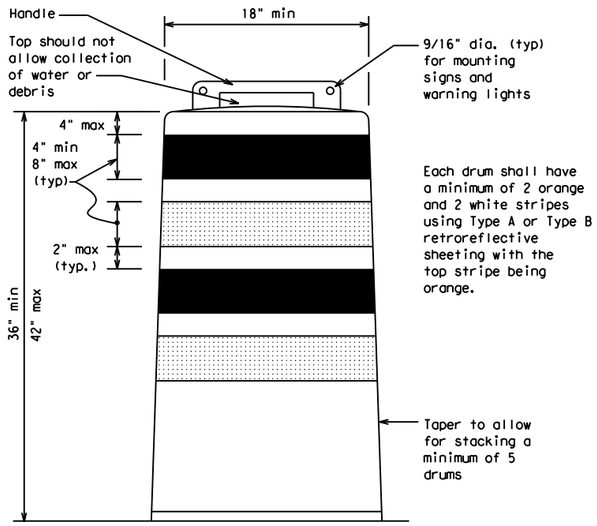
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

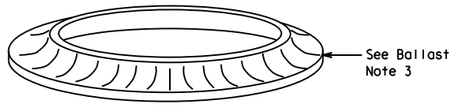
RETROREFLECTIVE SHEETING

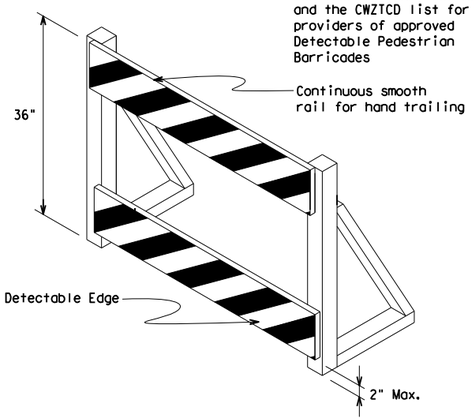
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

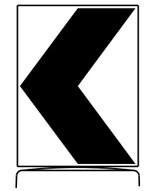




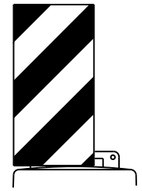


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

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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
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9-07 5-21	ODA	REEVES		25
7-13				

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DATE: 12/22/2022 11:09:58 AM
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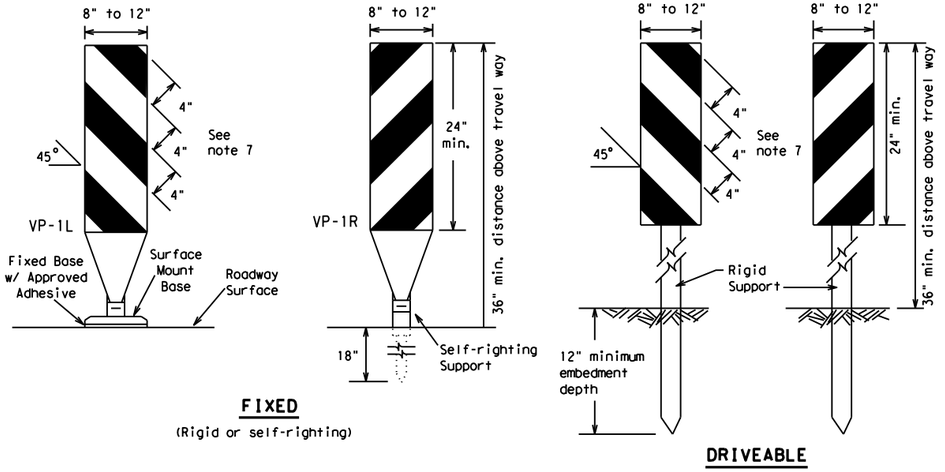
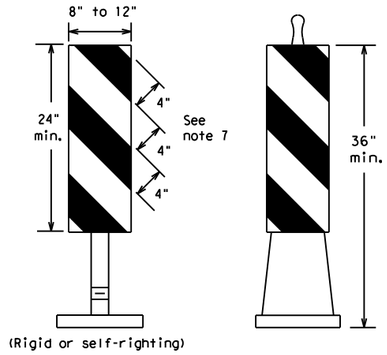


FIXED
(Rigid or self-righting)

DRIVEABLE

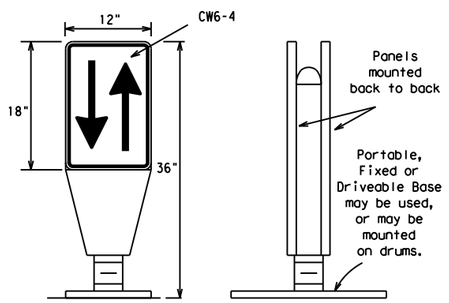


(Rigid or self-righting)

PORTABLE

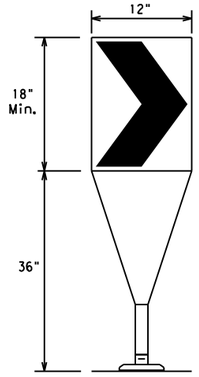
VERTICAL PANELS (VPs)

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



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



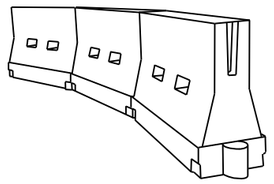
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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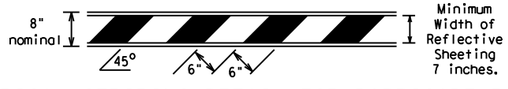
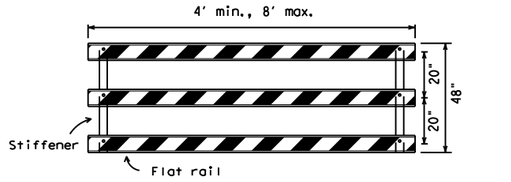
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



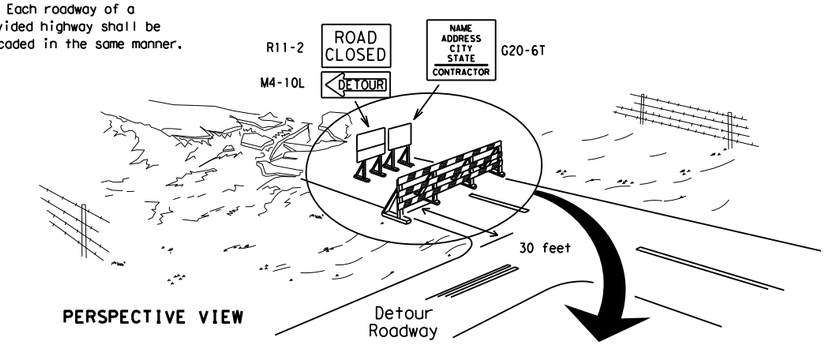
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

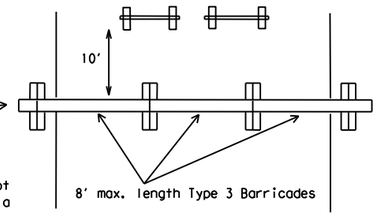
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

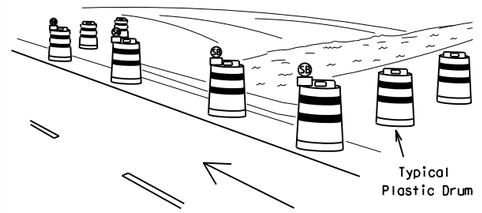
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

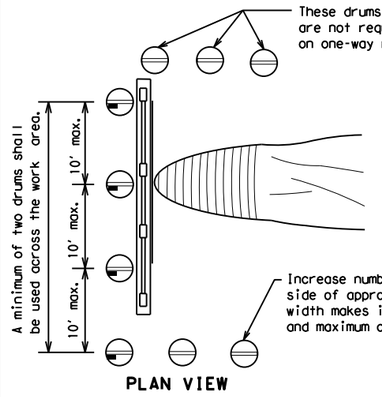
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

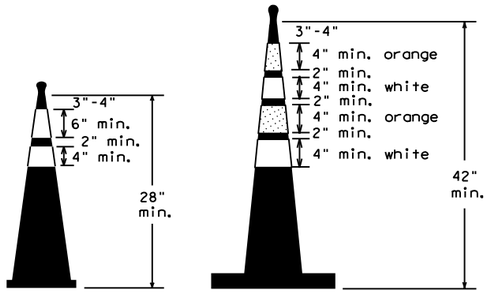
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



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

PLAN VIEW

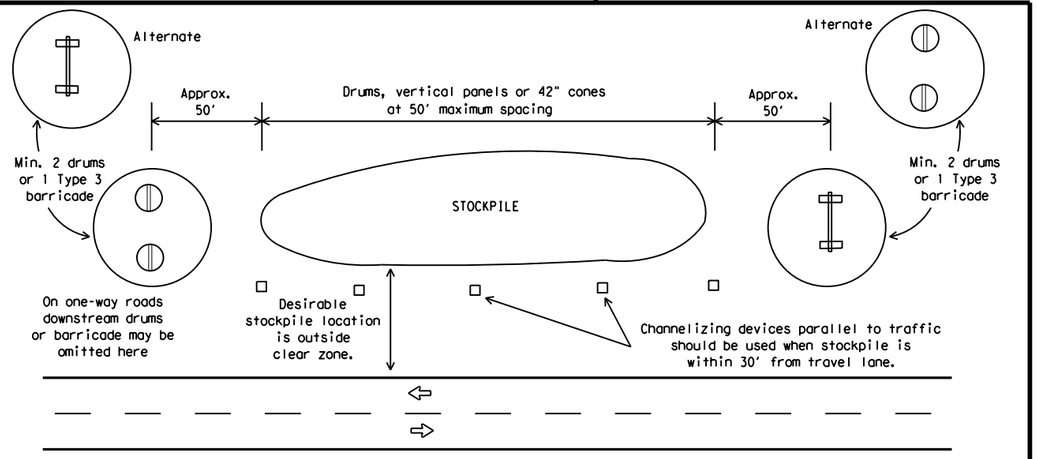
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH 20, ETC
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ODA	REEVES		27

104

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.

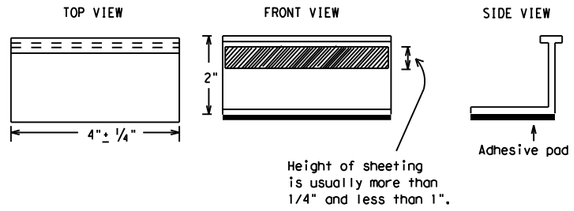
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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
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REVISIONS	0003	05	055	IH 20, ETC
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	ODA	REEVES		28
11-02 8-14				

TDS

DATE: 12/22/2022 11:09:58 AM
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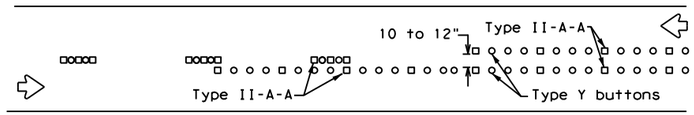
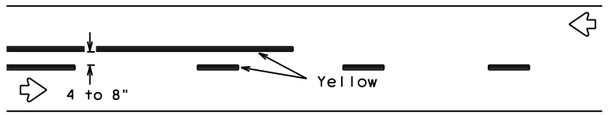
PAVEMENT MARKING PATTERNS

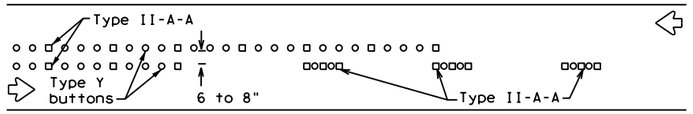
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



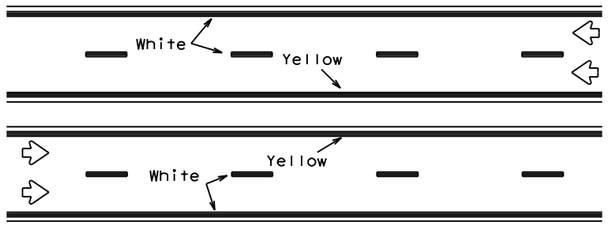
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



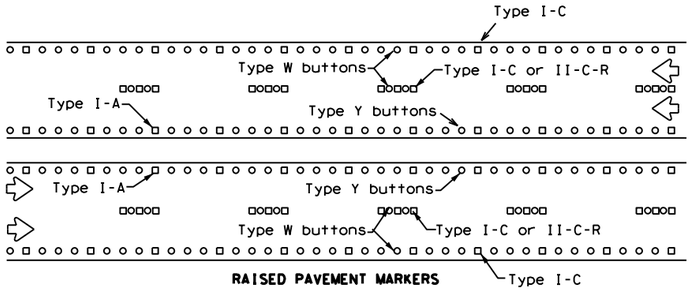
RAISED PAVEMENT MARKERS - PATTERN B

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

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



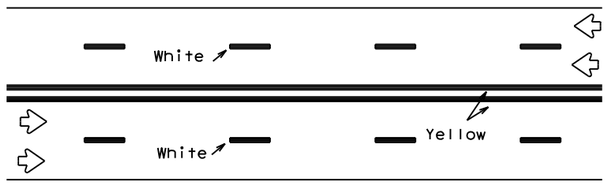
REFLECTORIZED PAVEMENT MARKINGS



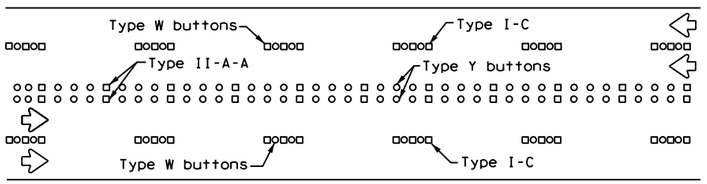
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



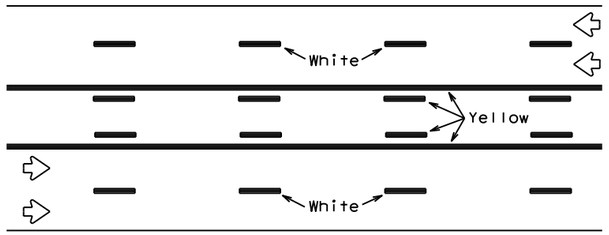
REFLECTORIZED PAVEMENT MARKINGS



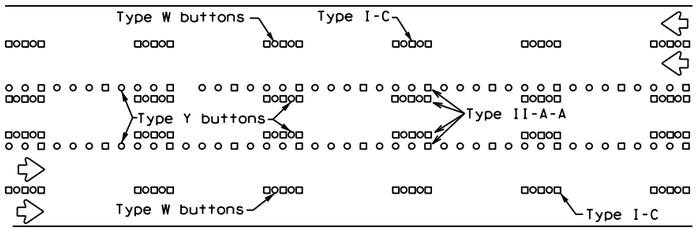
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

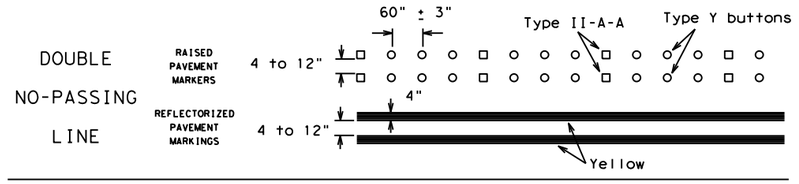
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

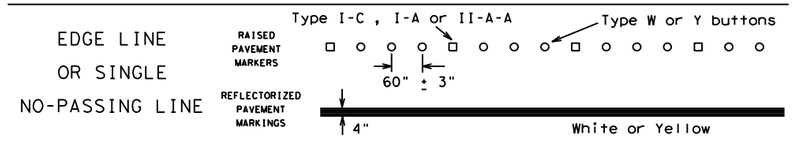
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

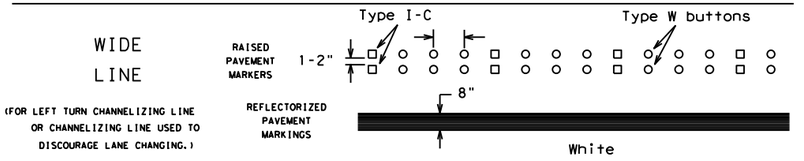


EDGE LINE OR SINGLE NO-PASSING LINE



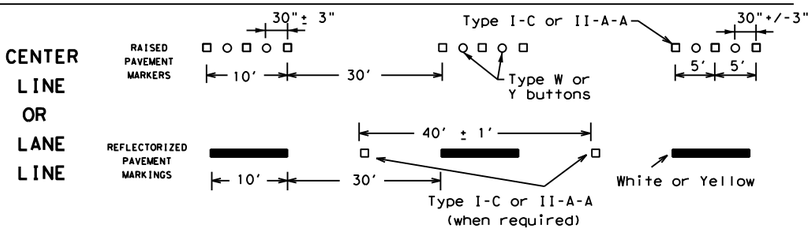
WIDE LINE

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

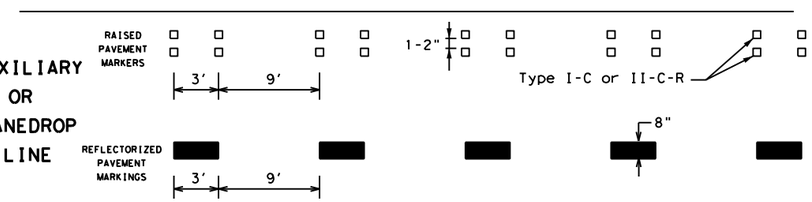


BROKEN LINES

CENTER LINE OR LANE LINE

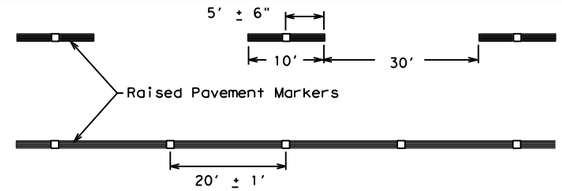


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

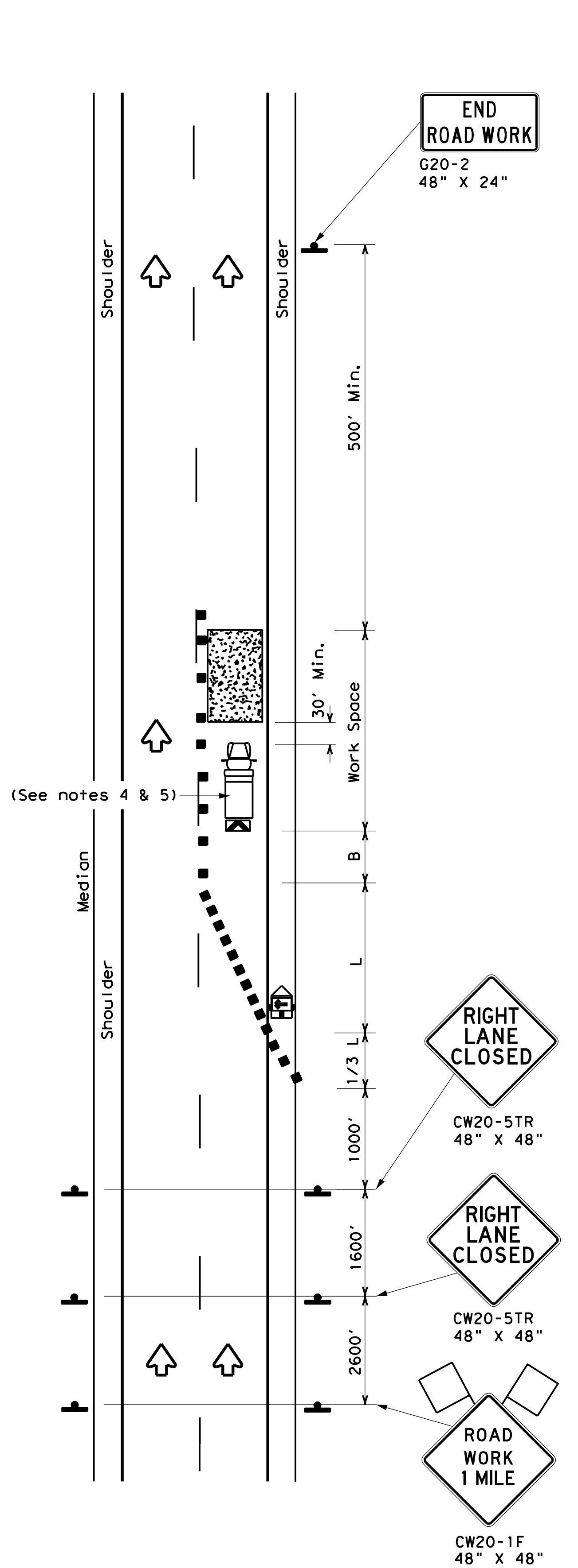
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

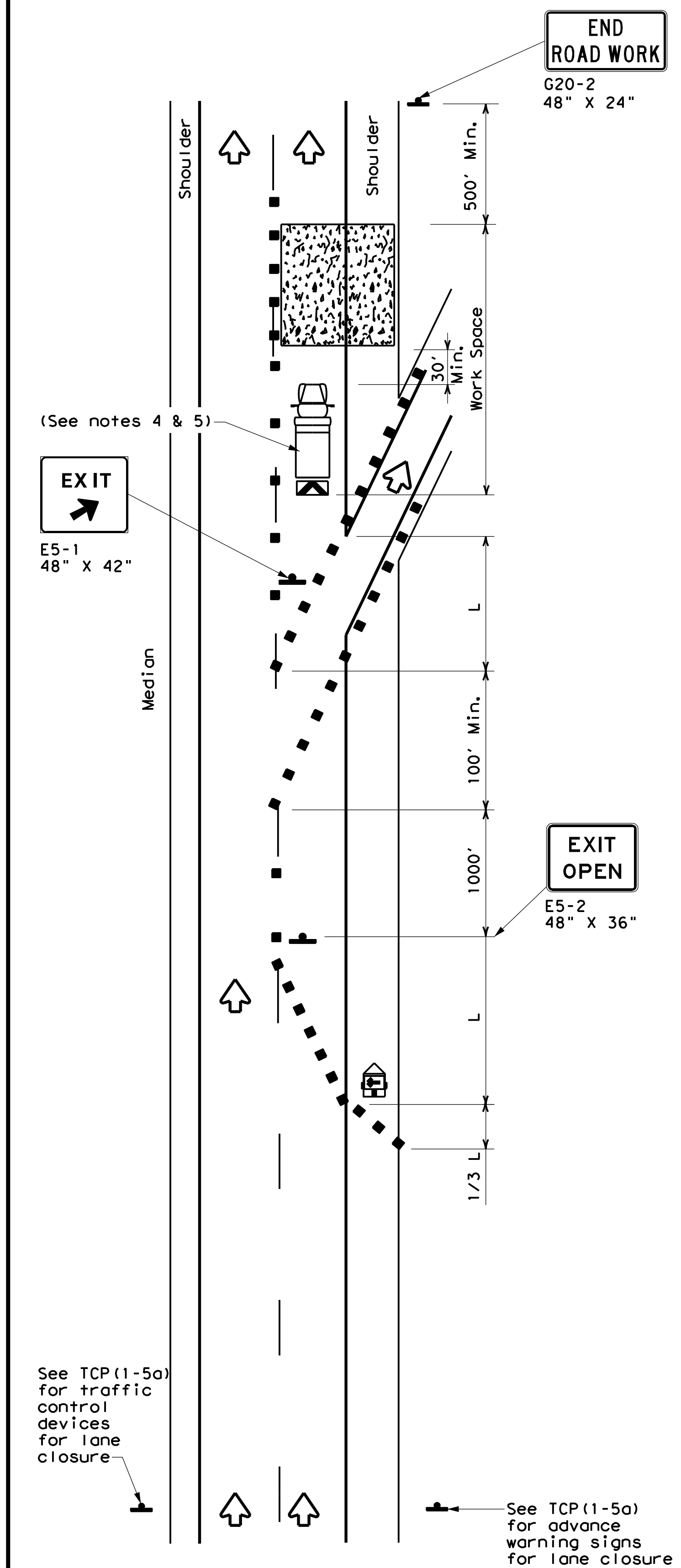
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0003	05	055	IH 20, ETC
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		29

106



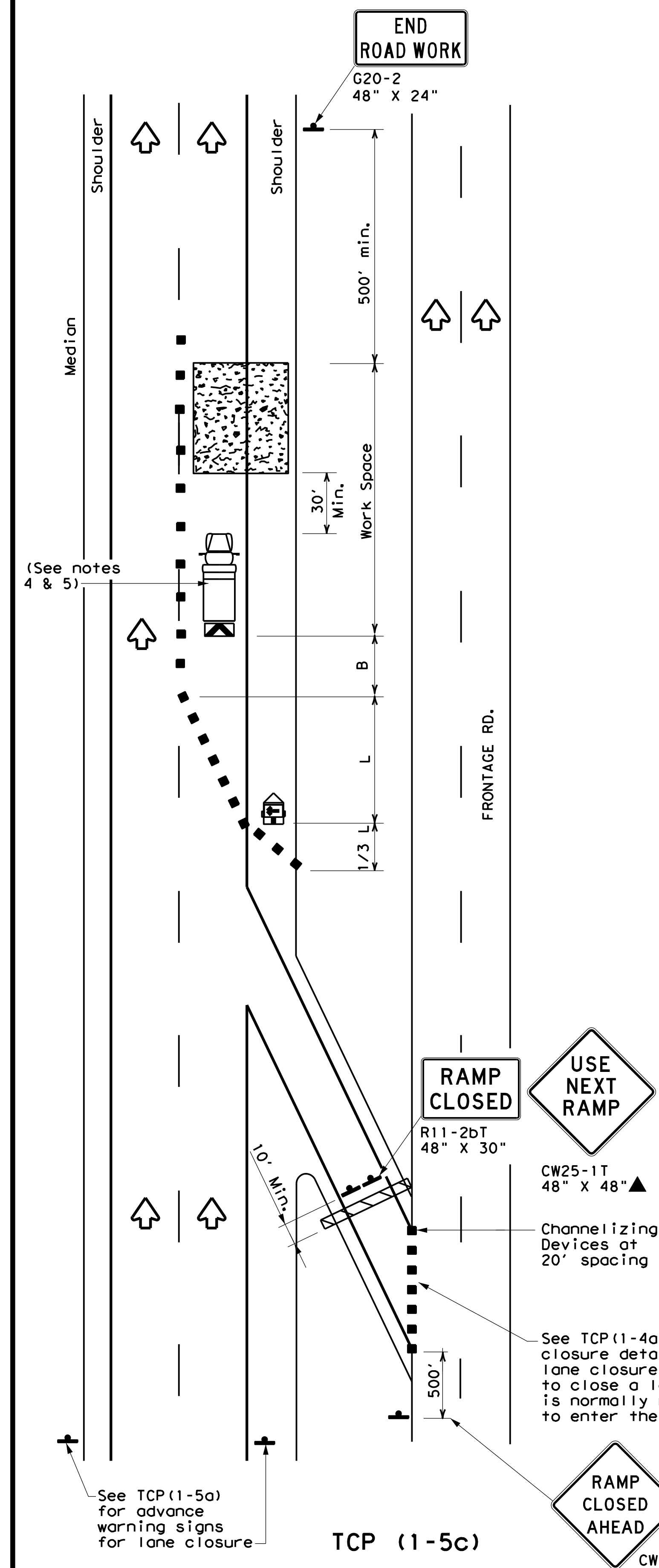
TCP (1-5a)

ONE LANE CLOSURE



TCP (1-5b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (1-5c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP(1-5)-18

FILE: tcp1-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT 0003	SECT 05	JOB 055	HIGHWAY IH 20, ETC
REVISIONS 2-18	DIST ODA		COUNTY REEVES	SHEET NO. 30

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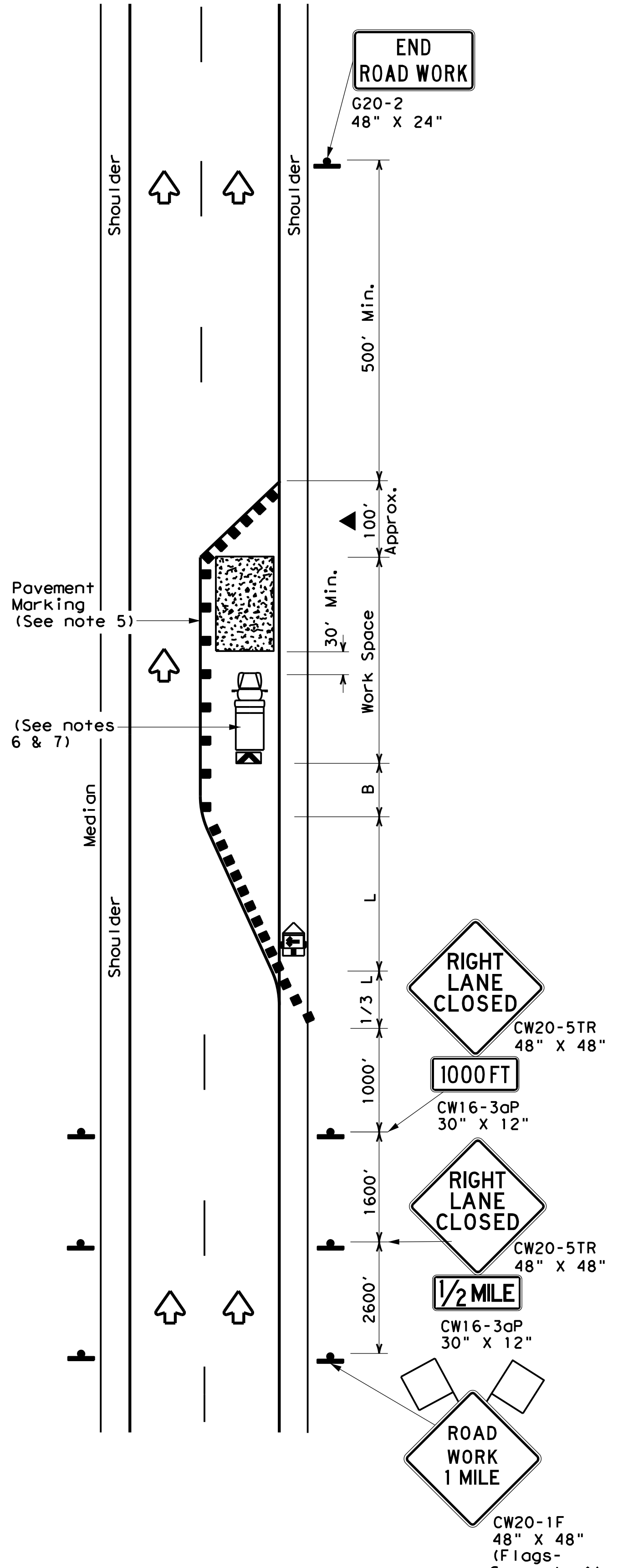
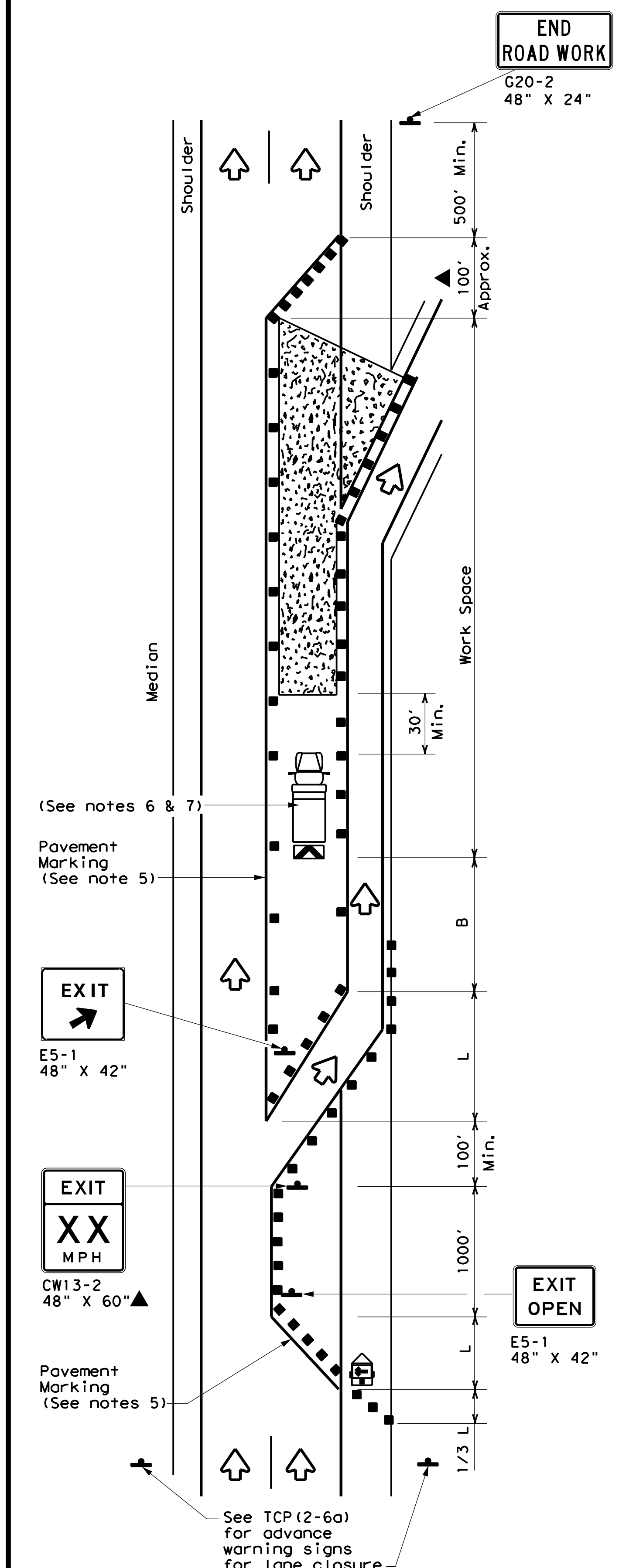


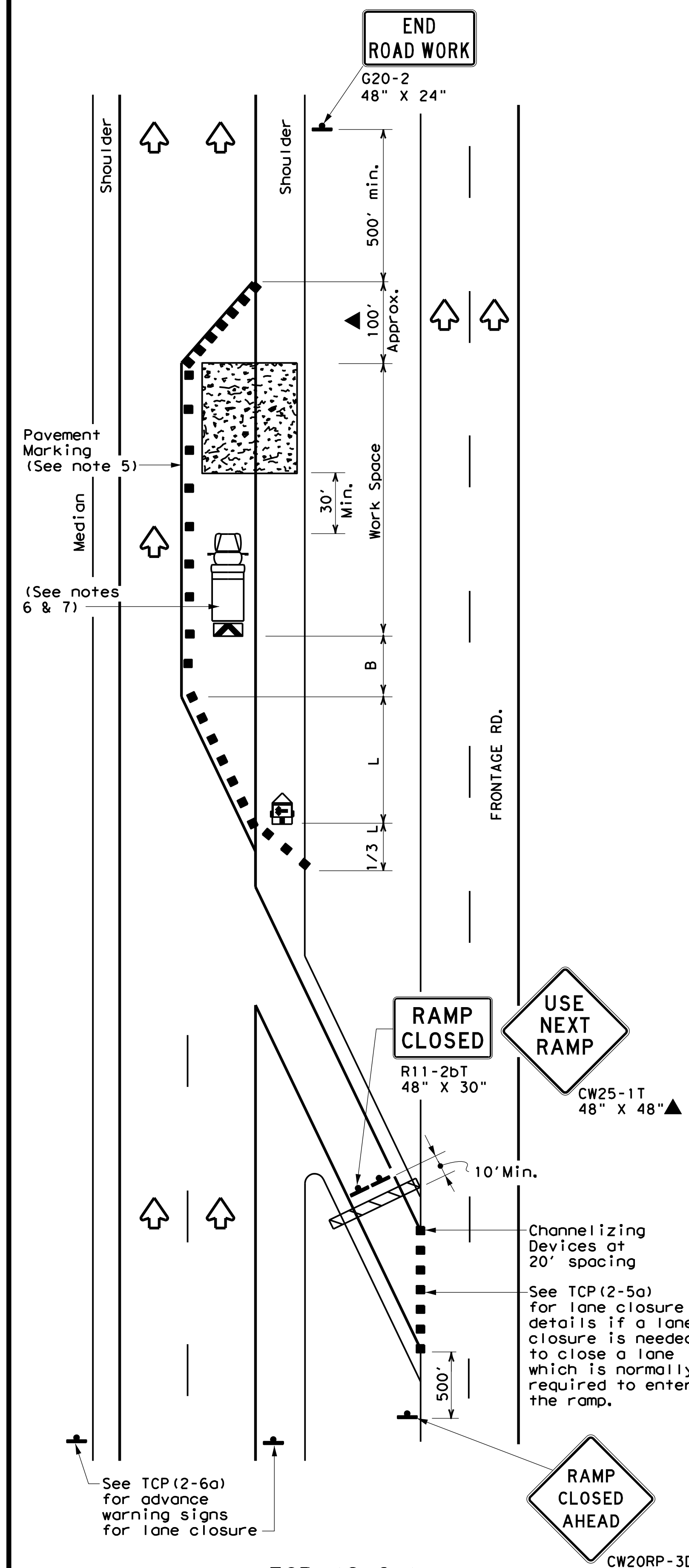
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

LEGEND

Symbol	Description	Symbol	Description
	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:
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REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	0003	05	055	IH 20, ETC
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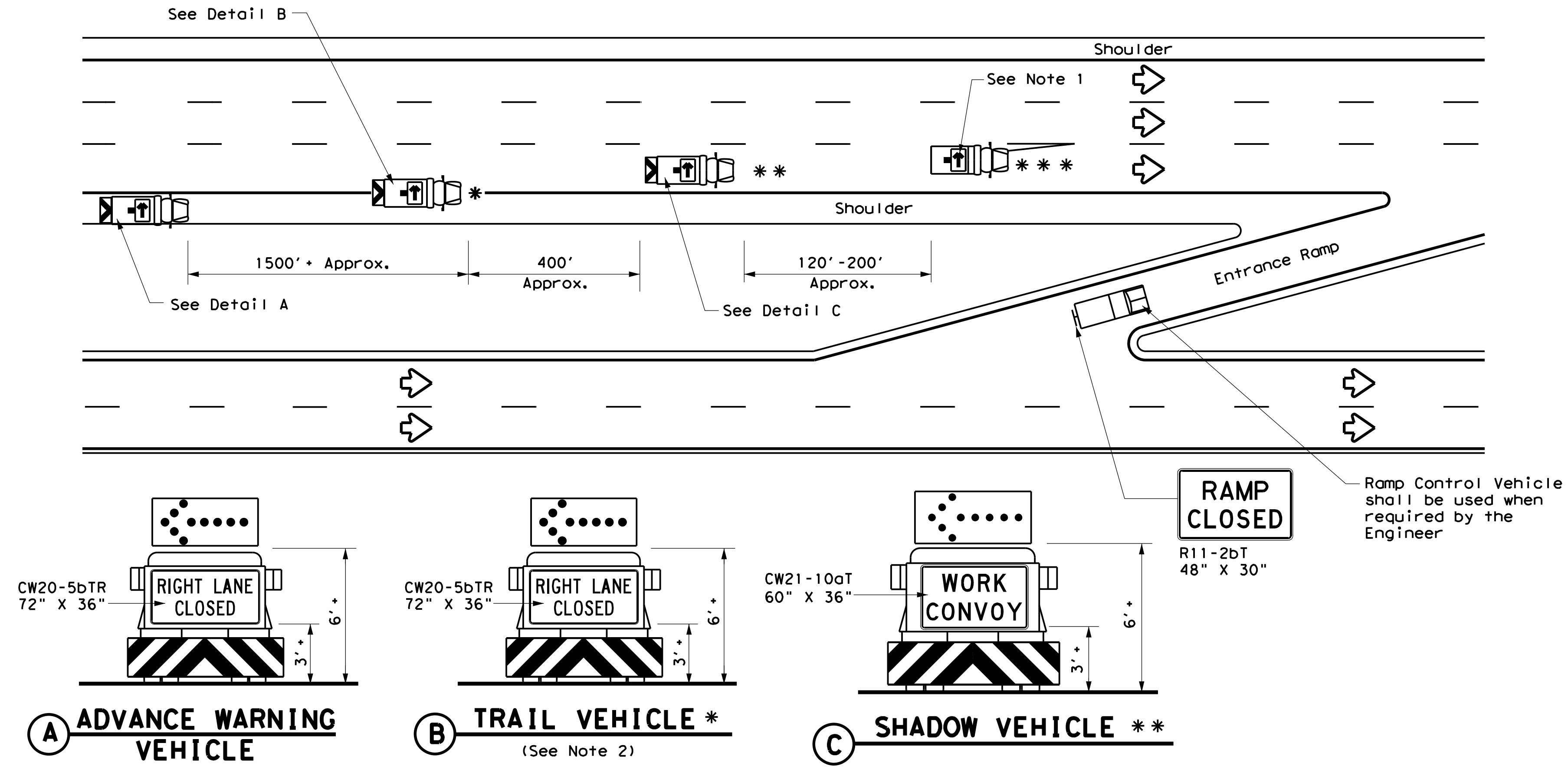
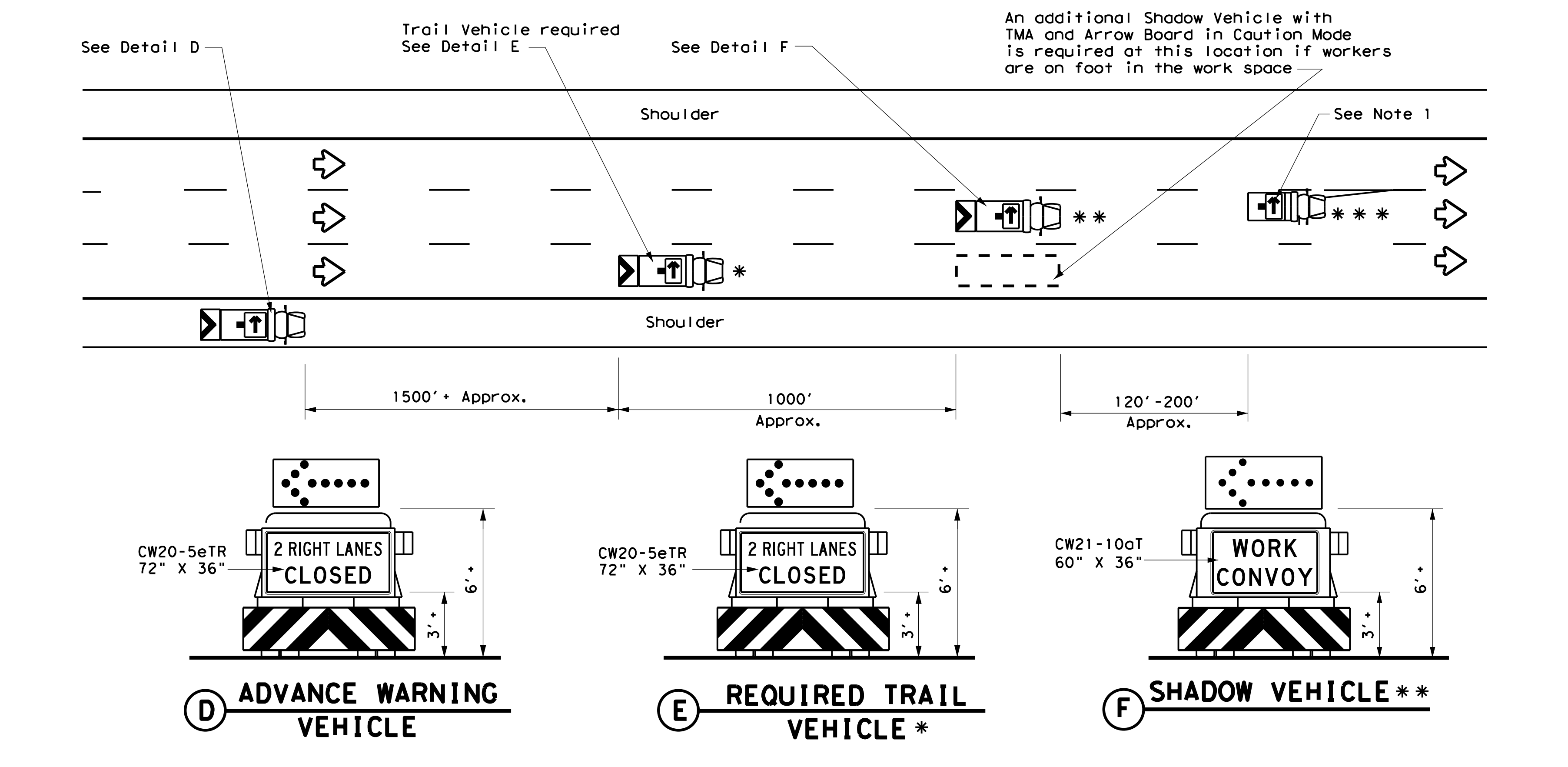


RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)



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

LEGEND

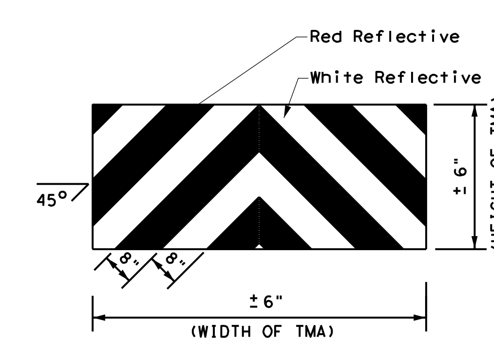
Symbol	Description	Symbol	ARROW BOARD DISPLAY
*	Trail Vehicle		
**	Shadow Vehicle		
***	Work Vehicle		RIGHT Directional
	Heavy Work Vehicle		LEFT Directional
	Truck Mounted Attenuator (TMA)		Double Arrow
	Traffic Flow		CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

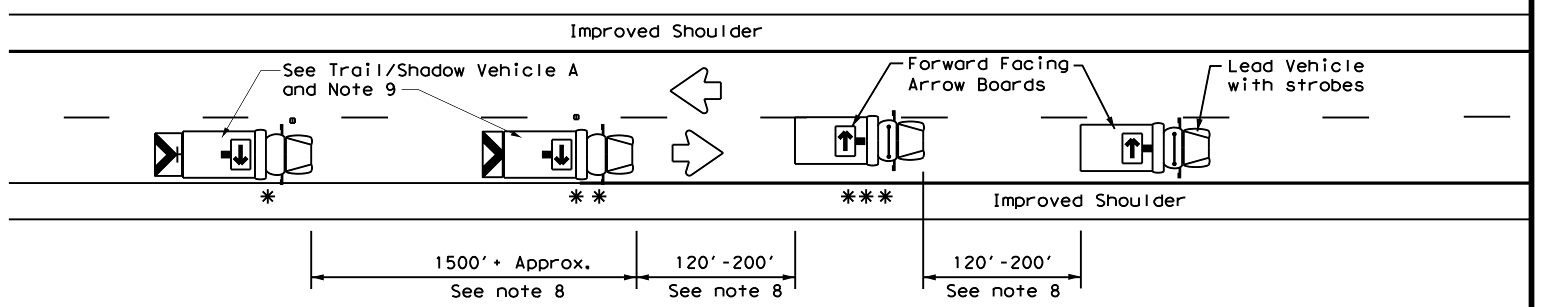
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

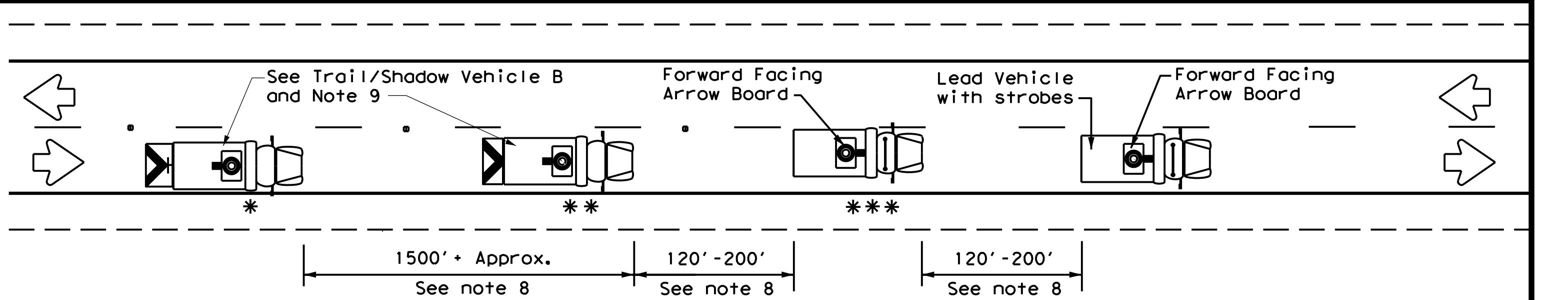
FILE: tcp3-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT December 1985	CONT 0003	SECT 05	JOB 055	HIGHWAY IH 20, ETC
REVISIONS 2-94 4-98 8-95 7-13 1-97	DIST ODA		COUNTY REEVES	SHEET NO. 32

176



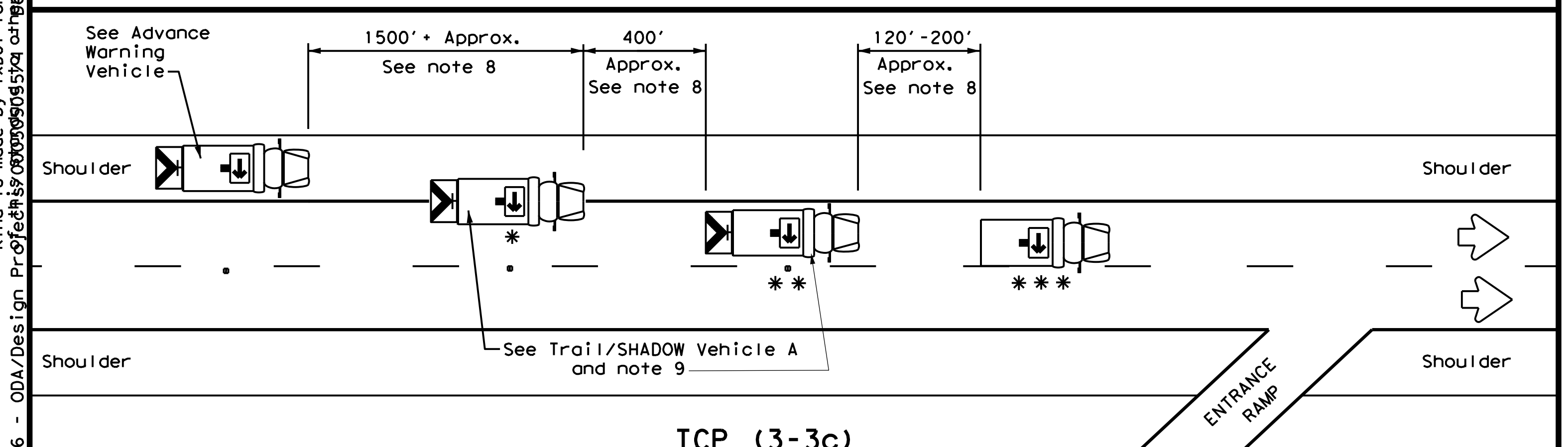
TCP (3-3a)

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



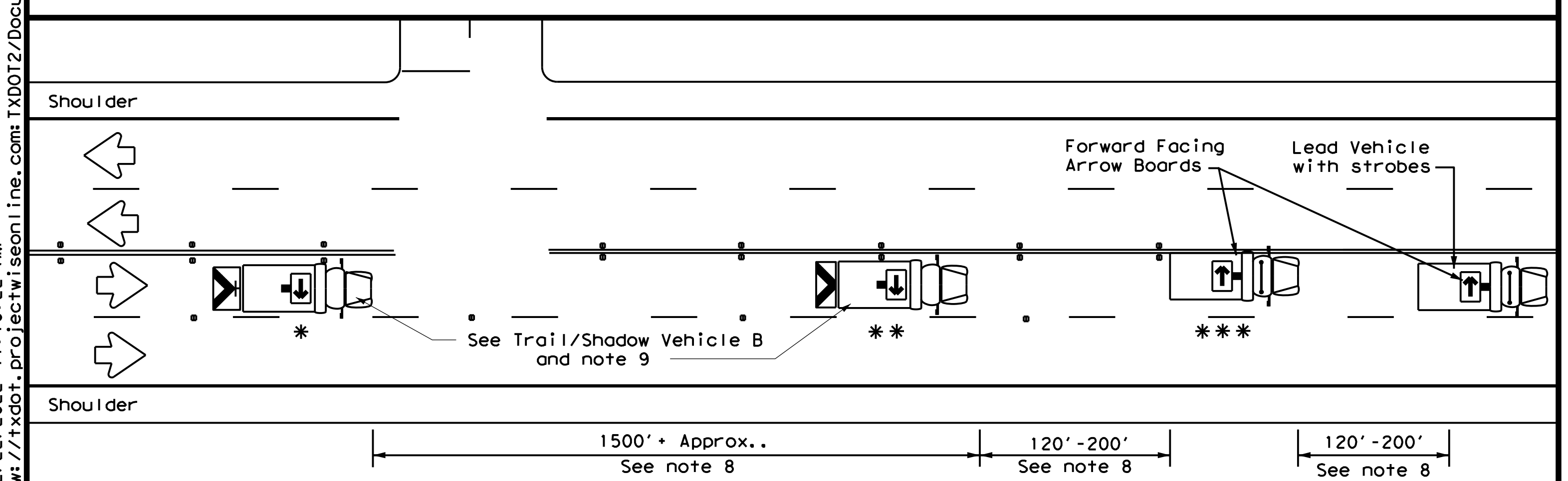
TCP (3-3b)

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



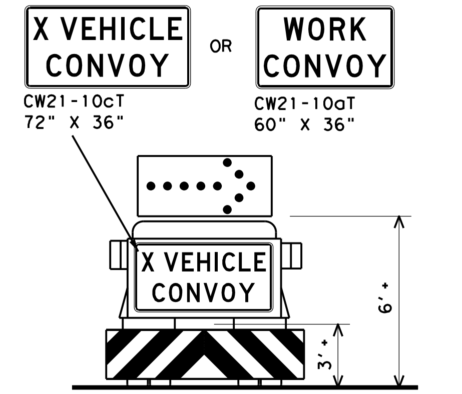
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



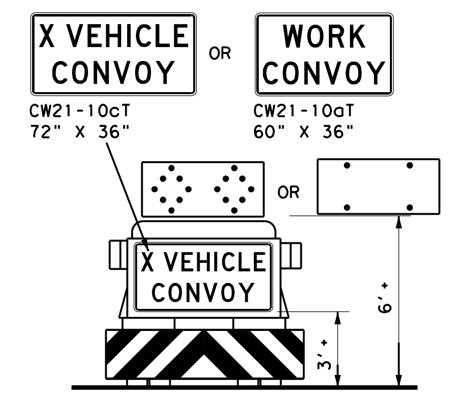
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



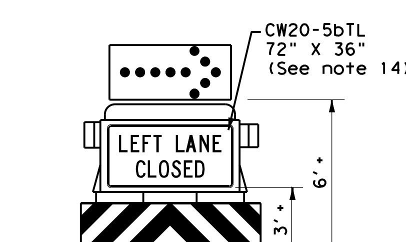
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

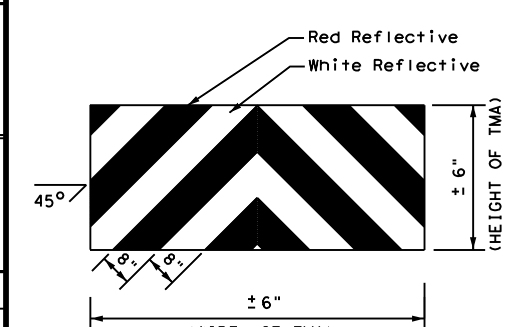


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

LEGEND

Symbol	Meaning	Symbol	ARROW BOARD DISPLAY
*	Trail Vehicle		
**	Shadow Vehicle		
***	Work Vehicle	[right arrow]	RIGHT Directional
[heavy vehicle]	Heavy Work Vehicle	[left arrow]	LEFT Directional
[TMA]	Truck Mounted Attenuator (TMA)	[double arrow]	Double Arrow
[arrow]	Traffic Flow	[caution]	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 2-94 4-98 8-95 7-13 1-97 7-14	0003	05	055	IH 20, ETC
	DIST		COUNTY	SHEET NO.
	ODA		REEVES	33

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DATE: 12/22/2022 11:10:28 AM
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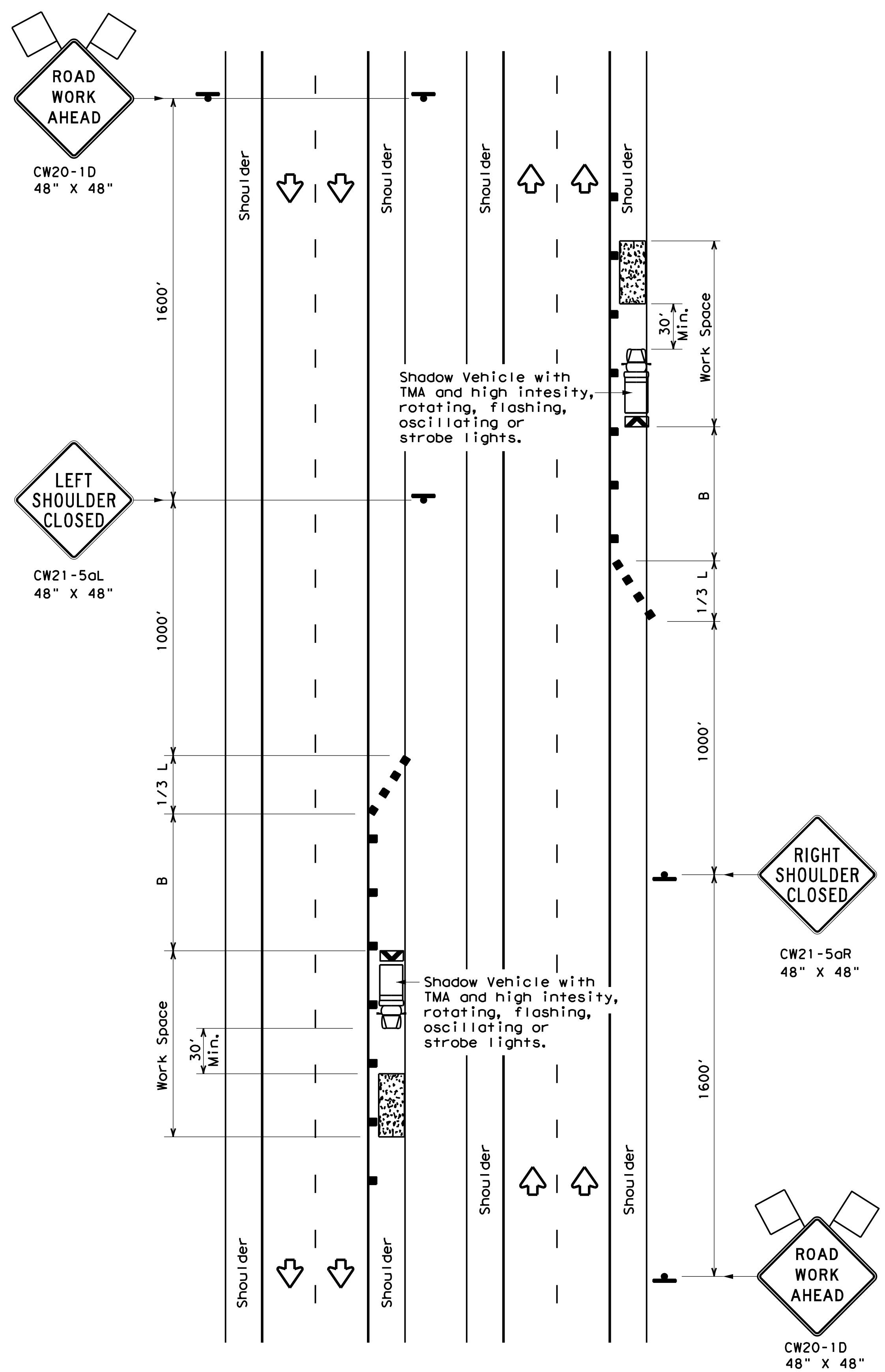
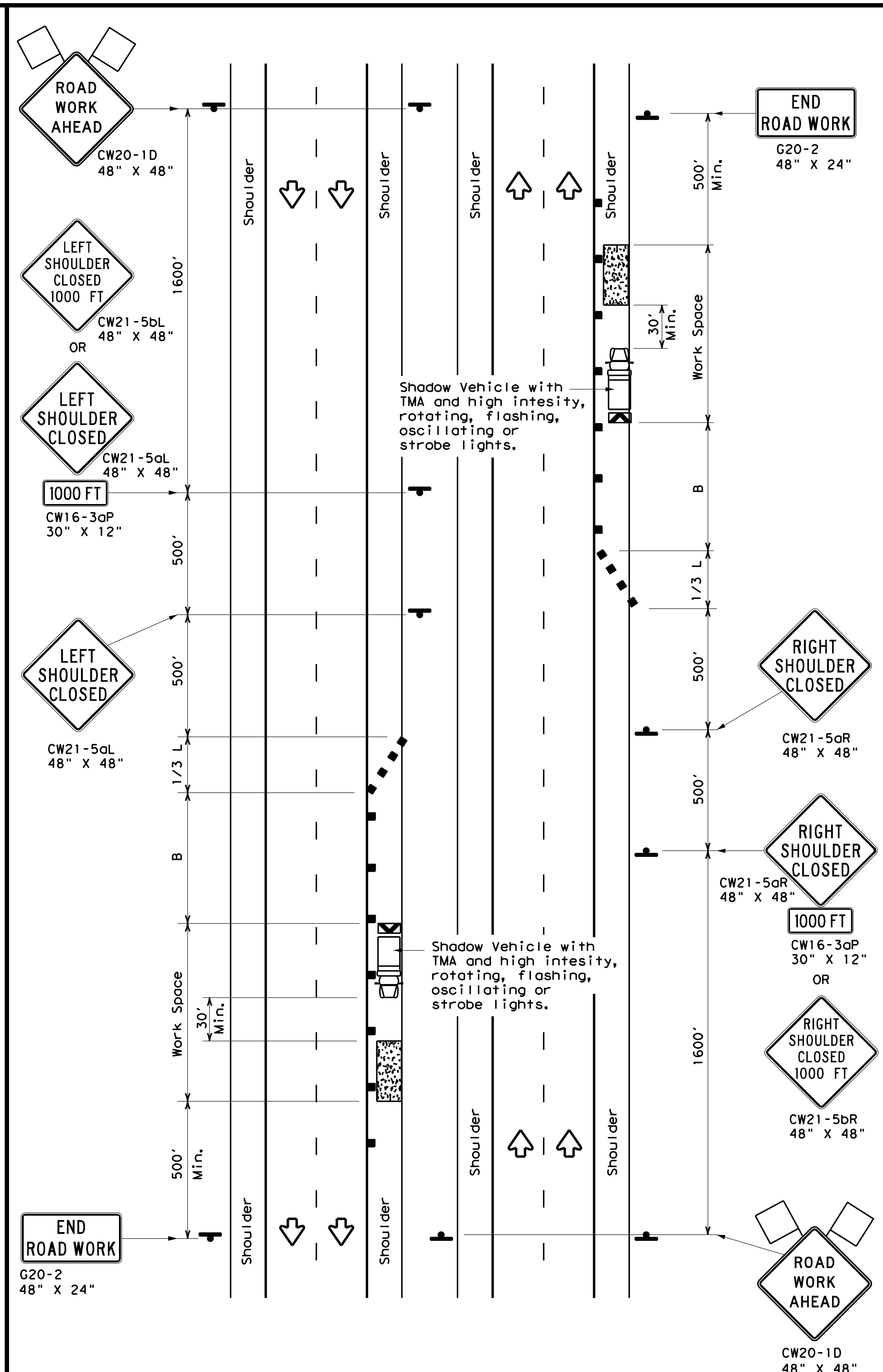


TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

LEGEND

	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		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	0003	05	055	IH 20, ETC
2-18	DIST		COUNTY	SHEET NO.
	ODA		REEVES	34

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DATE: 12/22/2022 11:10:34 AM
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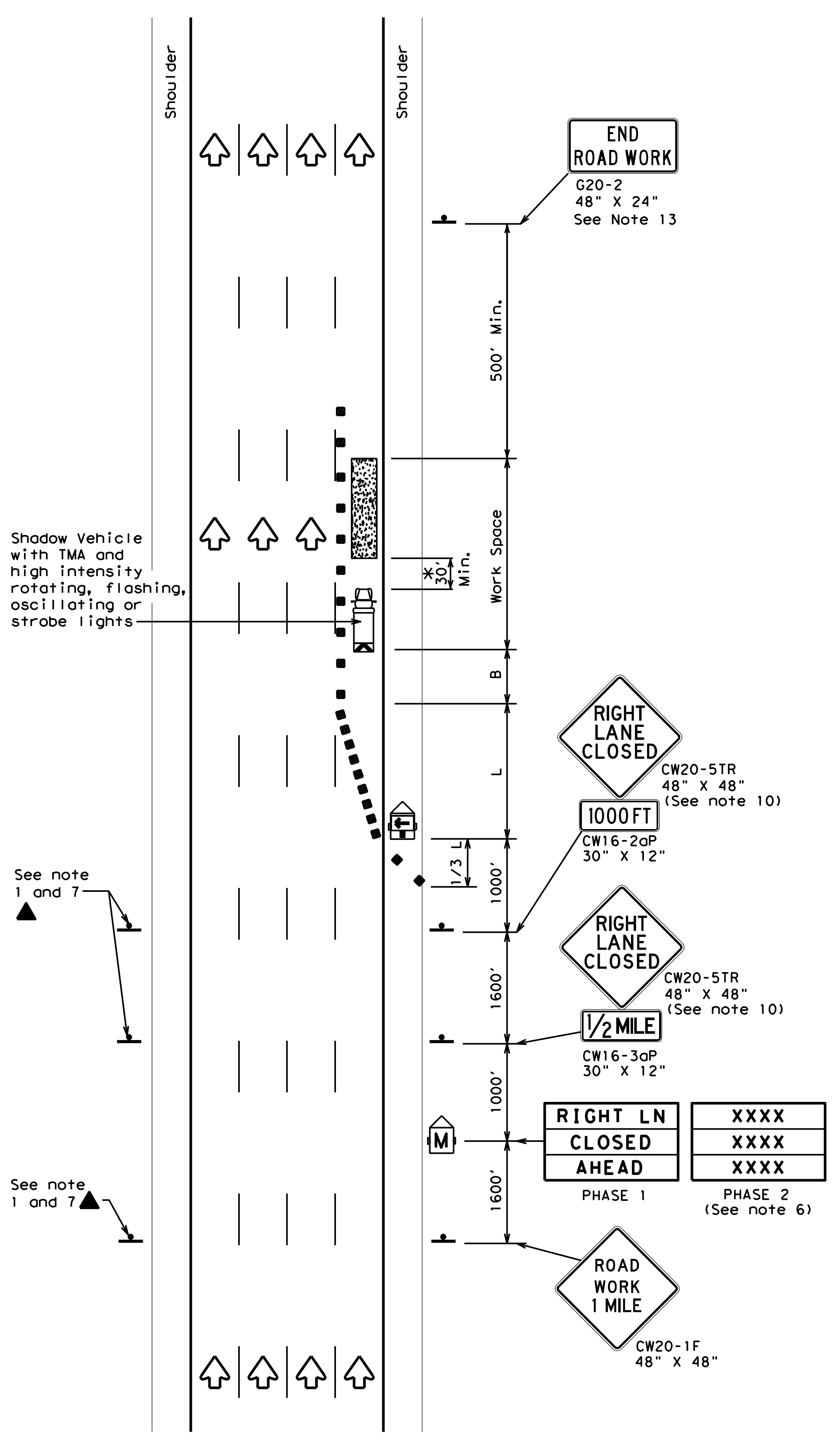
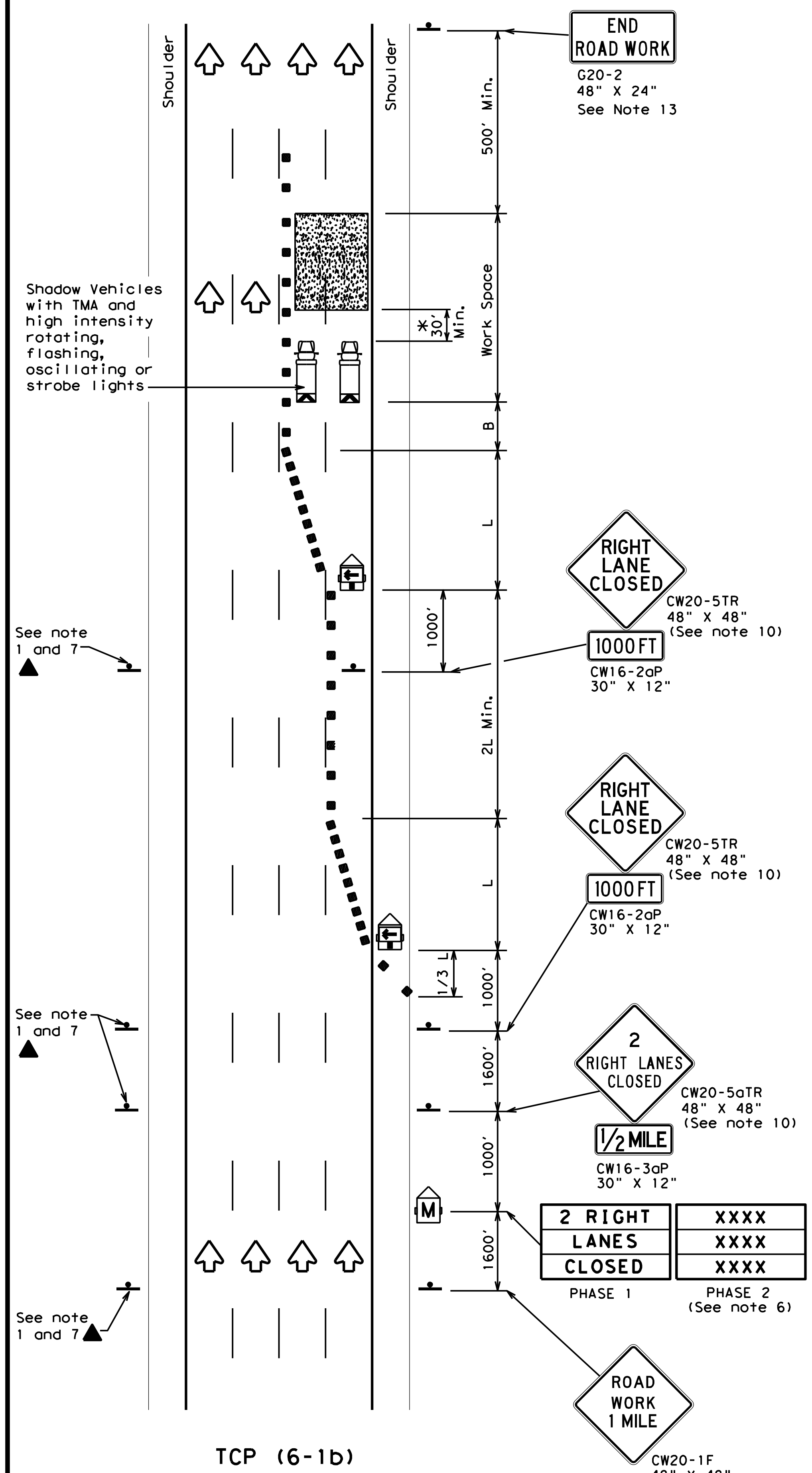


TCP (6-1a)

TYPICAL FREEWAY
ONE LANE CLOSURE



TCP (6-1b)

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
FREEWAY LANE CLOSURES

TCP(6-1)-12

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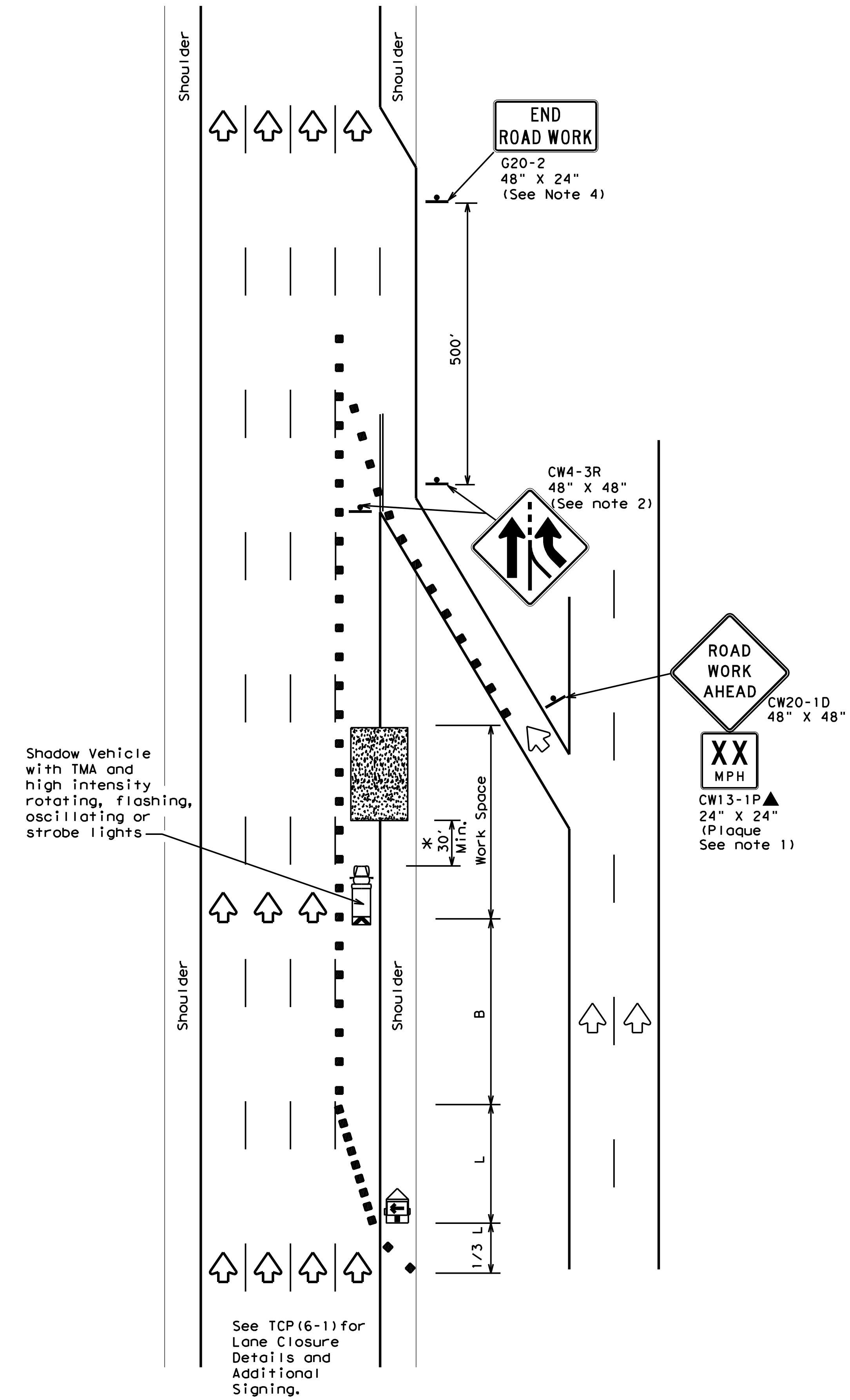
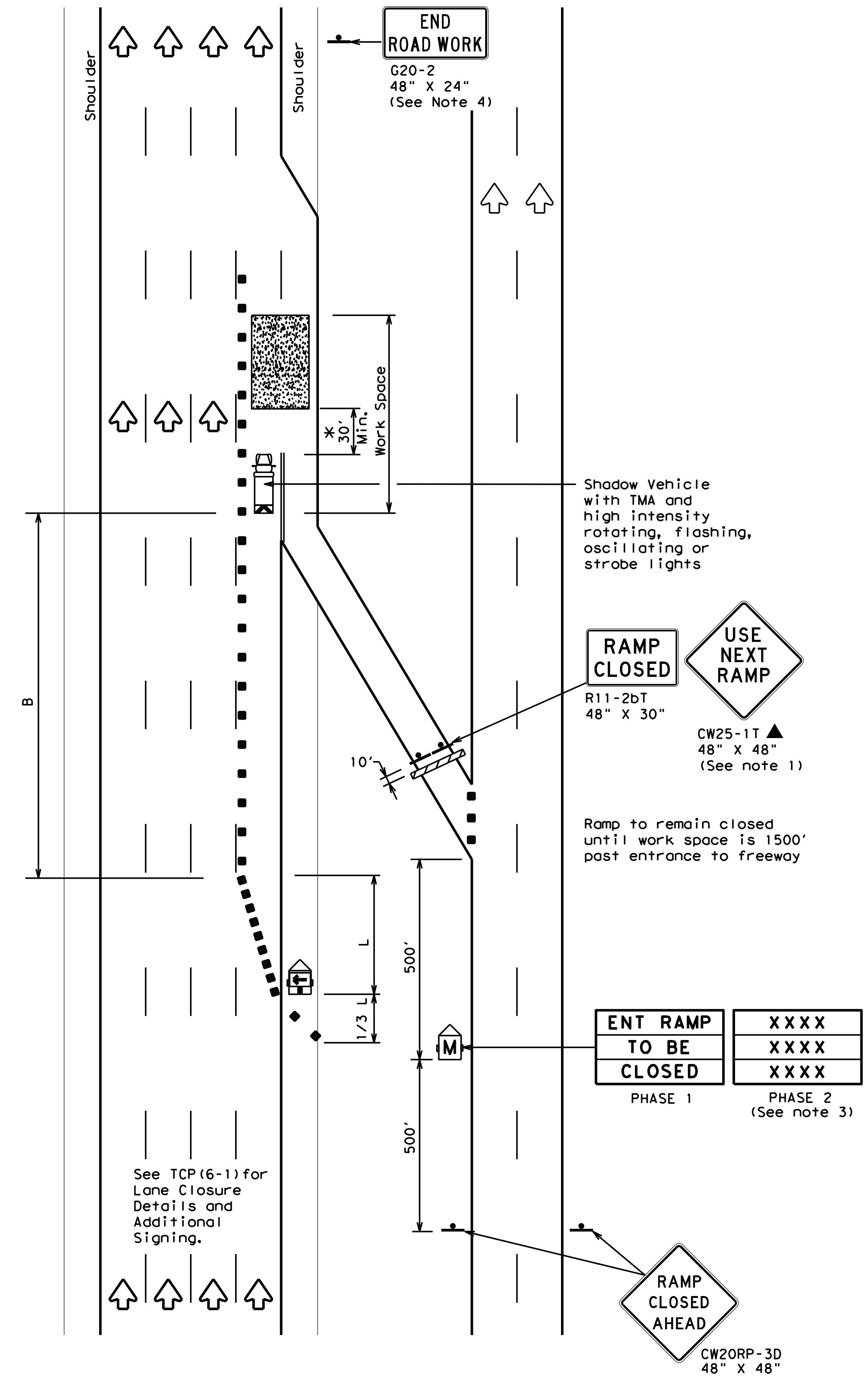
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-12	0003	05	055	IH 20, ETC
	DIST		COUNTY	SHEET NO.
	ODA		REEVES	35

201



TCP (6-2a)

ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)

ENTRANCE RAMP CLOSED

LEGEND

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

Posted Speed	Formula	Minimum Desirable Taper Lengths "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.

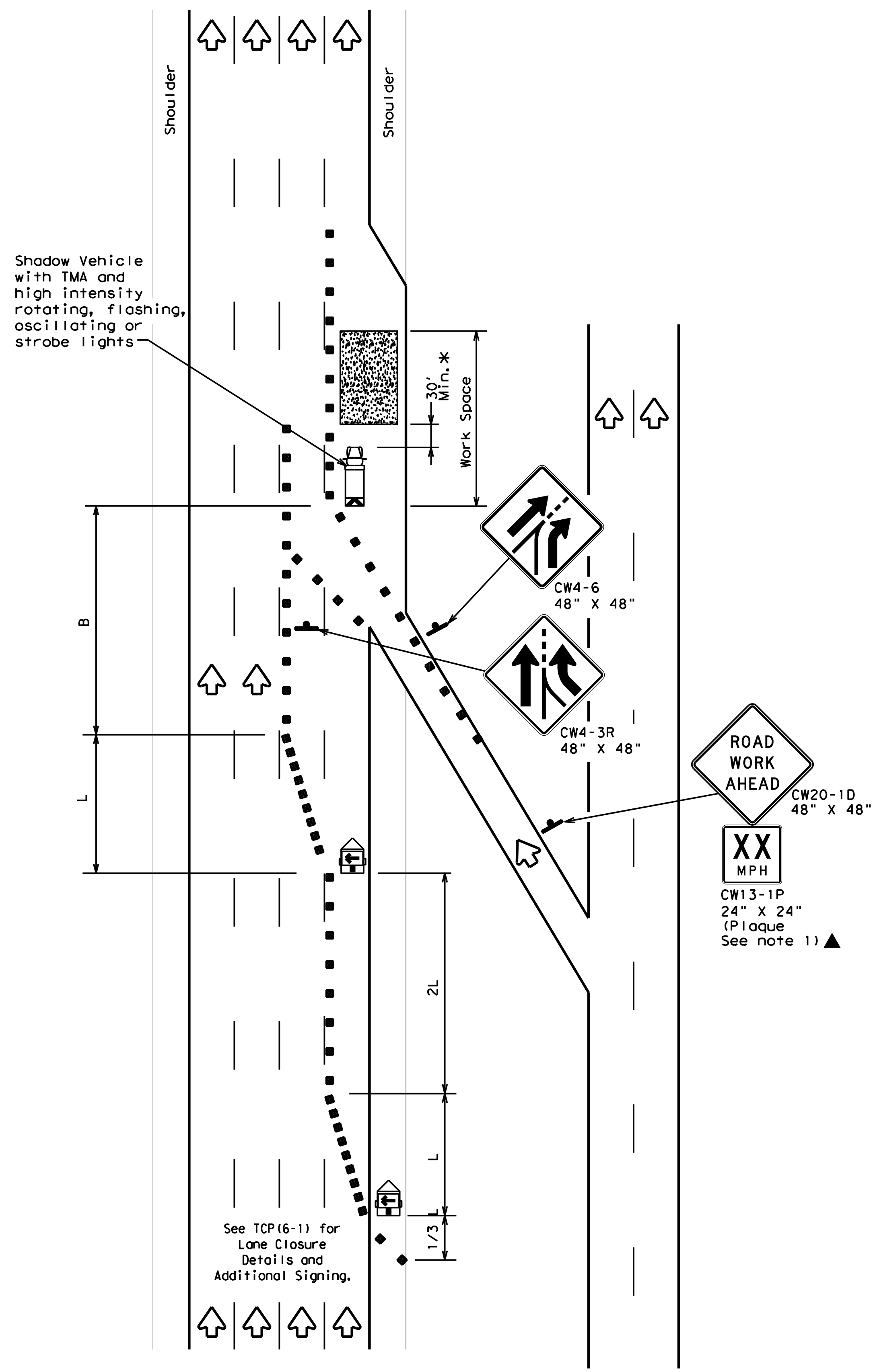
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP(6-2)-12

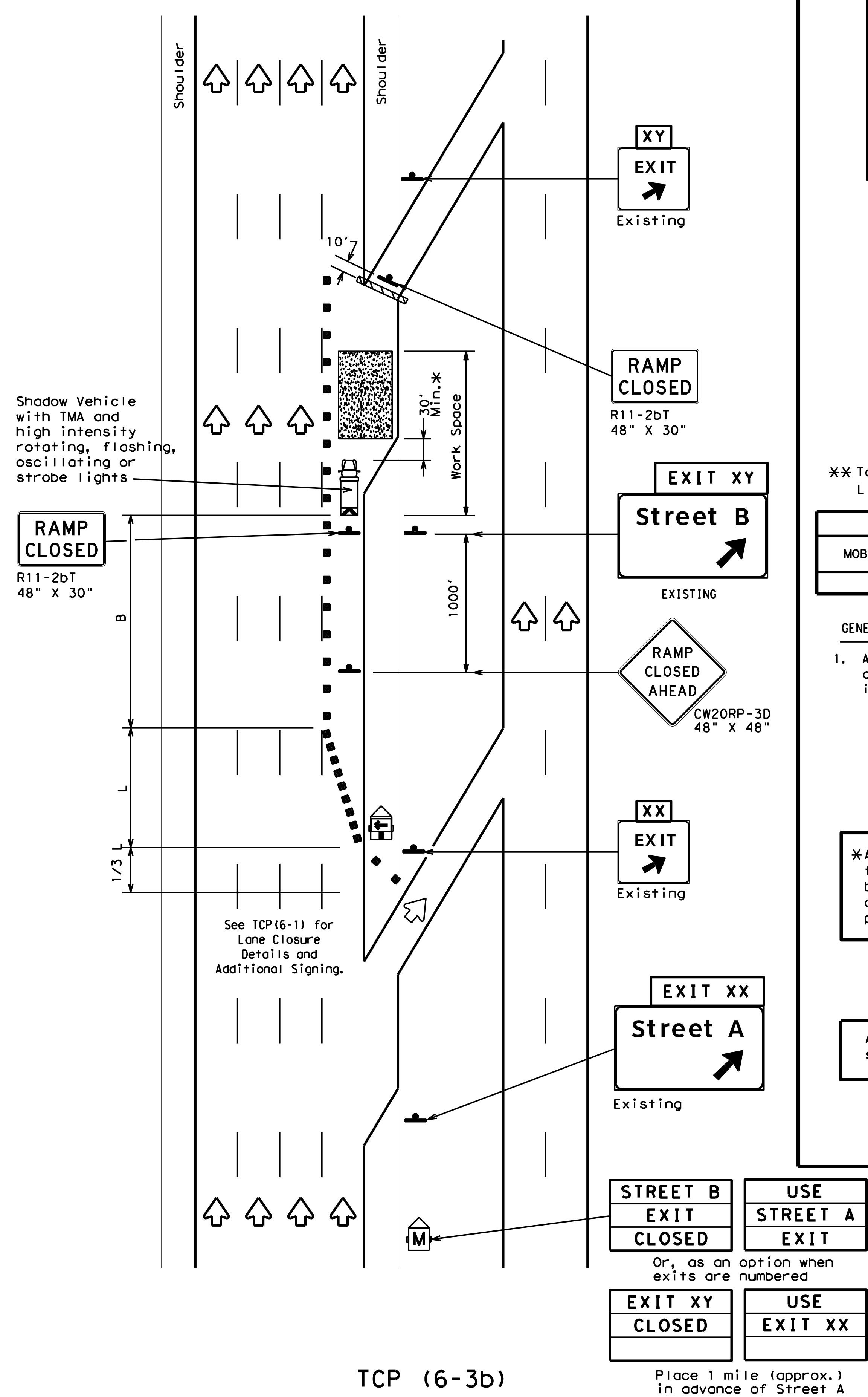
FILE: tcp6-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1994	CONT 0003	SECT 05	JOB 055	HIGHWAY IH 20, ETC
REVISIONS 1-97 8-98 4-98 8-12	DIST ODA		COUNTY REEVES	SHEET NO. 36

202



TCP (6-3a)

ENTRANCE RAMP OPEN



TCP (6-3b)

EXIT RAMP CLOSED

TRAFFIC EXITS PRIOR TO CLOSED RAMP

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

Posted Speed	Formula	Minimum Desirable Taper Lengths "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.

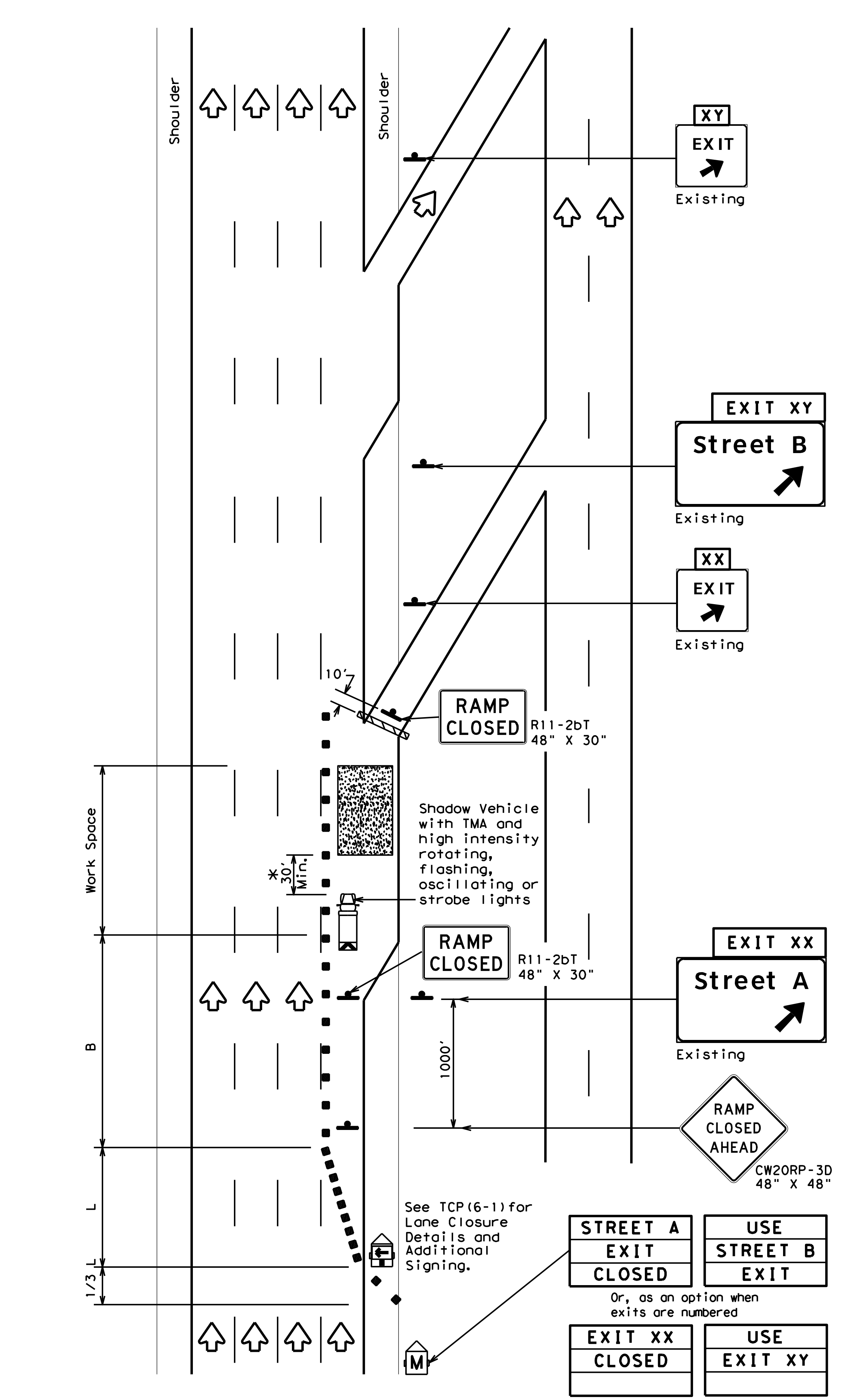
Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

TCP(6-3)-12

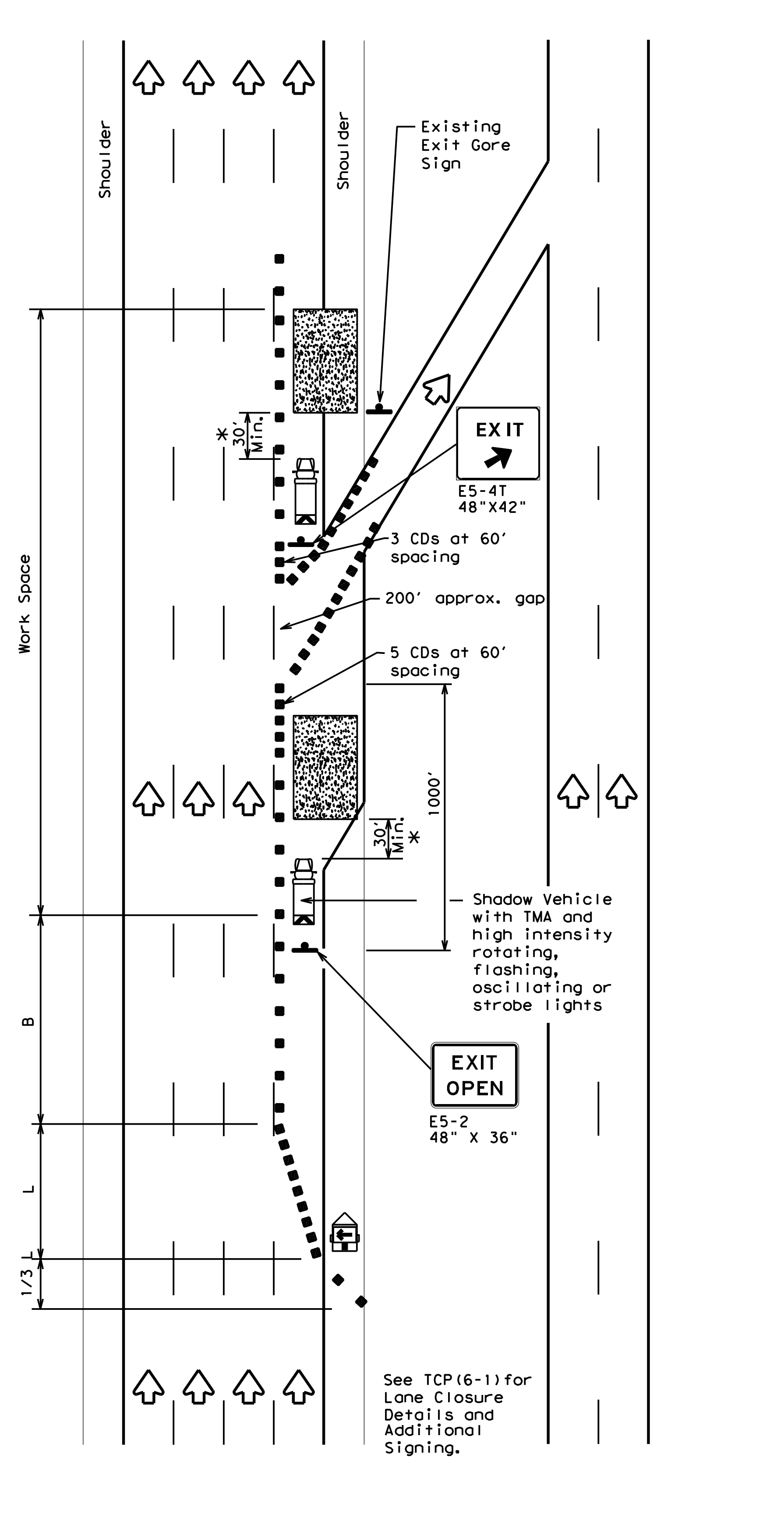
FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH 20, ETC
1-97 8-98 4-98 8-12	DIST		COUNTY	SHEET NO.
	ODA		REEVES	37



TCP (6-4a)

EXIT RAMP CLOSED

TRAFFIC EXITS PAST CLOSED RAMP



TCP (6-4b)

EXIT RAMP OPEN

LEGEND			
	Type 3 Barricade		Channelizing Devices (CDs)
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		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. See BC Standards for sign details.

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

TCP(6-4)-12

FILE: tcp6-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT Feburary 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH 20, ETC
1-97 8-98	DIST		COUNTY	SHEET NO.
4-98 8-12	ODA		REEVES	38

204

DATE: 12/22/2022 11:11:00 AM
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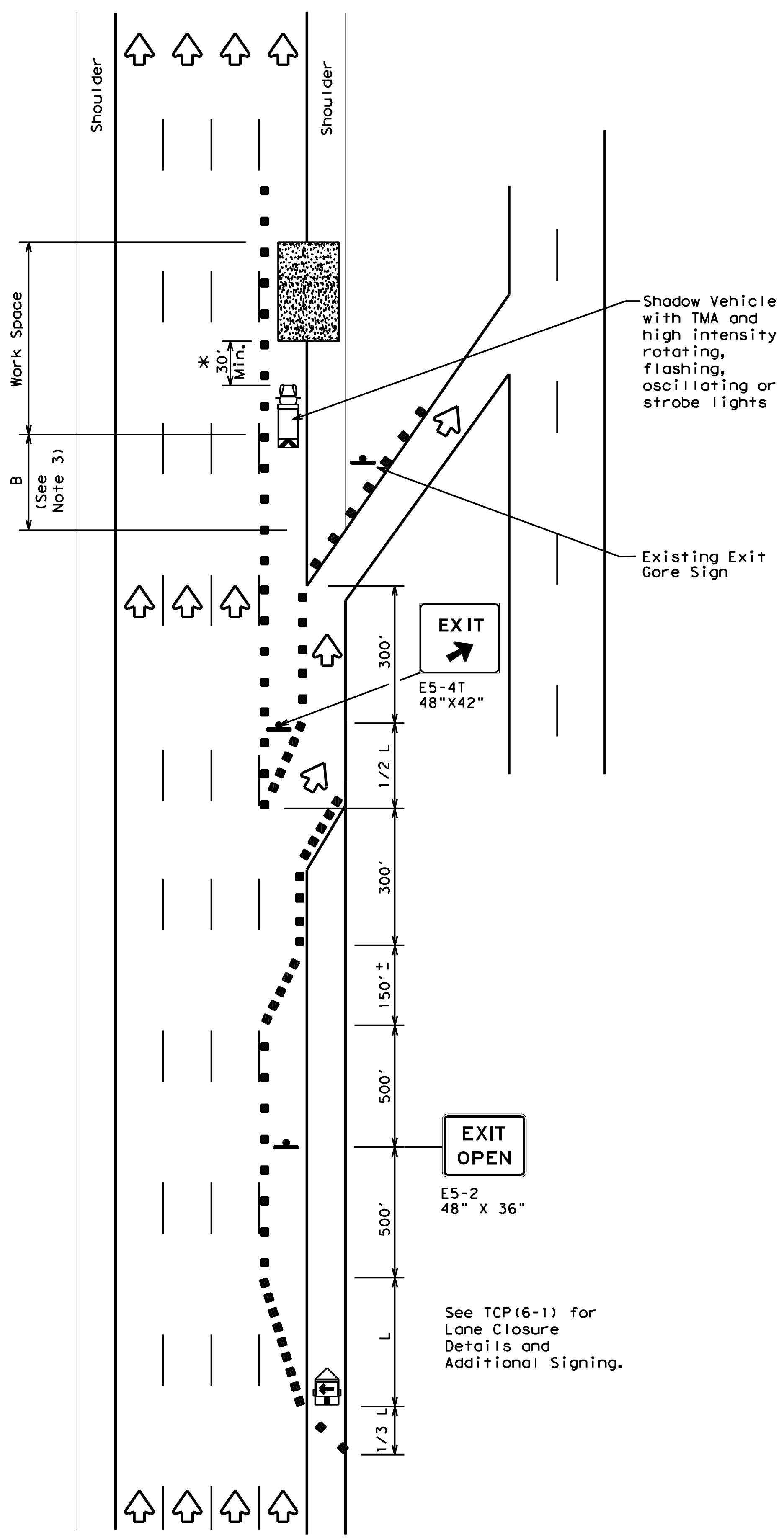
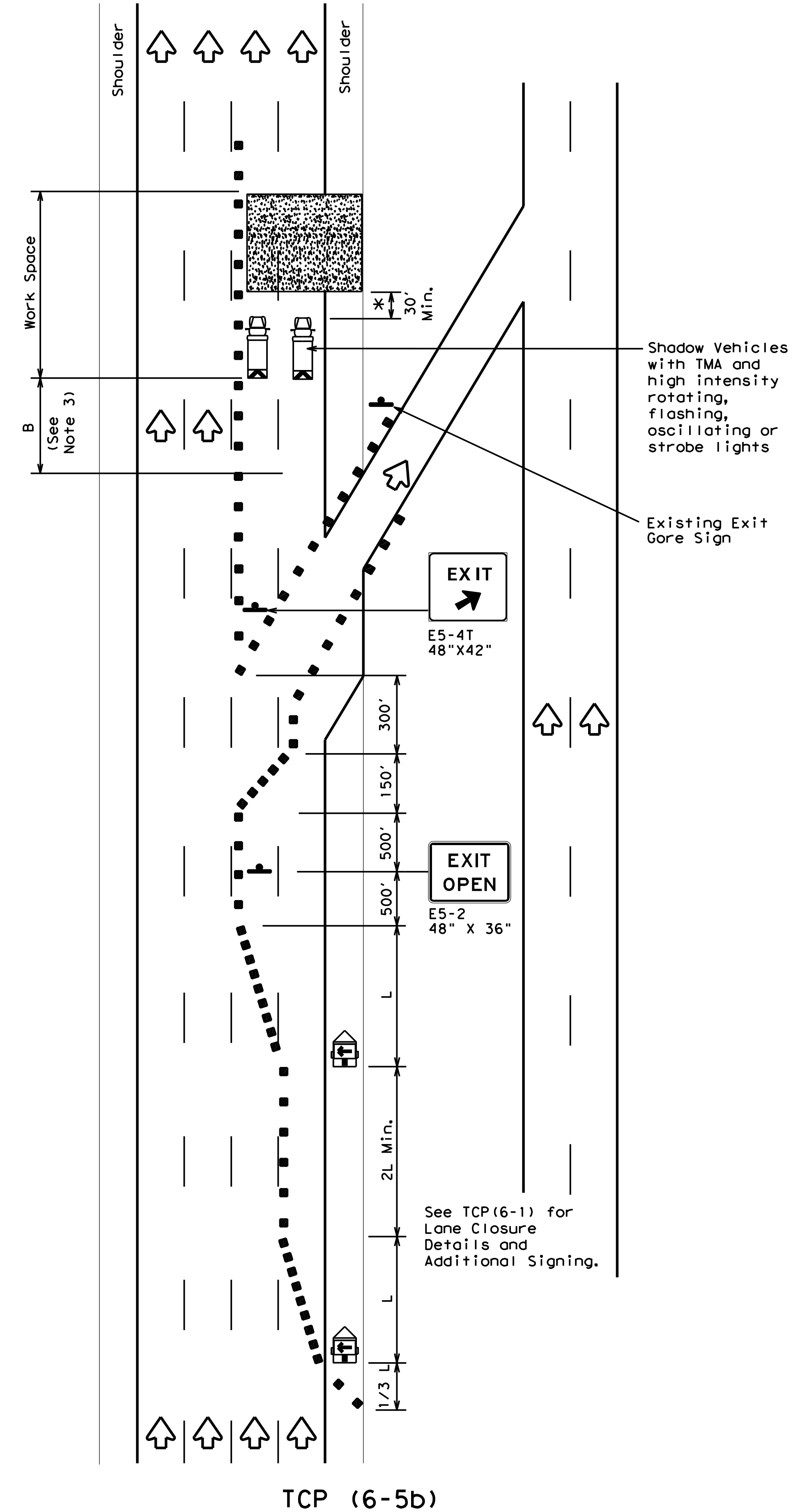


TCP (6-5a)

EXIT RAMP OPEN



TCP (6-5b)

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

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		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.

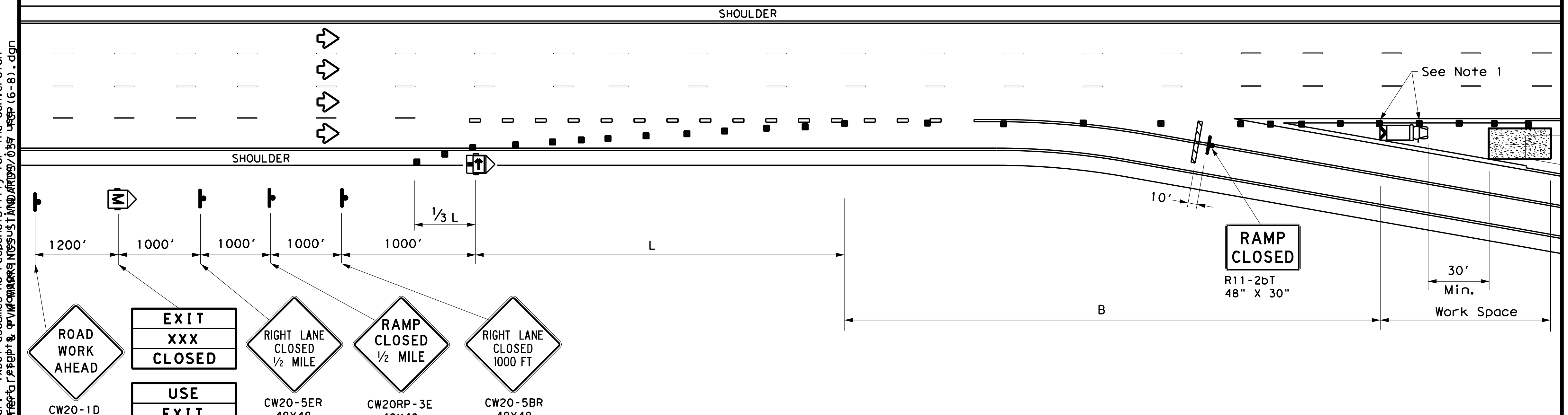
Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

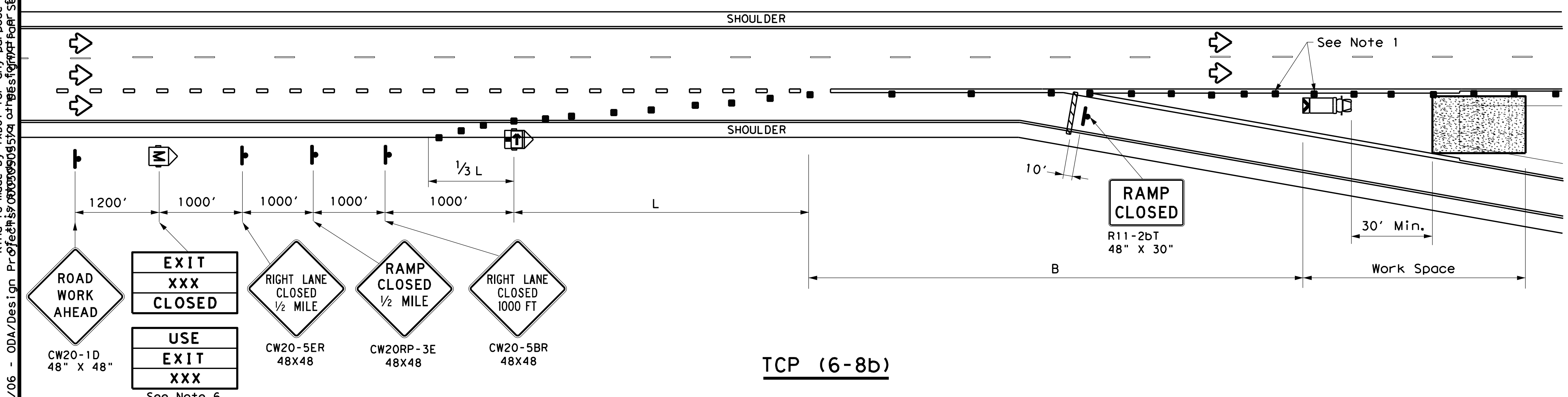
TRAFFIC CONTROL PLAN
WORK AREA BEYOND EXIT RAMP

TCP(6-5)-12

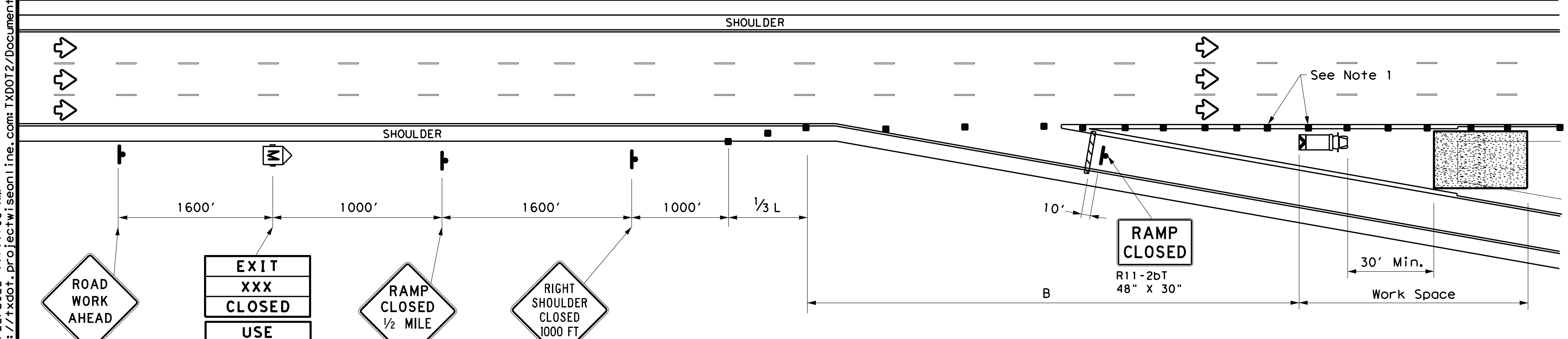
FILE: tcp6-5.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT 0003	SECT 05	JOB 055	HIGHWAY IH 20, ETC
REVISIONS 1-97 8-98 4-98 8-12	DIST ODA		COUNTY REEVES	SHEET NO. 39



TCP (6-8a)



TCP (6-8b)



TCP (6-8c)

LEGEND

	Type 3 Barricade		Channelizing Devices (CDs)
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		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 0003	SECT 05	JOB 055	HIGHWAY IH 20, ETC
REVISIONS	DIST ODA		COUNTY REEVES	SHEET NO. 40

208

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UNEVEN LANES
TWO LANE CONVENTIONAL ROAD

UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD

NO CENTER LINE
TWO LANE CONVENTIONAL ROAD

UNEVEN LANES
DIVIDED ROADWAY

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

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

GENERAL NOTES

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

TABLE 1

Edge Condition	Edge Height (D)	* Warning Devices
① D	Less than or equal to: $1\frac{1}{4}$" (maximum-planing) $1\frac{1}{2}$" (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	0003	05	055	IH 20, ETC
8-95 2-98 7-13 1-97 3-03	DIST	COUNTY		SHEET NO.
	ODA	REEVES		41

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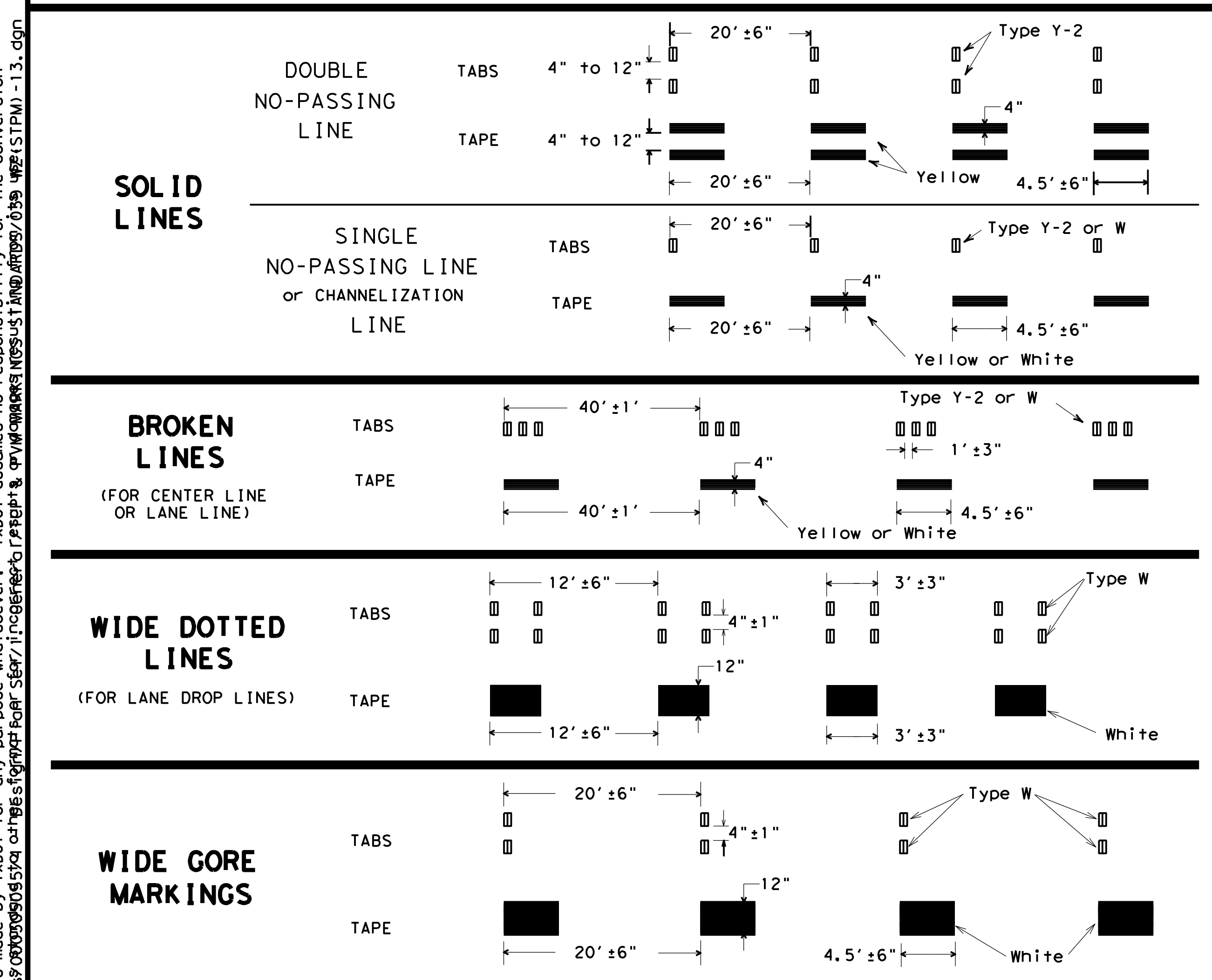
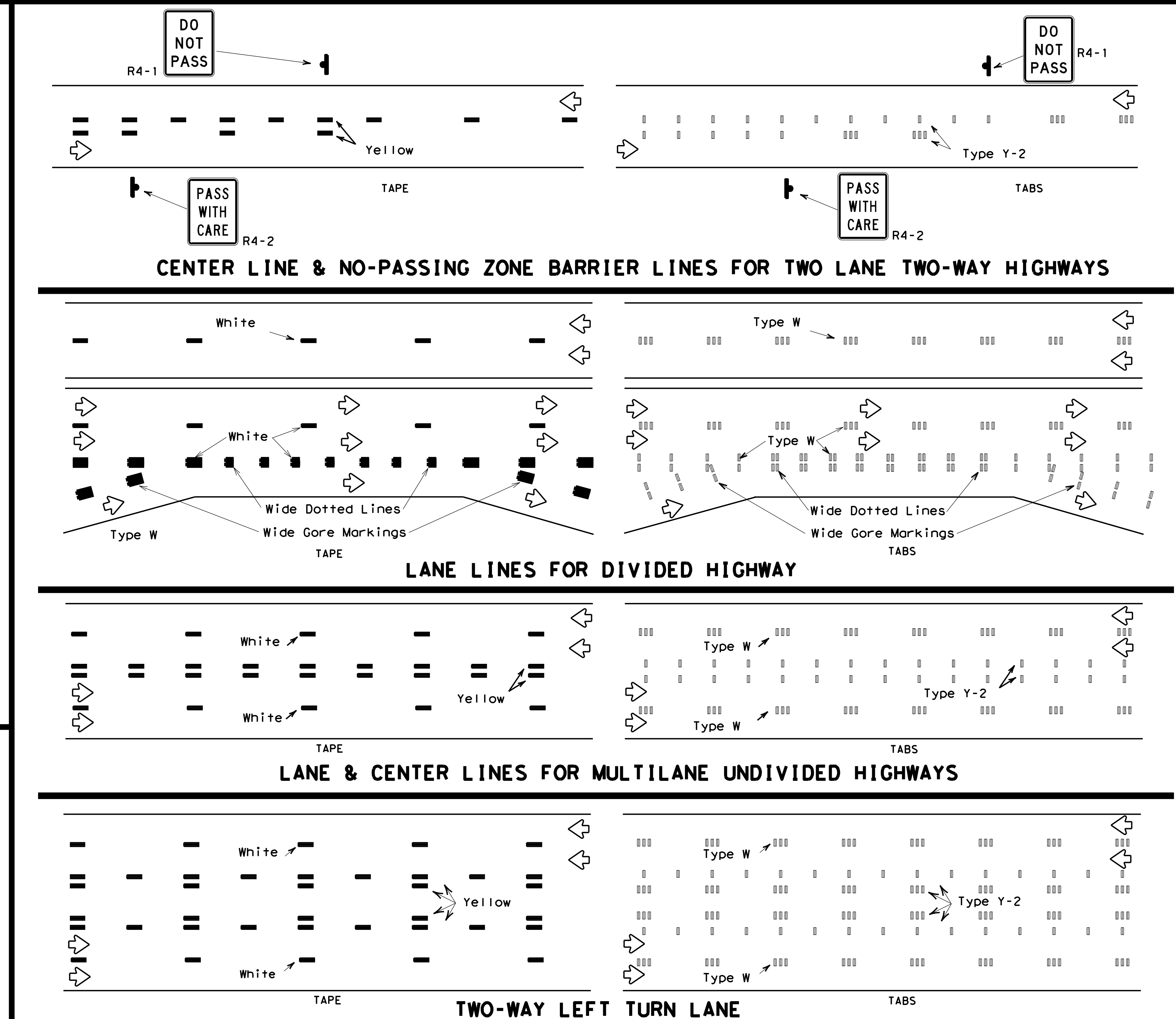
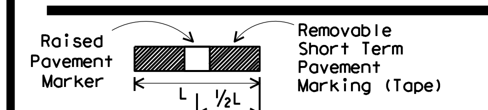
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS





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.

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.

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

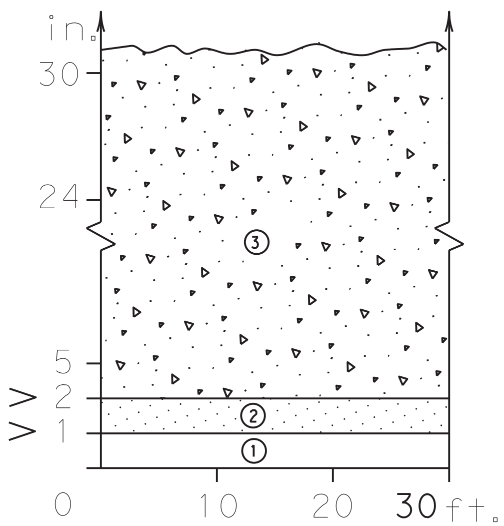
WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

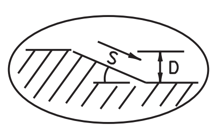
FILE: wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 3-03 7-13	0003	05	055	IH 20, ETC
	DIST		COUNTY	SHEET NO.
	ODA		REEVES	42

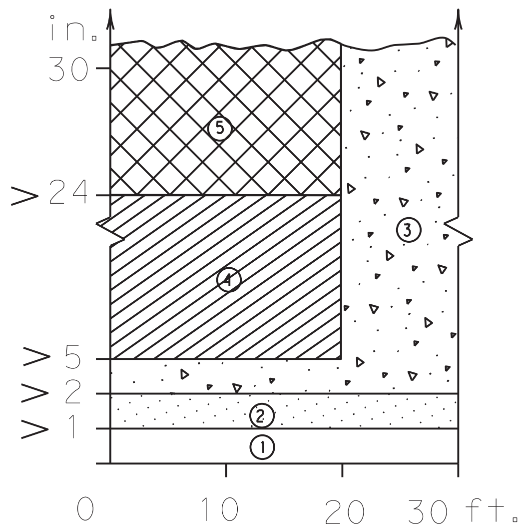
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

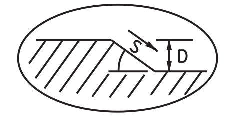


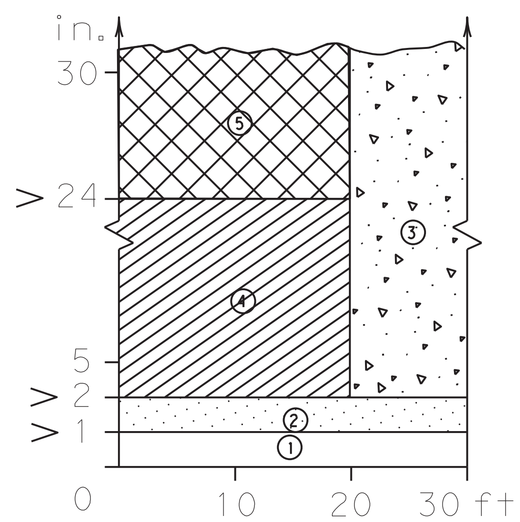
Edge Condition I
S = (3:1) (or flatter)





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





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

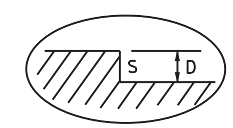
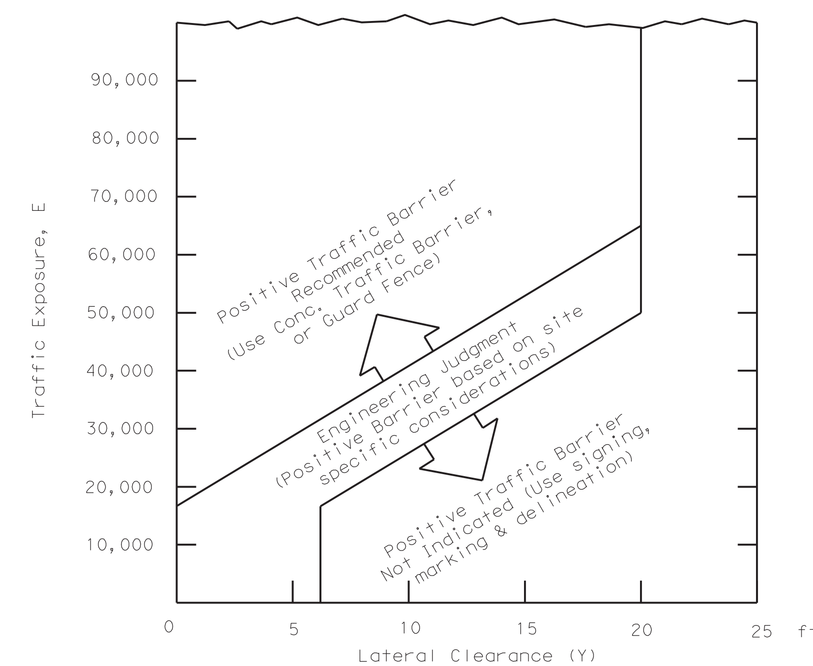


FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 (▩)

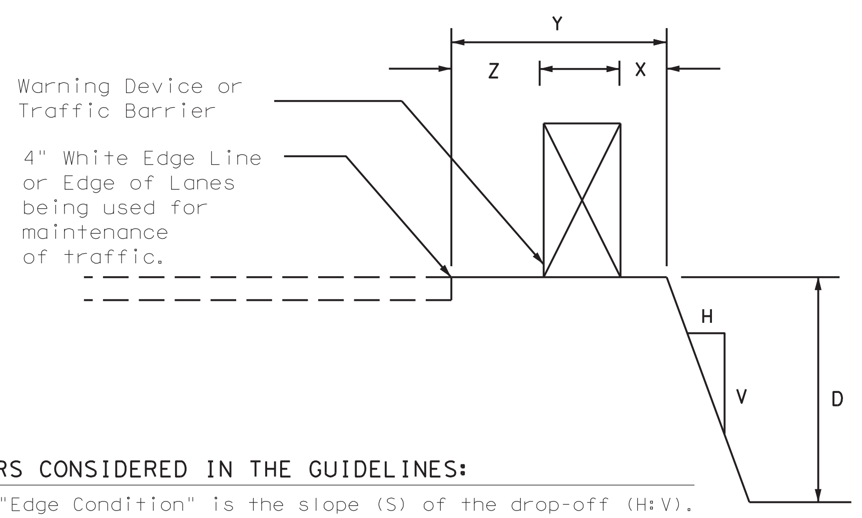


1. E = ADT x T
   Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.

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.

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.



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.

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:

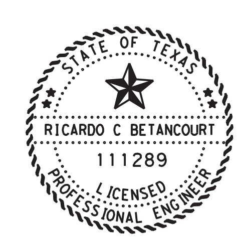
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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



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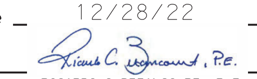

RICARDO C BETANCOURT, P.E.

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

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REVISIONS 03-01 08-01 9-21	0003	05	055		IH 20, ETC
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Safety Appurtenances

This project meets the basic safety requirements of the 4R design criteria. Guard fence (including connections to structures, post spacing and end treatments), signing, and pavement markings will be upgraded to meet current standards. Cross drainage box,pipe culverts, and sign supports within the required obstruction clearance of 30 feet have been treated or upgraded to standard.

Existing and Proposed Horizontal Alignment and Superelevation

RM Coverage	
RM	RM
1-0.090 (STA 111+00)	9+0.109 (STA 534+91)

BASED ON 0003-05-046

Curve Data										
Design Speed	HIGHWAY	PC	PI	PT	Delta	Degree	Tangent	Length	Radius	Super Rate %
70	IH 20	82+33.53	87+72.73	93+08.78	10° 45' 09''	1° 00''	539.21	1075.25	5729.58	4.2
70	IH 20	134+94.13	140+15.01	145+32.89	10° 39' 58.00''	1°01'36.50''	520.8881	1038.7659	5580	5.6

IH 20 ALIGNMENT AND 70 MPH DESIGN SPEED

Curve Data								
Design Speed	HIGHWAY	VPI	ELEVATION	LENGTH	G1%	G2 %	K	CREST OR SAG
70	IH 20	79+50	3887.87	300	-1.222%	-1.852%	476	CREST
70	IH 20	90+00	3868.42	300	-1.852%	-1.250%	498	SAG
70	IH 20	114+000	3838.42	400	-1.250%	-0.750%	800	SAG
70	IH 20	140+70	3814.39	200	-0.900%	-0.750%	1333	SAG
70	IH 20	154+00	3804.42	400	-0.750%	-0.250%	800	SAG
70	IH 20	162+00	3802.42	400	-0.250%	-0.750%	800	CREST
70	IH 20	170+00	3796.42	200	-0.750%	-1.000%	800	CREST
70	IH 20	186+00	3780.42	800	-1.000%	-2.000%	800	CREST
70	IH 20	217+00	3718.42	400	-2.000%	-1.600%	1000	SAG
70	IH 20	242+00	3678.42	200	-1.600%	-1.300%	667	SAG
70	IH 20	262+00	3652.42	200	-1.300%	-1.500%	1000	CREST

NOTE: Vertical Curve information is provided to verify 4R project requirements and is not intended for use in construction.
Project element information was taken from the as-built plans for CSJ 0003-05-046

STATE OF TEXAS
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111289
LICENSED
PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

ALIGNMENT DATA

SHEET 1 OF 2

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			44
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

Safety Appurtenances

This project meets the basic safety requirements of the 4R design criteria. Guard fence (including connections to structures, post spacing and end treatments), signing, and pavement markings will be upgraded to meet current standards. Cross drainage box,pipe culverts, and sign supports within the required obstruction clearance of 30 feet have been treated or upgraded to standard.

Existing and Proposed Horizontal Alignment and Superelevation

BASED ON 0441-09-004

RM Coverage	
RM	RM
186+0.033	192+0.808

Curve Data

Design Speed	Highway	PI	Delta	Degree	Tangent	Length
70	IH 10	3+19.8	27° 50'	1° 00'	19197'	27833'
70	IH 10	29+22.2	25° 29'	0° 59' 52"	1294'	2595.3'
70	IH 10	30+93	18° 97'	1° 00'	9477'	1876.3'
70	IH 10	59+7.57	47°	1° 45'	1923.7	2665.7
70	IH 10	97+0.85	57° 27'	1° 00'	3190.3	5793
70	IH 10	110+98.7	22° 38'	1° 00'	1146.62	2263.33
70	IH 10	112+68.85	22° 38'	1° 00'	1146.62	2264.33
70	IH 10	165+15.2	18° 08'	1° 00'	914.40'	1813.33'
70	IH 10	164+60.05	14° 40'	1° 00'	737.40'	1466.67'
70	IH 10	207+89.0	11° 42'	1° 00'	587.06'	1170.0'
70	IH 10	219+63.0	16° 01'	1° 00'	806.1'	1001.57'
70	IH 10	253+98.8	17° 00'	1° 00'	8503	1700.00'
70	IH 10	295+12.0	5° 02'	0° 30'	503.60'	1006.66'
70	IH 10	288+58.15	14° 15'	1° 00'	716.24'	1425.00'
70	IH 10	360+65.17	46° 16'	1° 00'	2447.84'	4626.67'

IH 10 ALIGNMENT AND 70 MPH DESIGN SPEED

BASED ON 0441-09-005

RM Coverage	
RM	RM
186+0.033	192+0.808

Curve Data

Design Speed	Highway	PI Station	ELEVATION	Length	G1(%)	G2(%)	K
70	IH 10	96+00	4000.19	300	2.24%	2.42%	1657.46
70	IH 10	110+00	4035.00	1450	2.51%	-1.58%	355.13
70	IH 10	120+00	4019.23	400	-1.58%	-2.37%	505.69
70	IH 10	133+00	3988.45	400	-2.37%	-0.98%	287.15
70	IH 10	147+00	3974.80	600	-0.98%	-2.34%	440.53
70	IH 10	162+00	3940.02	400	-2.34%	-1.33%	398.80
70	IH 10	184+50	3910+00	500	-1.33%	0.62%	255.62
70	IH 10	227+50	3938.00	500	-1.33%	0.56%	264.13
70	IH 10	240+00	3945.00	1200	0.56%	-3.50%	295.57
70	IH 10	255+00	3892.50	300	-3.50%	-3.00%	600.00
70	IH 10	275+00	3832.50	500	-3.00%	-1.06%	258.13
70	IH 10	283+00	3824.00	300	-1.06%	-0.44%	481.54
70	IH 10	298+00	3817.40	800	-0.44%	-2.44%	400.00
70	IH 10	308+00	3793.00	700	-2.44%	1.14%	195.64
70	IH 10	322+00	3808.93	800	1.14%	-1.07%	361.99
70	IH 10	335+00	3795.00	400	-1.07%	-0.25%	486.62
70	IH 10	345+00	3792.50	400	-0.25%	-1.03%	515.46
70	IH 10	358+00	3778.42	300	-1.13%	-0.92%	1415.09
70	IH 10	380+50	3756.07	300	-1.03%	-1.58%	545.45

NOTE: Vertical Curve information is provided to verify 4R project requirements and is not intended for use in construction.
Project element information was taken from the as-built plans for CSJ 0441-09-004 & 0441-09-005.

STATE OF TEXAS
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RICARDO C BETANCOURT, P.E. 12/19/22

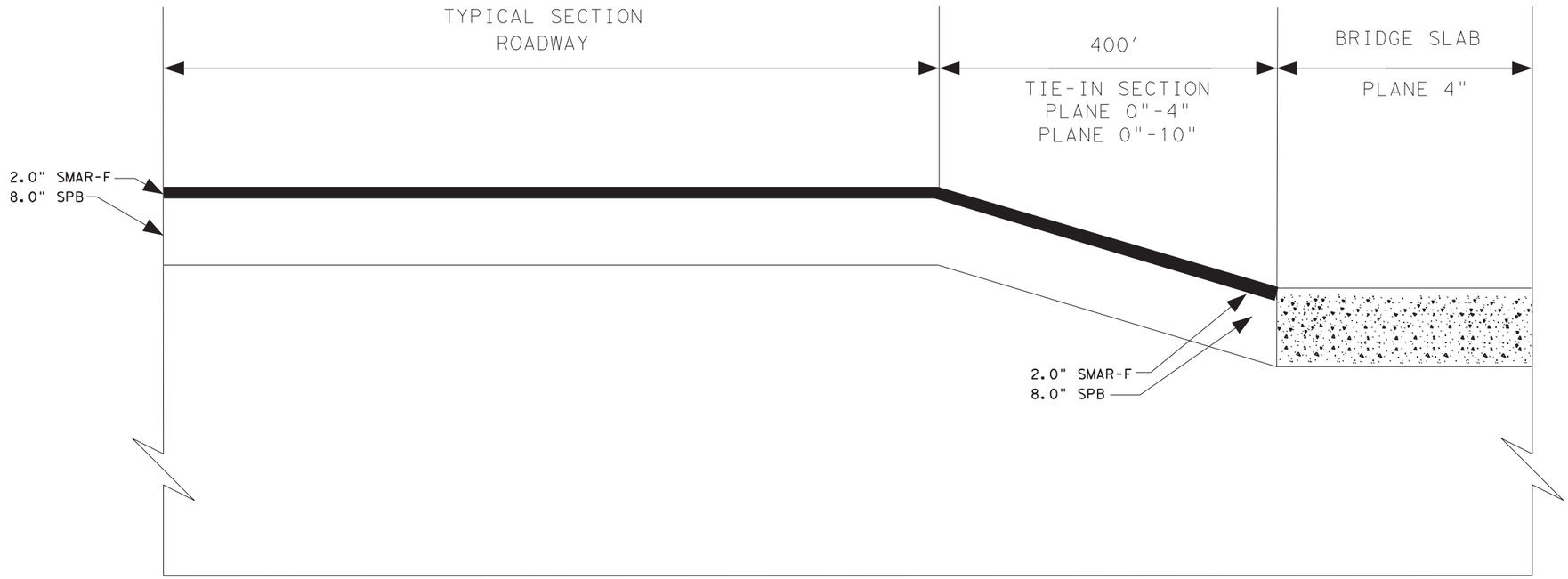
ALIGNMENT DATA

SHEET 2 OF 2

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			45
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FULL WIDTH
BRIDGE TIE-IN TYPICAL SECTION



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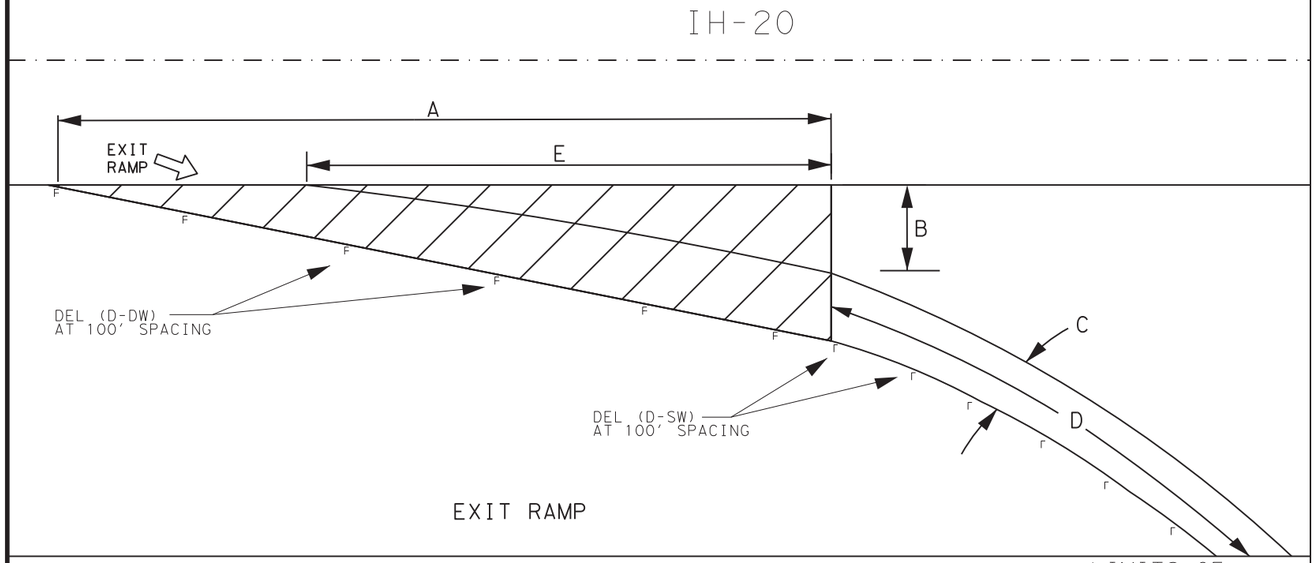
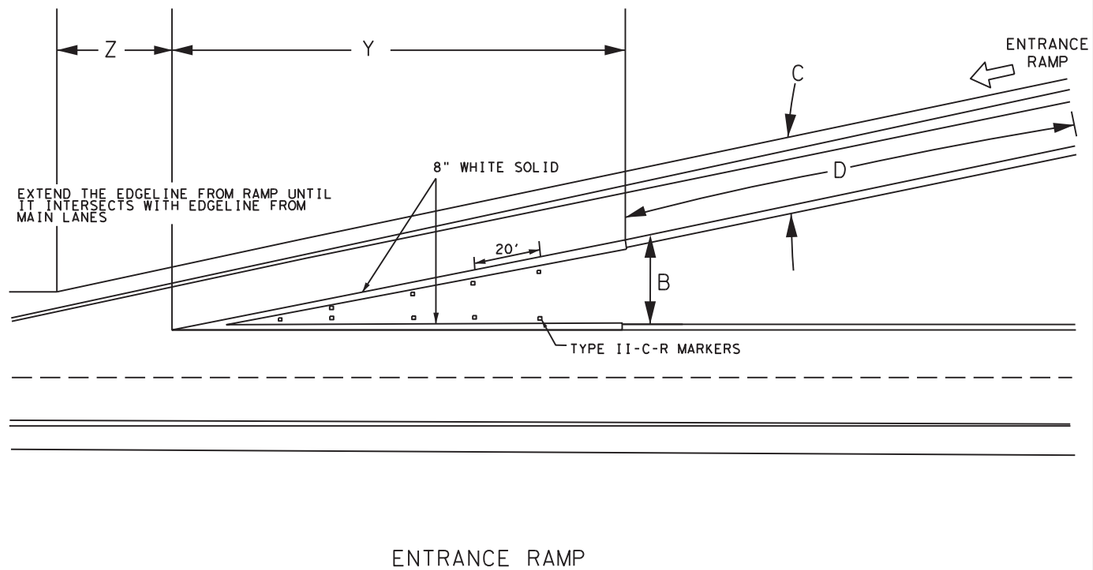
Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

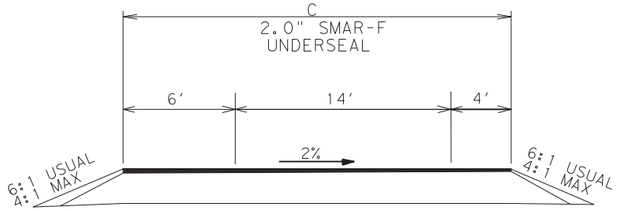
ROADWAY MISC DETAIL

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			46
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC





RAMP	*A	*B	*C	*D	*E	*Y	*Z	* FILL ET AREA	*TOTAL AREA
	FT	FT	FT	FT	FT	FT	FT	FT²	SY
STOCKS RD EB EXIT RAMP	622	30	22	544	689			26,55	6,077
STOCKS RD EB ENT. RAMP		28	20	362		369	428	13,387	4,417
STOCKS RD WB EXIT RAMP	552	27	24	926	326			35,43	7,971
STOCKS RD WB ENT. RAMP		23	20	562		405	507	0	3,428
MM 7 EB EXIT RAMP	481	28	18	400	300			23,22	4,609
MM 7 EB ENT. RAMP		25	18	275		382	345	4,494	2,786
MM 7 WB EXIT RAMP	456	32	22	1190	306			45,78	9,364
MM 7 WB ENT. RAMP		24	18	381		350	481	6,062	3,375
GIFFIN RD EB EXIT RAMP	350	24	27	840	188			1,896	3,722
GIFFIN RD EB ENT. RAMP		16	24	1225		400	320	71,901	12,856
GIFFIN RD WB EXIT RAMP	448	28	25	932				21,84	6,335
GIFFIN RD WB ENT. RAMP		10	23	1073		295	400	32,989	7,682
FM 3078 EB EXIT RAMP	355	24	28	956	171			5,851	4,650
FM 3078 EB ENT. RAMP		10	24	1345		294	678	12,777	6,842
FM 3078 WB EXIT RAMP	358	14	25	1130	201			36,68	7,991
FM 3078 WB ENT. RAMP		22	25	977		321	401	71,209	12,511



PROPOSED RAMP
TYPICAL SECTION

NOTE: * FOR CONTRACTOR'S INFORMATION ONLY
RAMPS SHALL BE CLOSED ACCORDING TO TCP (6-2b) AND TCP (6-4a)

N.T.S

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

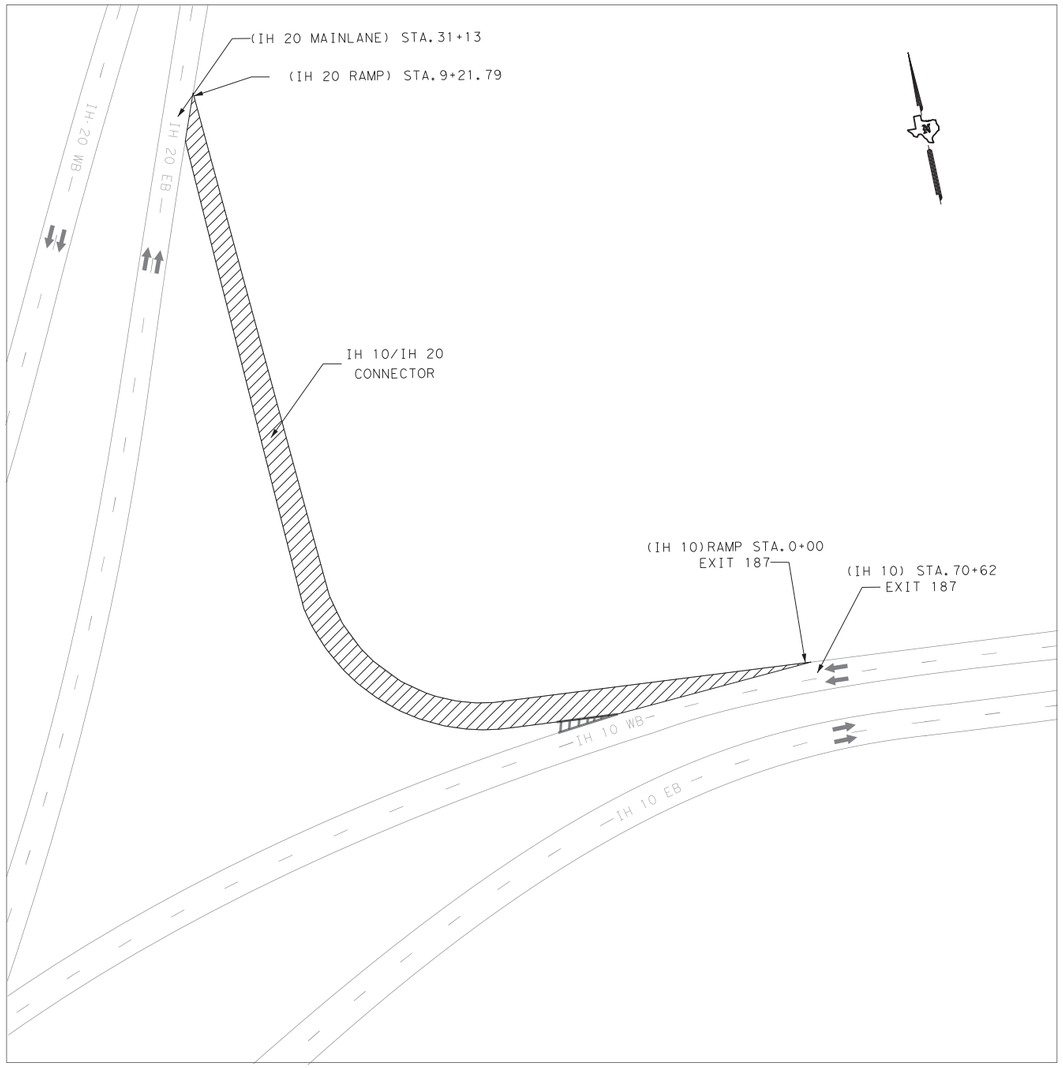
RICARDO C BETANCOURT, P.E. 12/19/22

RAMP DETAILS

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			47
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

IH 10
EXIT 187



NTS

RAMP WORK AREA

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

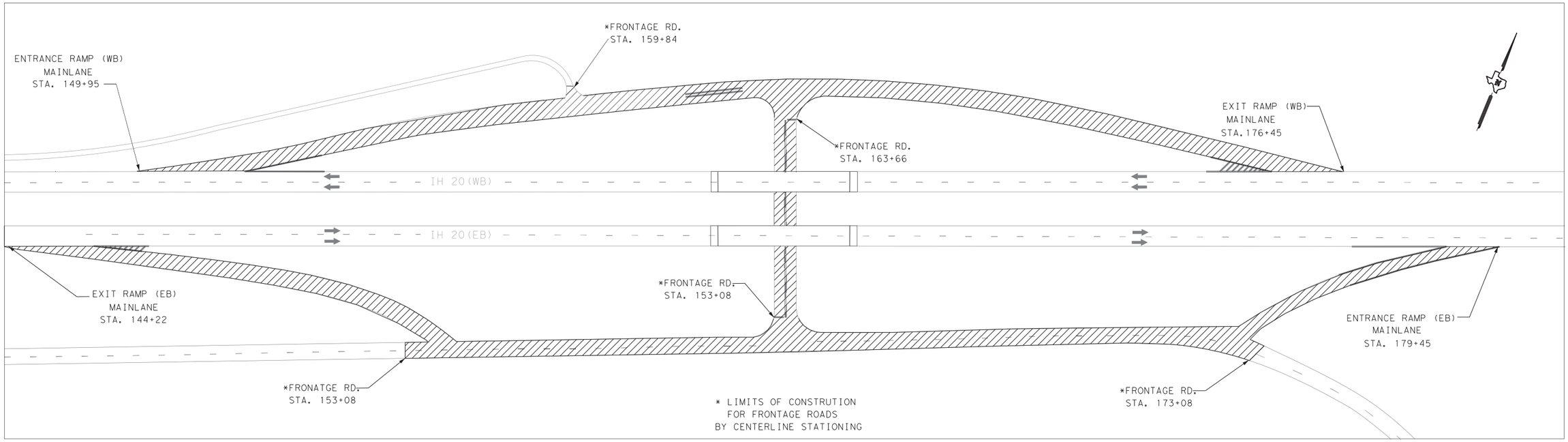
RICARDO C BETANCOURT, P.E. 12/19/22

RAMP DETAILS

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			48
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

STOCKS RD
EXIT 3



NTS

RAMP WORK AREA

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

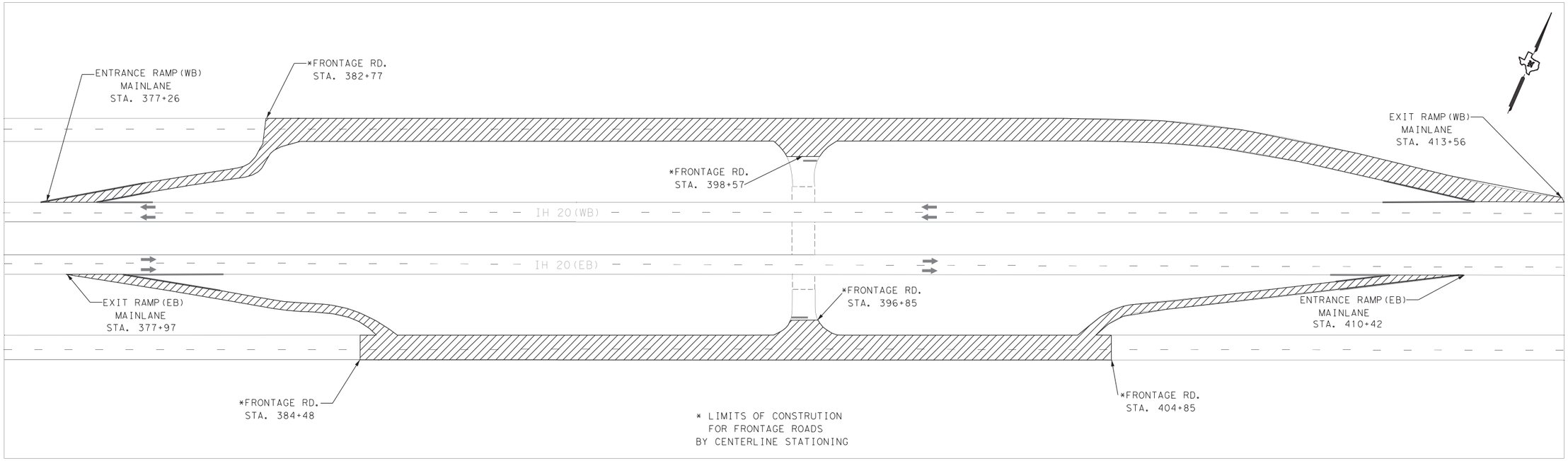
RICARDO C BETANCOURT, P.E. 12/19/22

RAMP DETAILS

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			49
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

JOHNSON RD.
EXIT 7



* LIMITS OF CONSTRUTION
FOR FRONTAGE ROADS
BY CENTERLINE STATIONING

NTS

RAMP WORK AREA

STATE OF TEXAS
RICARDO C BETANCOURT
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LICENSED
PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

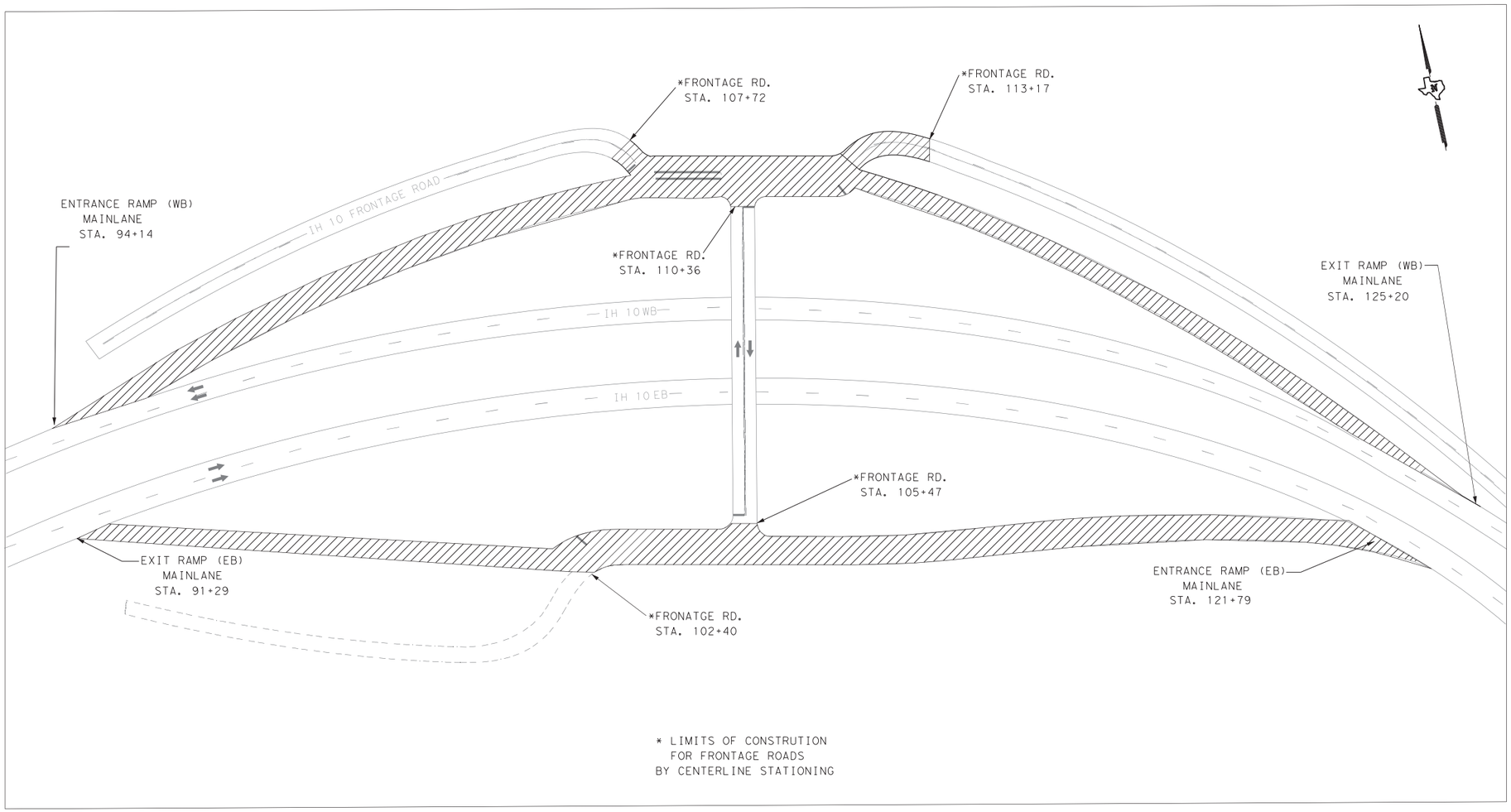
RICARDO C BETANCOURT, P.E. 12/19/22

RAMP DETAILS

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			50
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

06-195-0441-09-061
GIFFIN RD.
EXIT 188



NTS

RAMP WORK AREA

STATE OF TEXAS
RICARDO C BETANCOURT
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PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

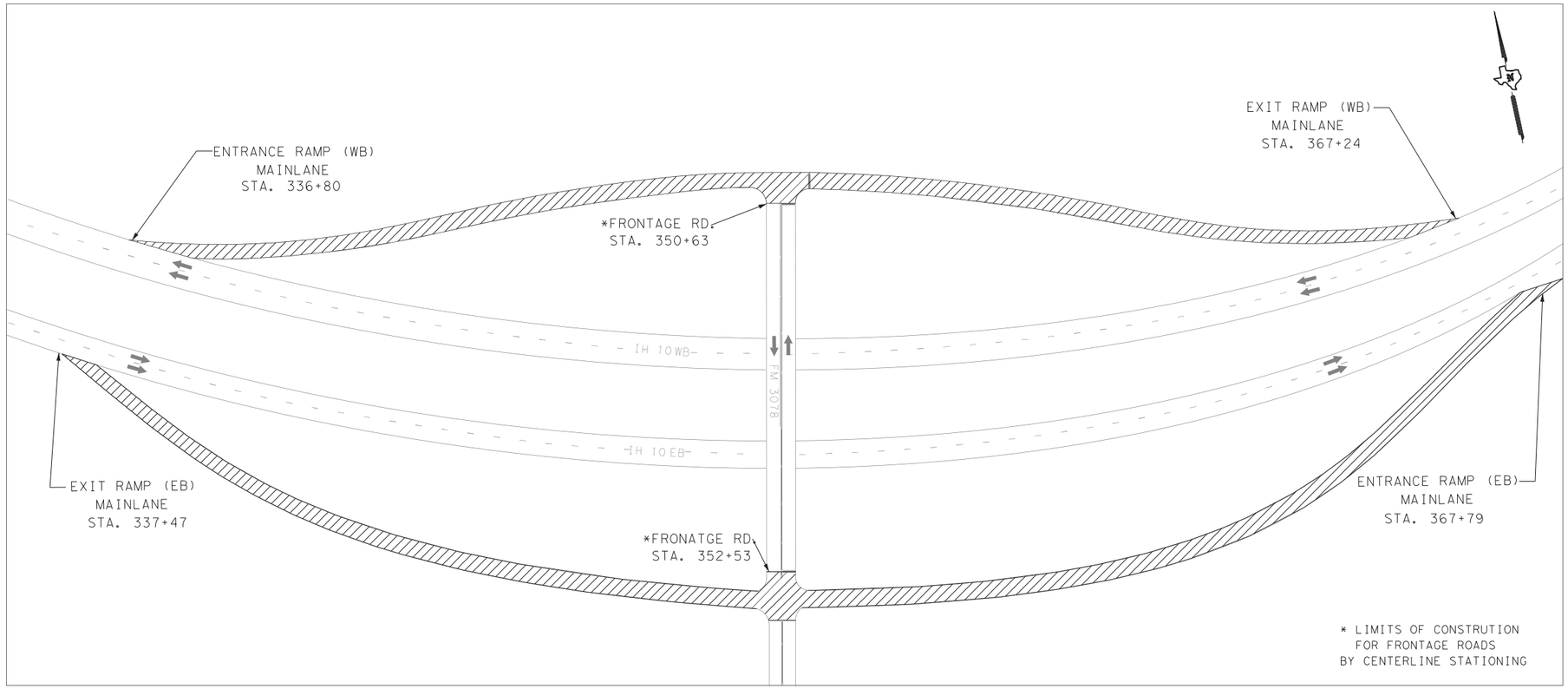
RICARDO C BETANCOURT, P.E. 12/19/22

RAMP DETAILS

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			51
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

06-195-0441-09-069
FM 3078



NTS

RAMP WORK AREA

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

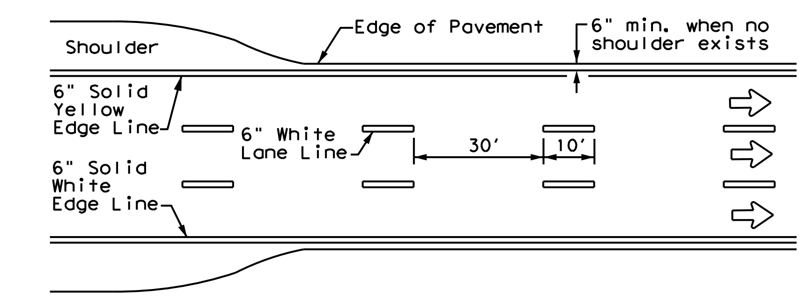
Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

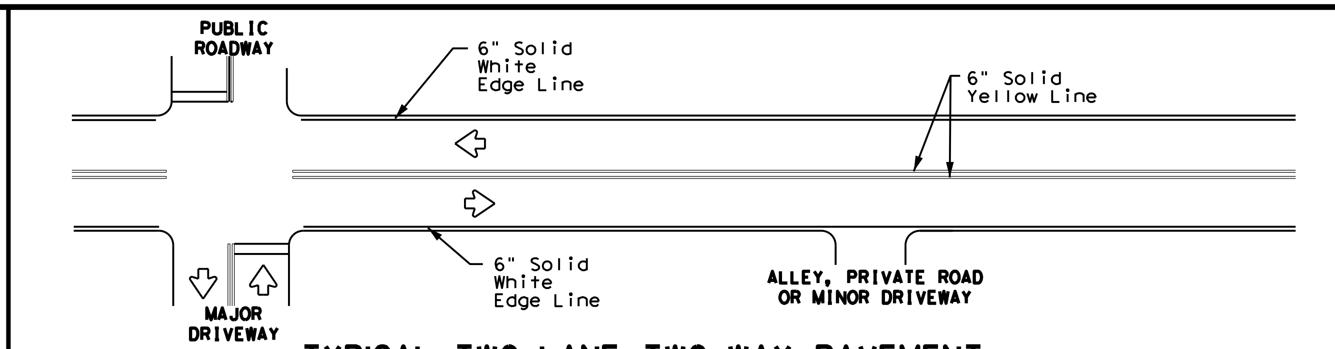
RAMP DETAILS

Texas Department of Transportation

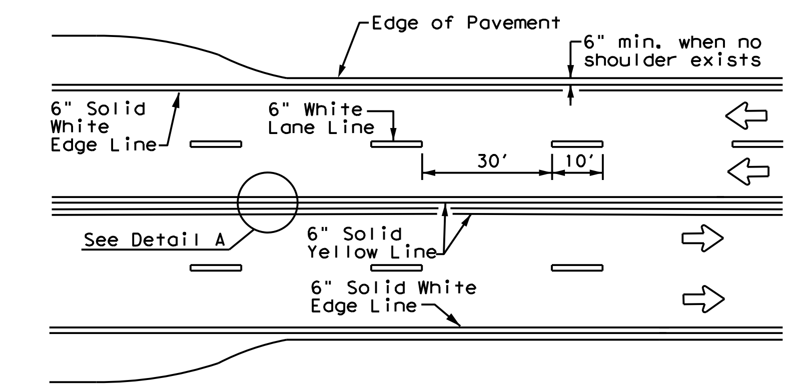
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			52
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



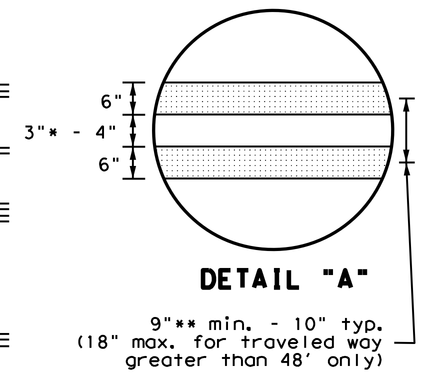
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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



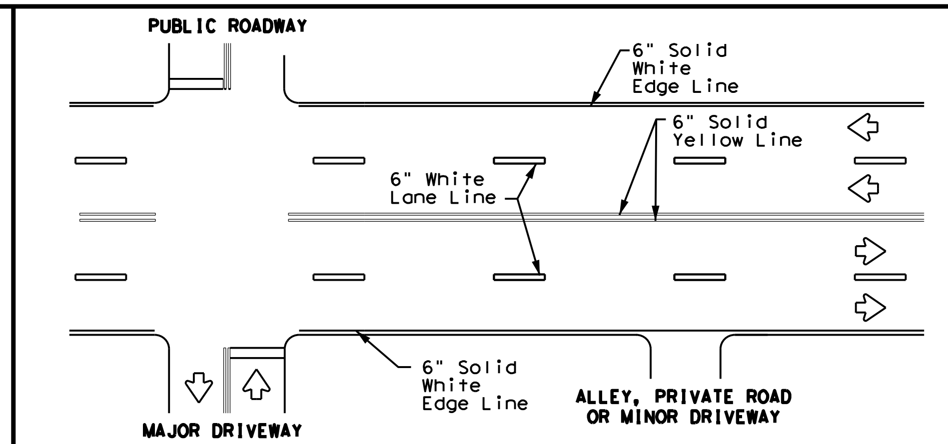
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



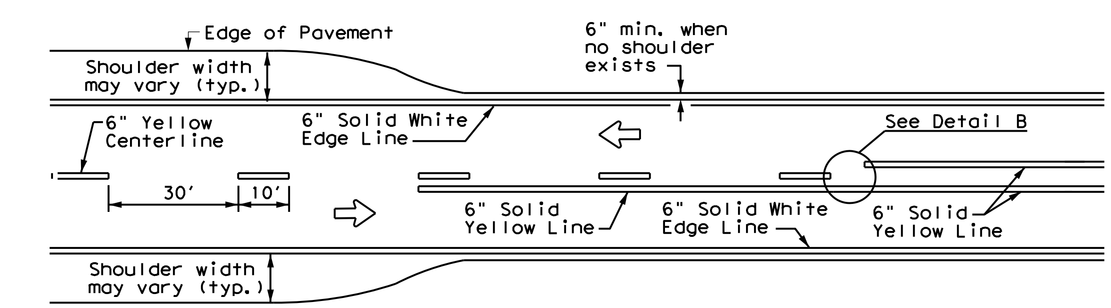
DETAIL "A"

* 2" minimum for restripe projects when approved by the Engineer.

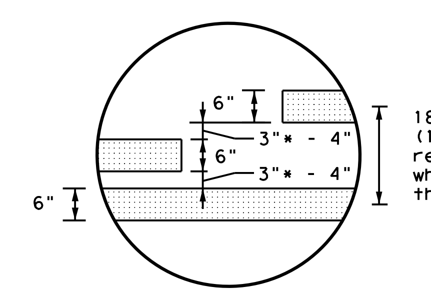
** 8" minimum for restripe projects when approved by the Engineer.



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

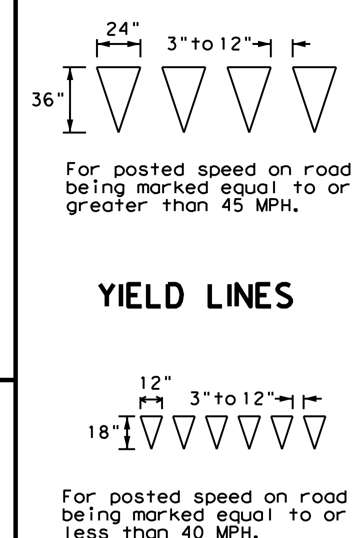


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



DETAIL "B"

* 2" minimum for restripe projects when approved by the Engineer.



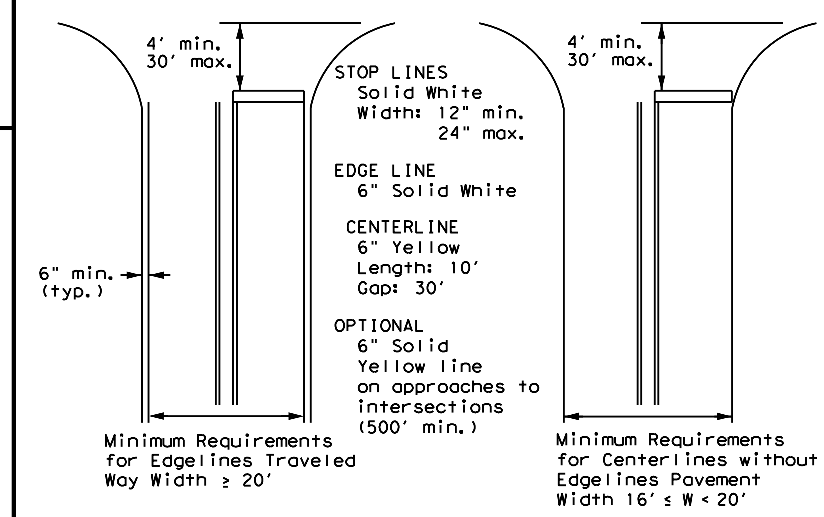
GENERAL NOTES

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

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

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

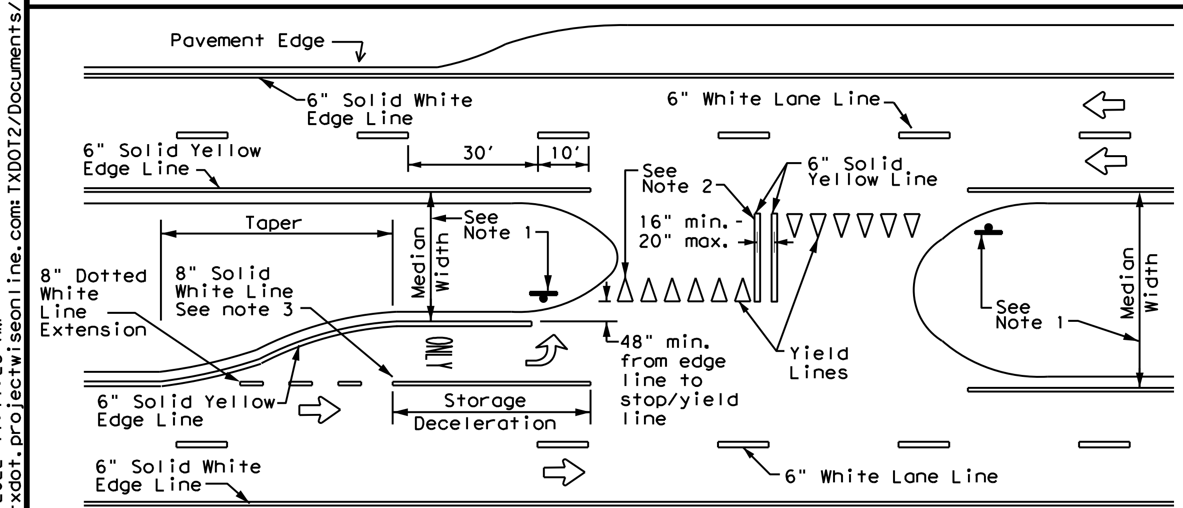
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

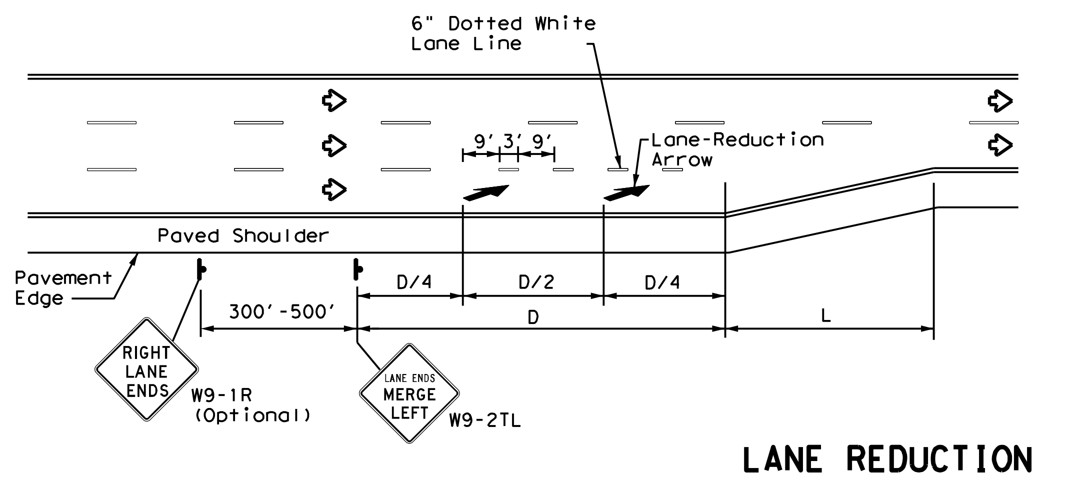
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT 0003	SECT 05	JOB 055	HIGHWAY IH 20, ETC
REVISIONS 11-78 8-00 6-20; 8-95 3-03 12-22; 5-00 2-12	DIST ODA		COUNTY REEVES	SHEET NO. 53

22A

DATE: 12/22/2022 11:11:25 AM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/06 - ODA/Design Projects/...pm(1)-22.dgn



LANE REDUCTION

NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

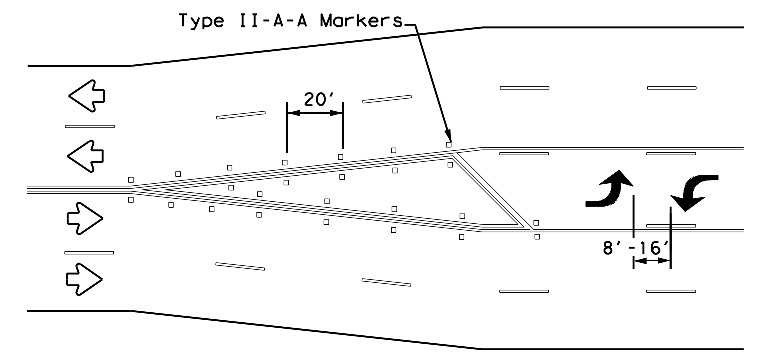
ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L = \frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

GENERAL NOTES

1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

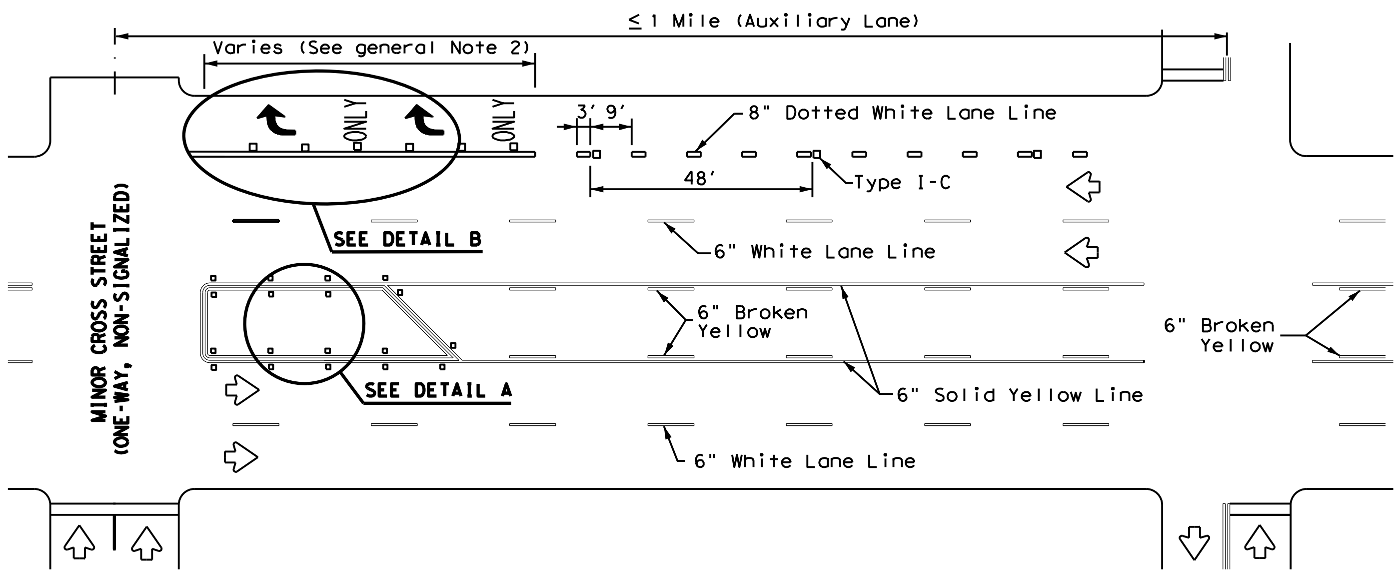
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

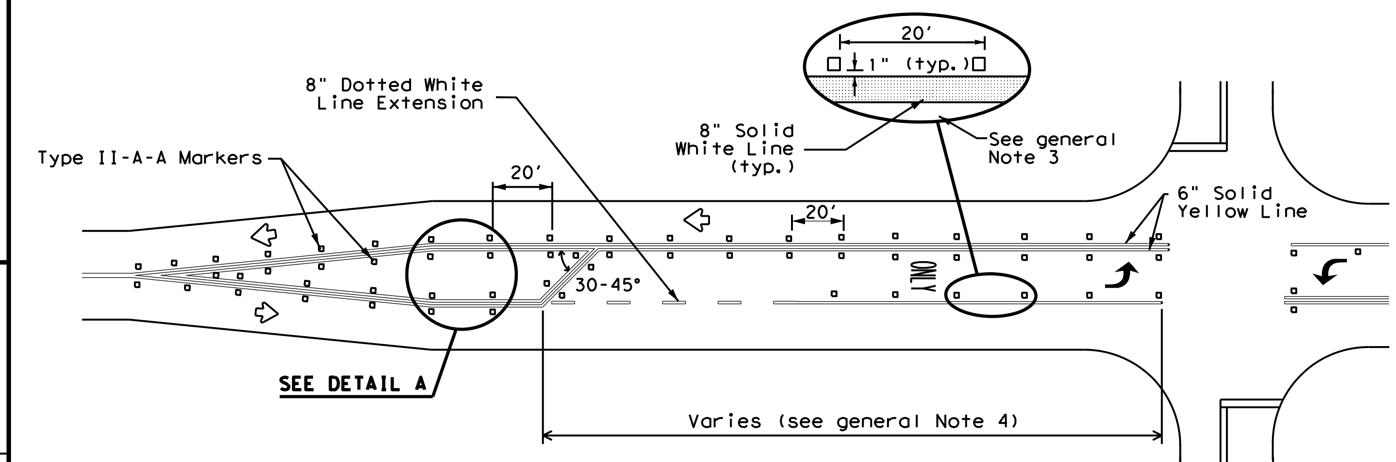


A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

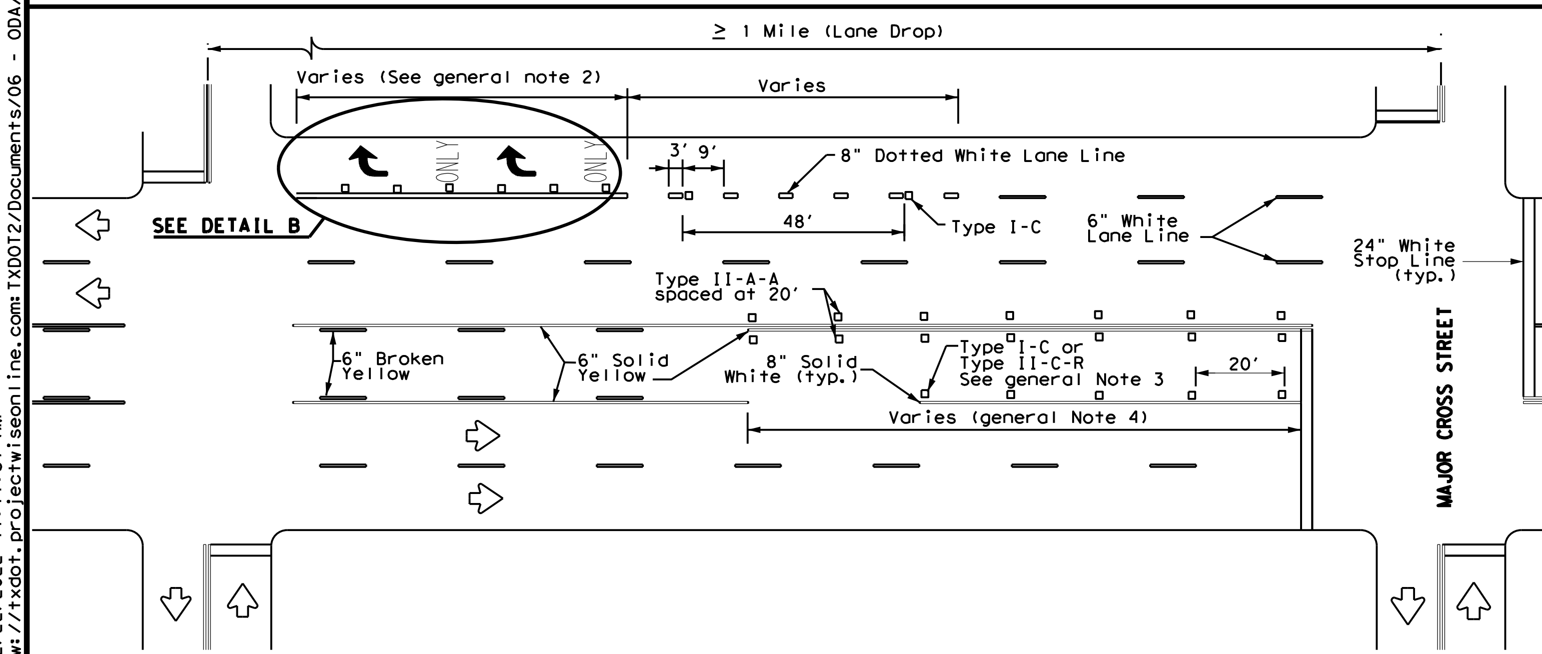
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY



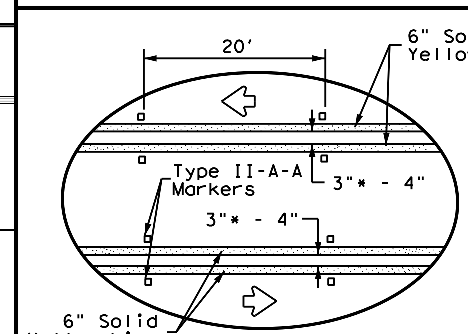
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



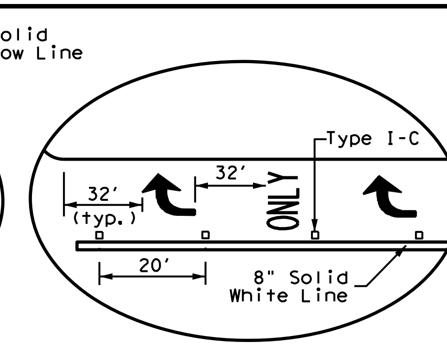
TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



DETAIL A



DETAIL B

* 2" minimum allowed for restripe projects when approved by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20 / 5-00 2-10 12-22 / 8-00 2-12	0003	05	055	IH 20, ETC
	DIST		COUNTY	SHEET NO.
	ODA		REEVES	54

22C

DATE: 12/22/2022 11:11:37 AM
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PLAN ver. 2013.04.05
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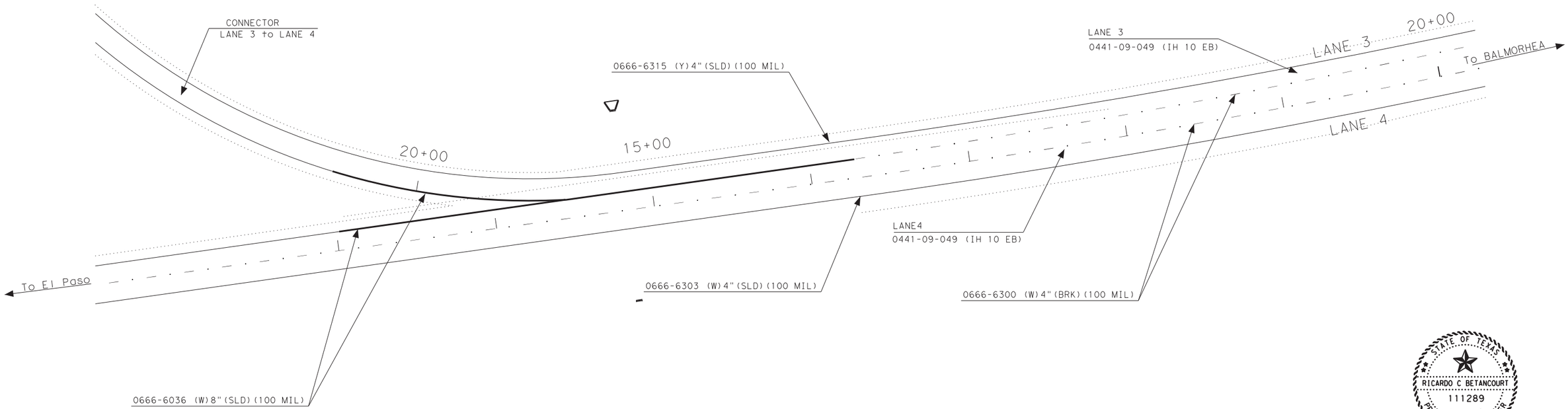
IH 10 (EB) 0441-09-049
LANES 2 &4
STRIPING DETAIL



STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

RICARDO C BETANCOURT, P.E. 12/19/22

PAVEMENT MARKINGS DETAIL IH 20/IH 10

SHEET 1 OF 4

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			55
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

PLAN ver. 2013.04.05
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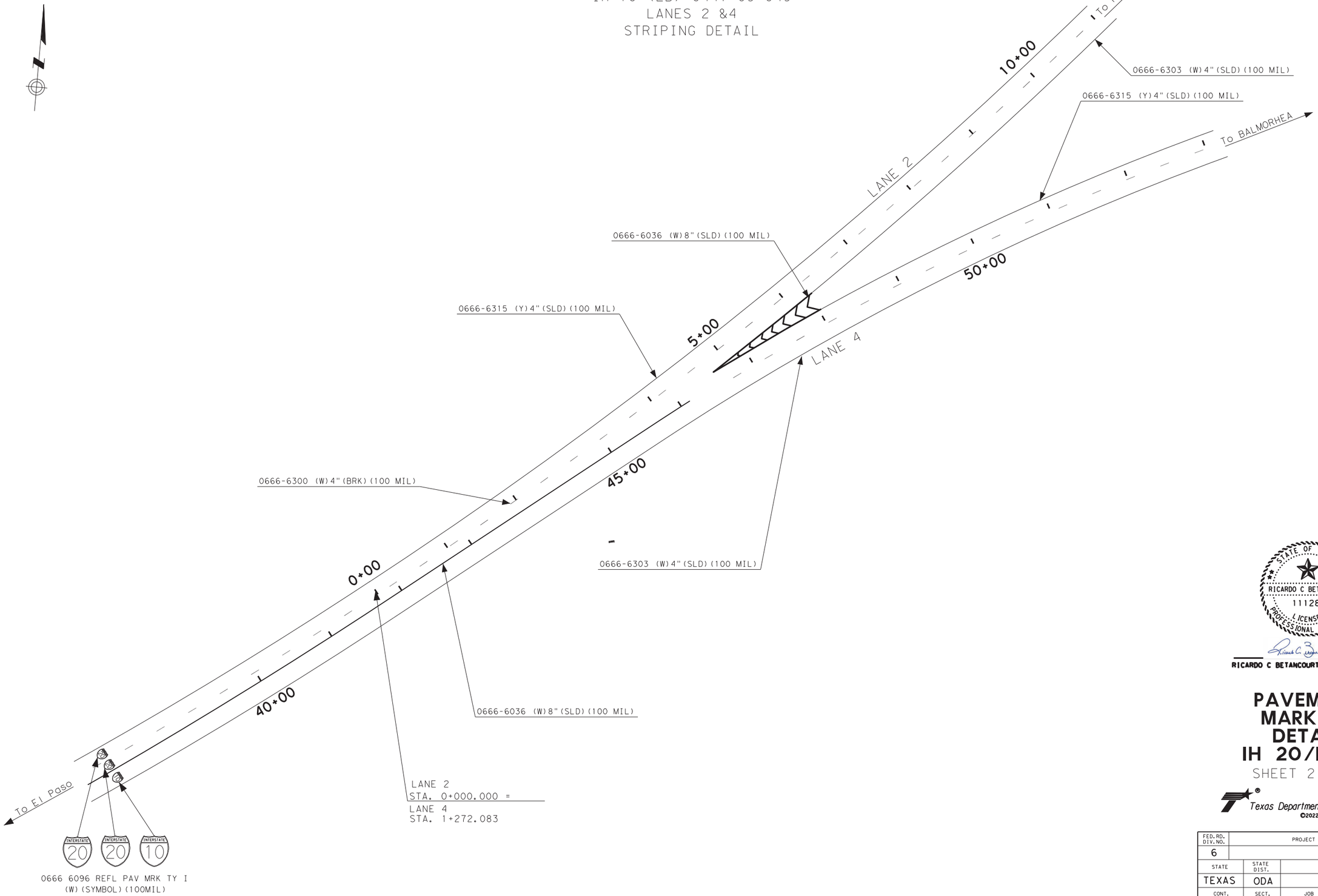
IH 10 (EB) 0441-09-049
LANES 2 &4
STRIPING DETAIL



0666 6096 REFL PAV MRK TY I
(W)(SYMBOL)(100MIL)

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

RICARDO C BETANCOURT, P.E. 12/19/22

PAVEMENT MARKINGS DETAIL IH 20/IH 10

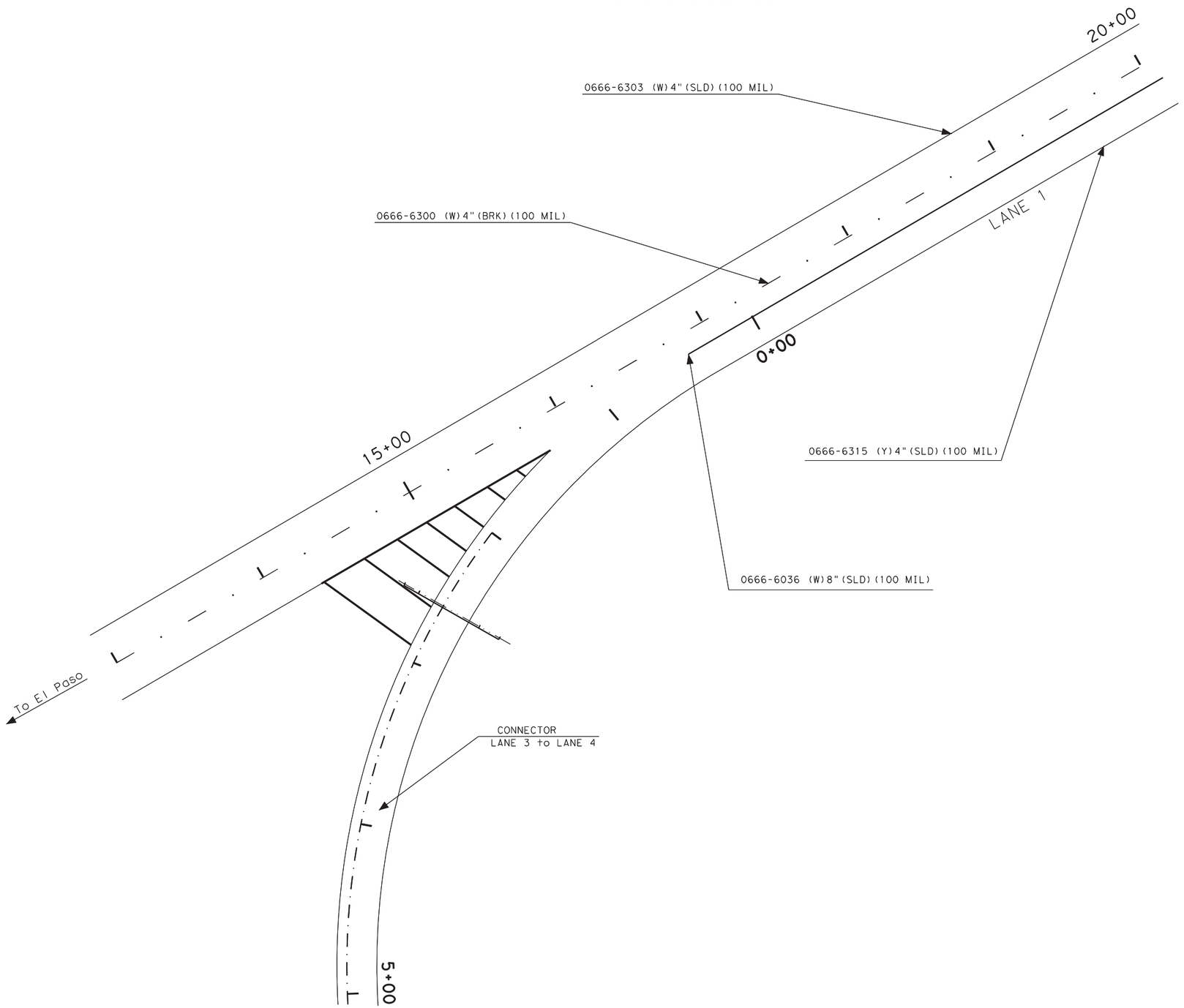
SHEET 2 OF 4

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			56
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

PLAN ver. 2013.04.05
x:\engdata\filename.dgn

IH 20 (EB) 0003-05-055
LANE 1&3
STRIPING DETAIL



STATE OF TEXAS
RICARDO C BETANCOURT
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RICARDO C BETANCOURT, P.E. 12/19/22

PAVEMENT MARKINGS DETAIL IH 20/IH 10

SHEET 3 OF 4

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			57
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

PLAN ver. 2013.04.05
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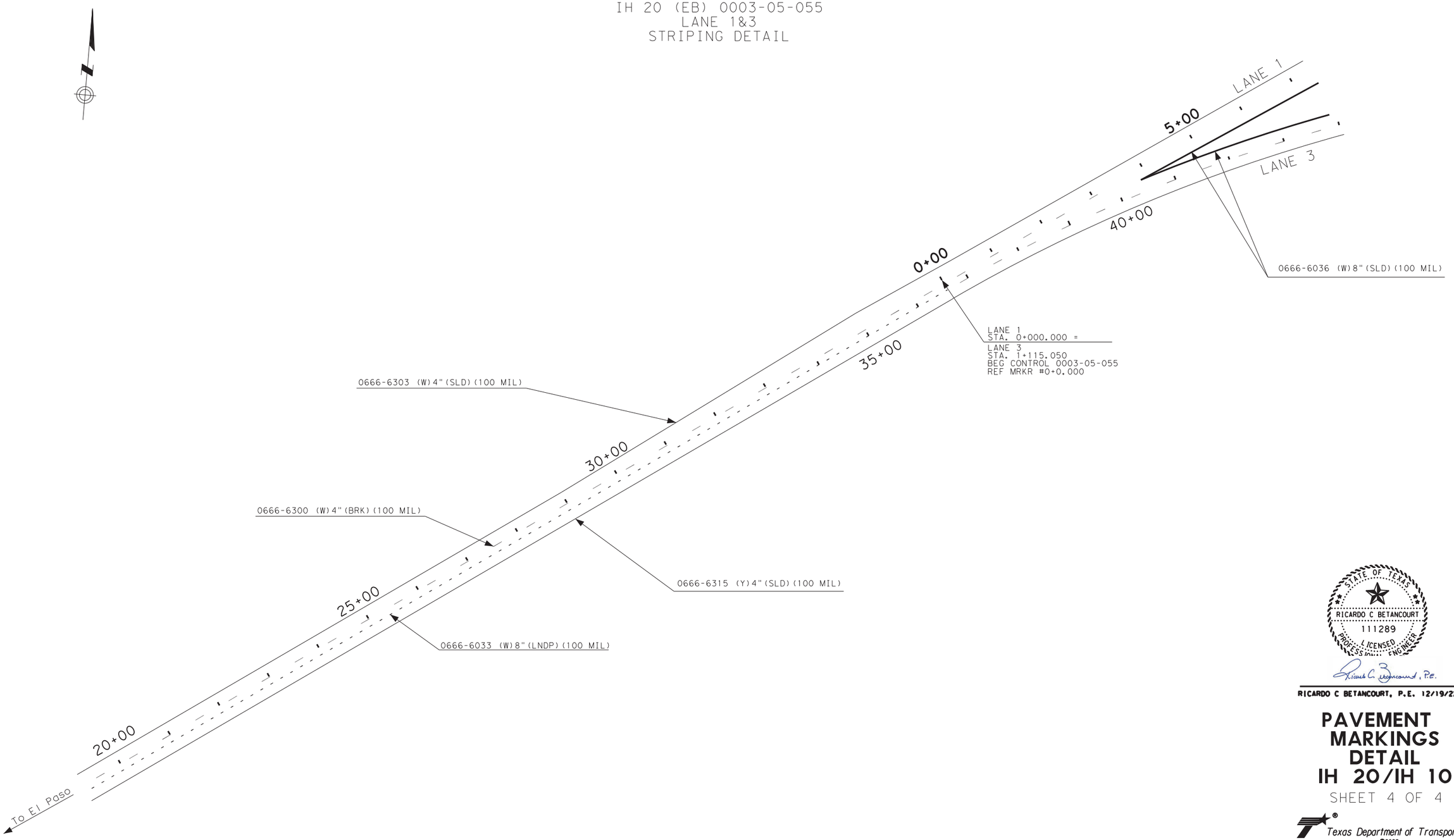
IH 20 (EB) 0003-05-055
LANE 1&3
STRIPING DETAIL



STATE OF TEXAS
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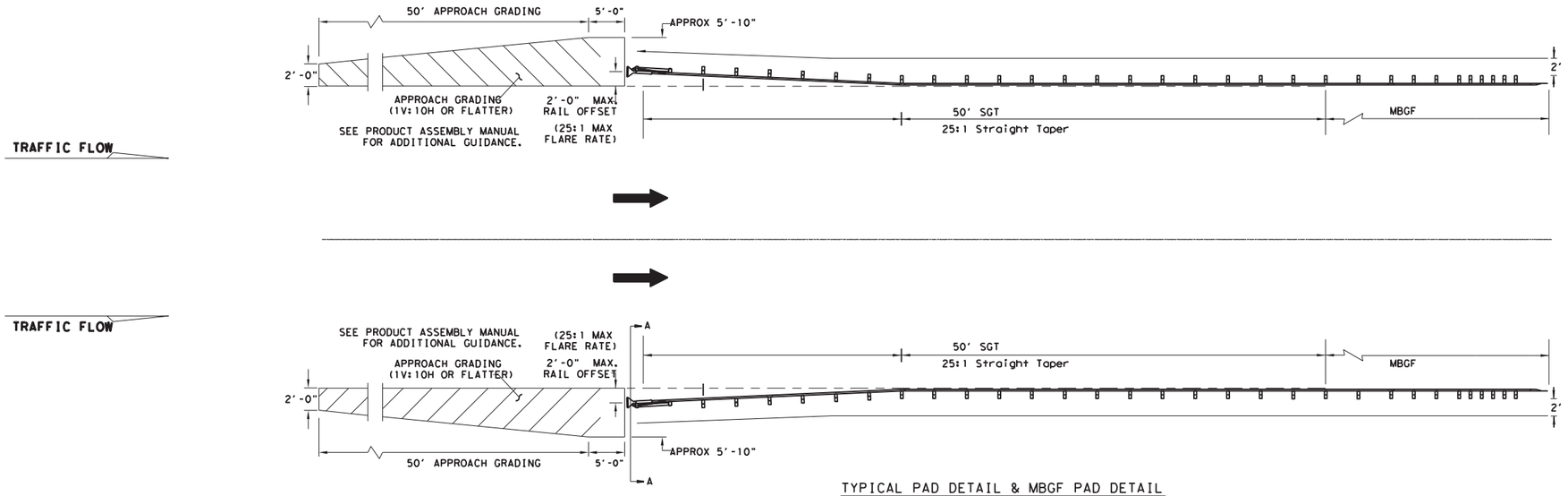
RICARDO C BETANCOURT, P.E. 12/19/22

PAVEMENT MARKINGS DETAIL IH 20/IH 10

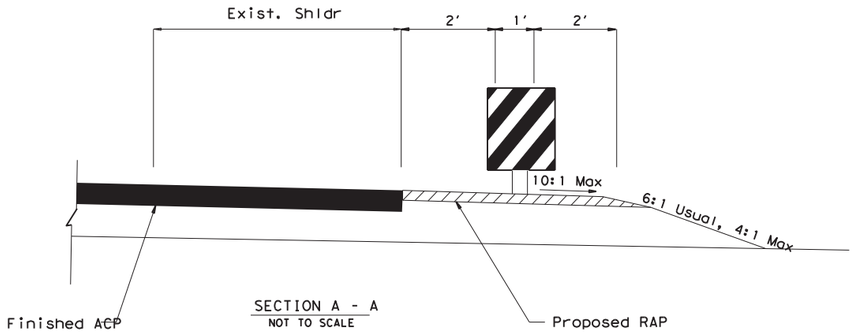
SHEET 4 OF 4

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			58
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



TYPICAL PAD DETAIL & MBGF PAD DETAIL
NOT TO SCALE



SECTION A - A
NOT TO SCALE

FOR CONTRACTOR'S INFORMATION ONLY

CARE SHALL BE TAKEN TO KEEP EXISTING CROWN WIDTH TO ACCOMODATE GUARDRAIL.

ROADWAY CROWN IS TYPICALLY 2FT FROM THE BACK OF THE POST LOCATION TO PROVIDE LATERAL SUPPORT FOR THE POST.

MAINTAIN EXISTING TYPICAL WHEN BLADING SIDESLOPES AT S.G.T. LOCATIONS. IF EXISTING RAP MATERIAL IS DISTURBED, ALL HAULING, STOCKPILING, PLACEMENT OF MATERIAL, AND OTHER INCIDENTAL MANIPULATIONS SHALL BE PLACED AND ROLLED AS APPROVED BY THE ENGINEER.

STATE OF TEXAS
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PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

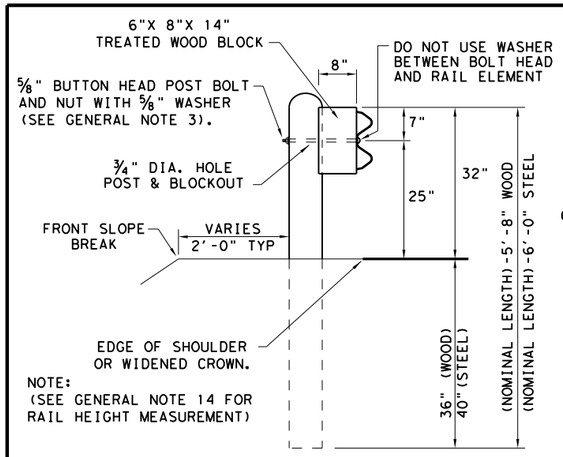
RICARDO C BETANCOURT, P.E. 12/19/22

GUARD RAIL DETAIL

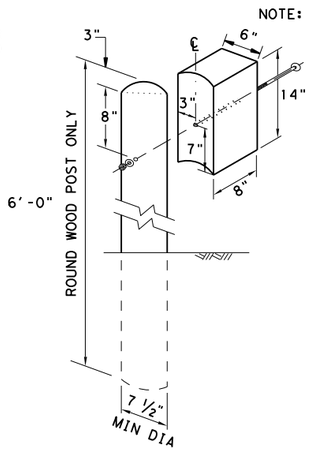
Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			59
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

DATE:
FILE:

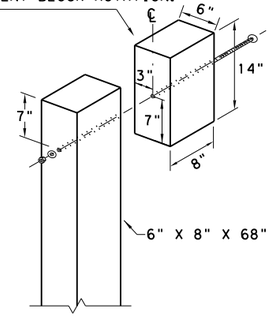


TYPICAL POST PLACEMENT

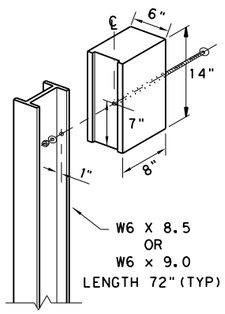


WOOD BLOCK TO ROUND WOOD POST

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

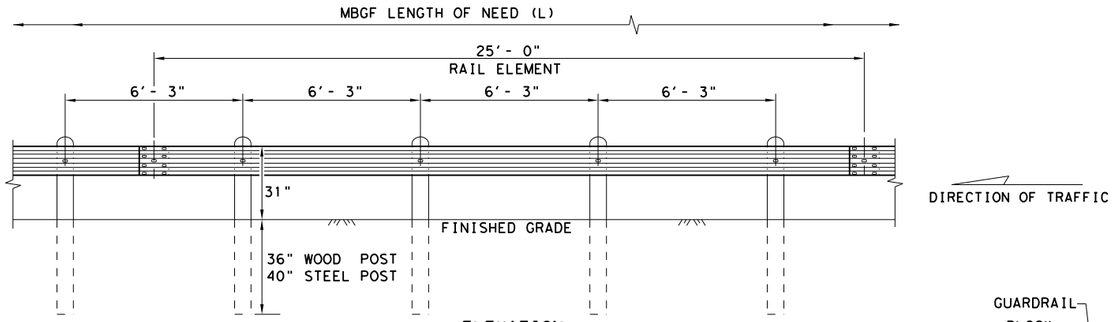


WOOD BLOCK TO RECTANGULAR WOOD POST



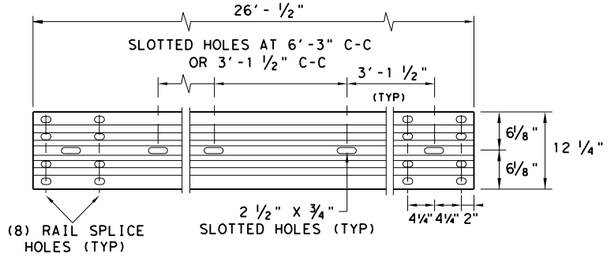
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

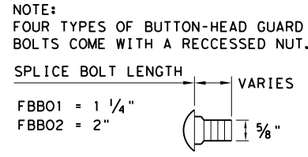
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

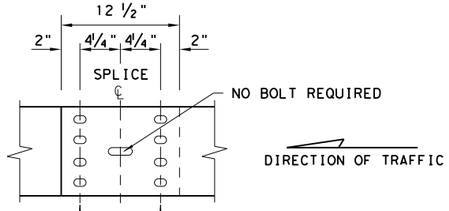
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



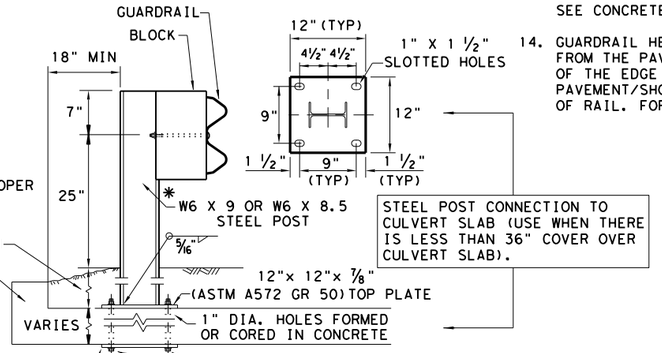
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

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

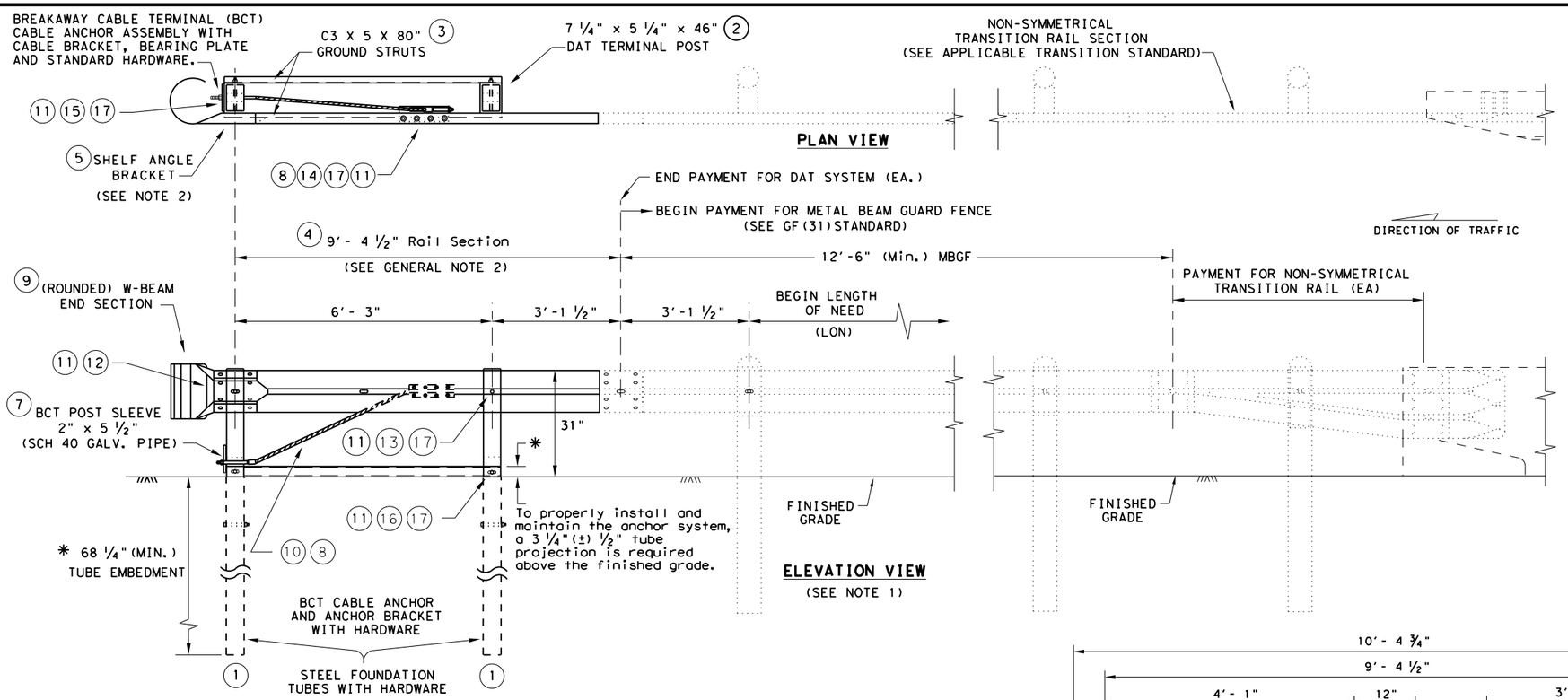
Texas Department of Transportation

Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
REVISIONS	000	305	055	IH 20, ETC	
	DIST	COUNTY		SHEET NO.	
	ODA	REEVES		60	

DATE:
FILE:



DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

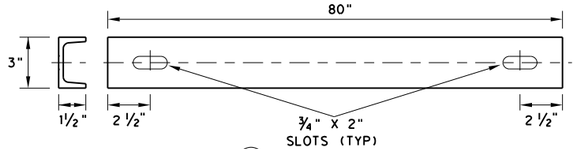
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 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

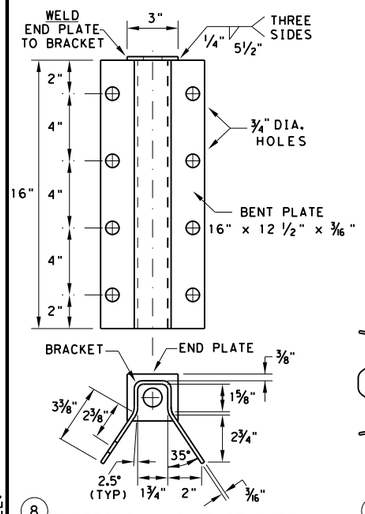
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(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

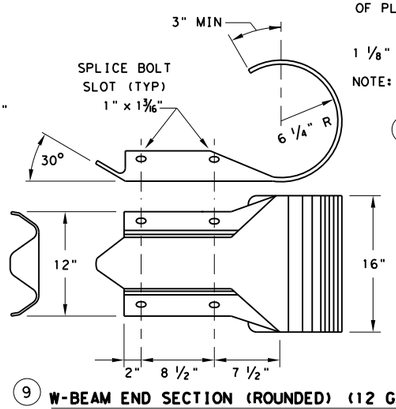
(4) TERMINAL RAIL ELEMENT FOR DAT



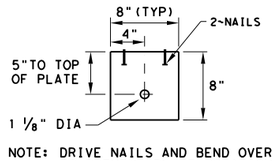
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

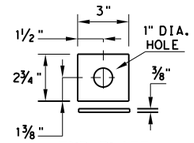


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

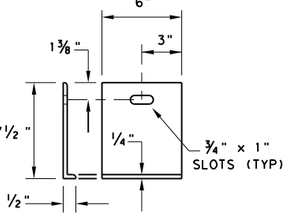


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

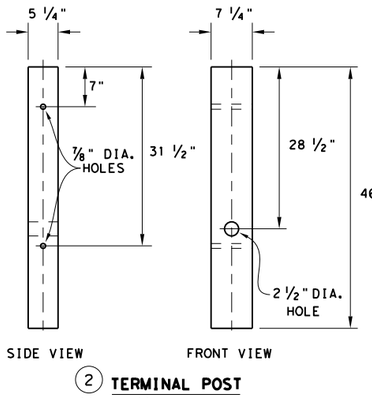
(6) BEARING PLATE
8"x 8"x 5/8" R



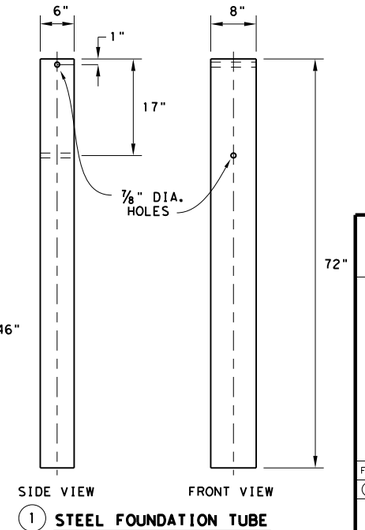
END PLATE



(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

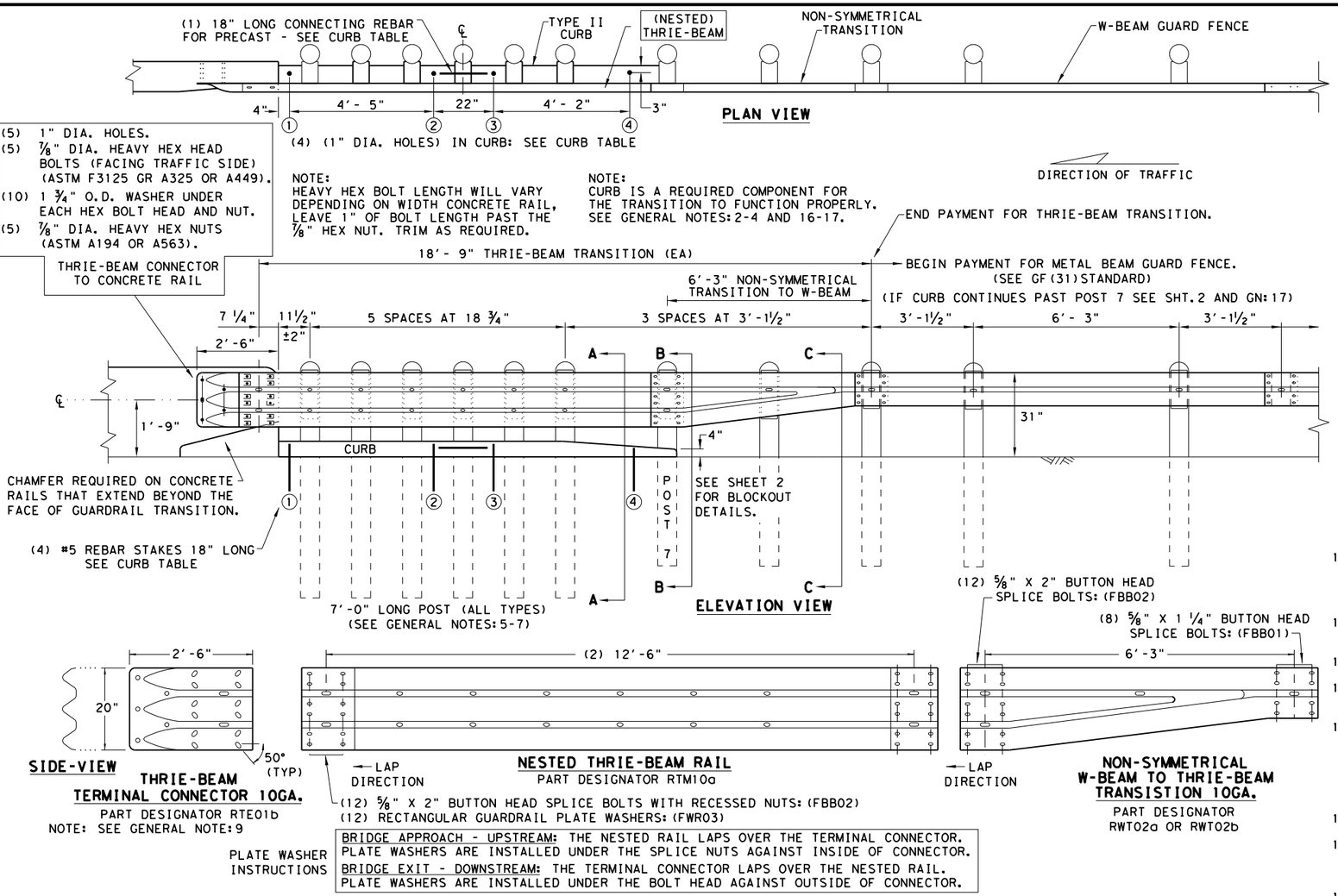
Texas Department of Transportation — Design Division Standard

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	0003	05	055	IH 20, ETC
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		61

DATE: 12/22/2022
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/06 - ODA/Design Projects/000305055/4 - Design/Plan Set/1. General/GUARDRAIL & DOM STANDARDS/067 GF(31)TRTL3-20.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- ¾" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE: 17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 ½" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST ⅝" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED) (TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED) (STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.

THRIE-BEAM TERMINAL - CURB TABLE

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

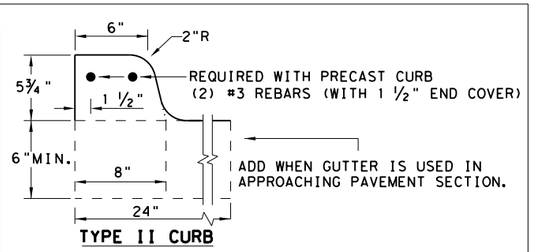
CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7

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

SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE *:
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND ½" BELOW TOP OF CURB.
FILL HOLES WITH APPROVED GROUT MIXTURE.

* 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



TYPE II CURB

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

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	0003	05	055	IH 20, ETC	
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DATE: 12/22/2022
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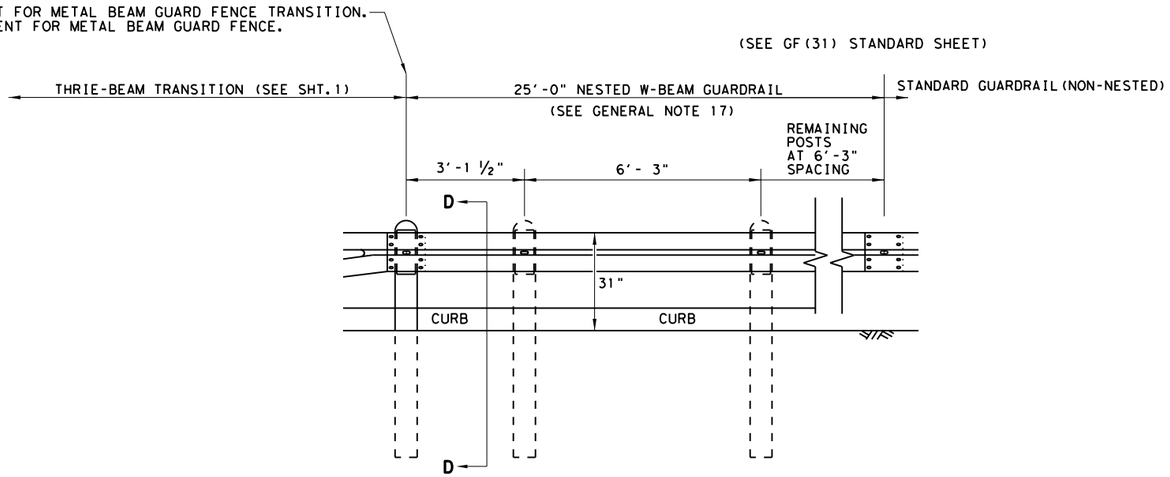
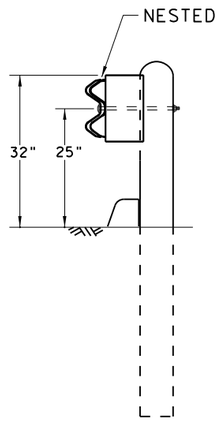
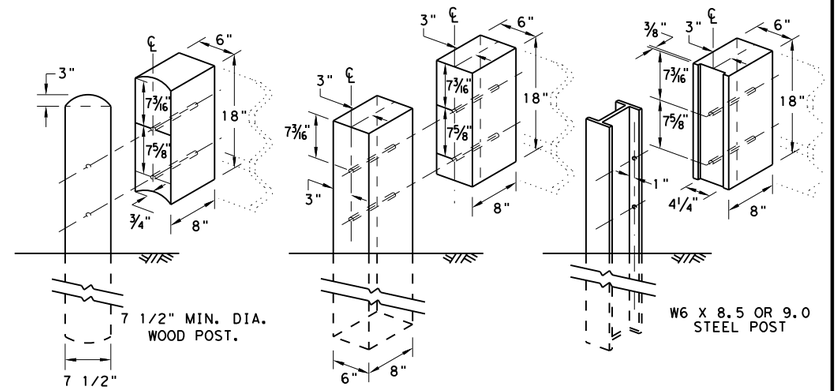
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
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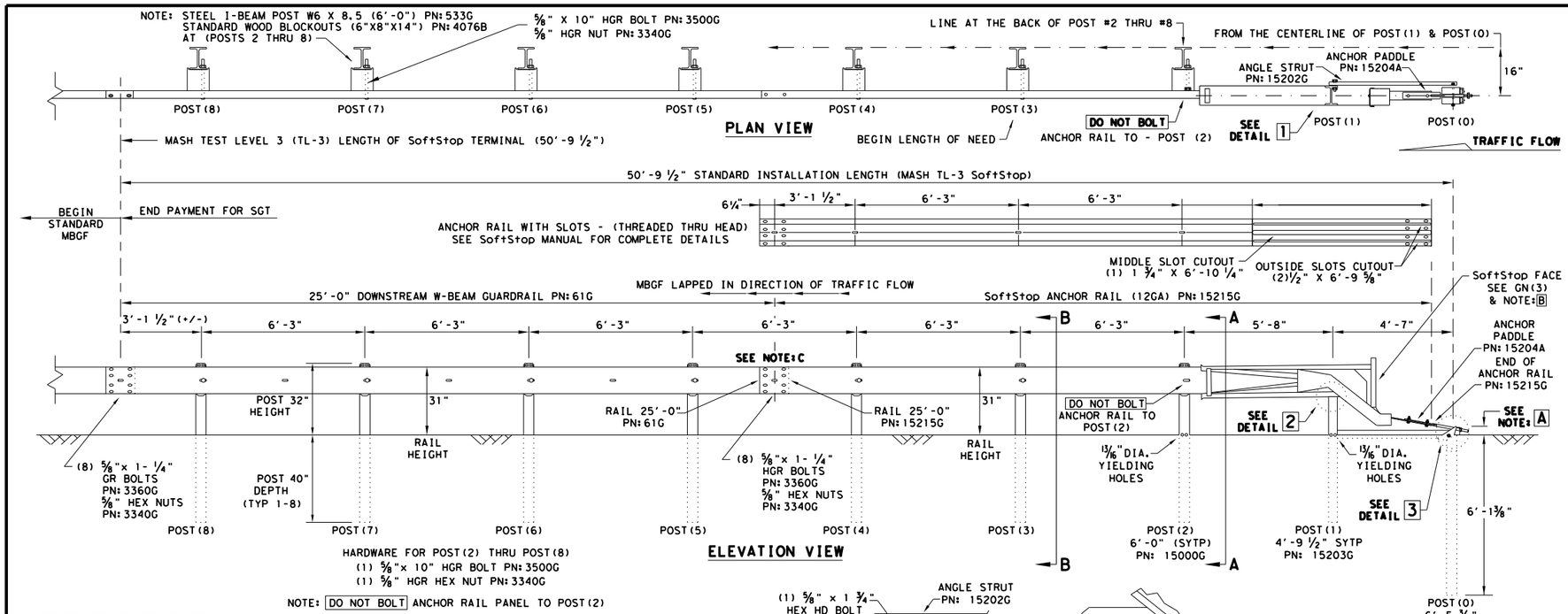

GENERAL NOTES

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 3-3/4" 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 7/8")
15203G	1	POST #1 - (SYTP) (4'- 9 1/2")
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 1/2" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (1/2" 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	3/4" x 2 1/2" HEX BOLT A325
3701G	4	3/4" ROUND WASHER F436
3704G	2	3/4" HEAVY HEX NUT A563 GR.DH
3360G	16	5/8" x 1 1/4" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	5/8" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	5/8" x 10" HGR POST BOLT A307
3391G	1	5/8" x 1 3/4" HEX HD BOLT A325
4489G	1	5/8" x 9" HEX HD BOLT A325
4372G	4	5/8" WASHER F436
105285G	2	5/8" x 2 1/2" HEX HD BOLT GR-5
105286G	1	5/8" x 1 1/2" HEX HD BOLT GR-5
3240G	6	5/8" ROUND WASHER (WIDE)
3245G	3	5/8" 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	
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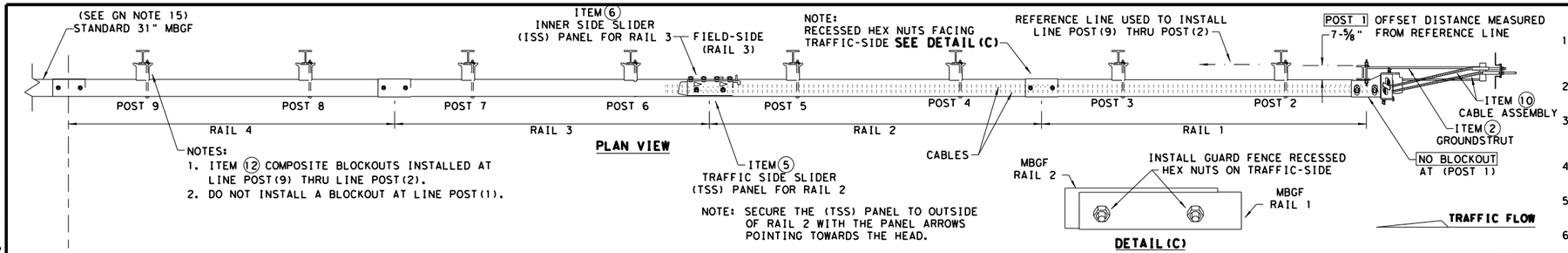

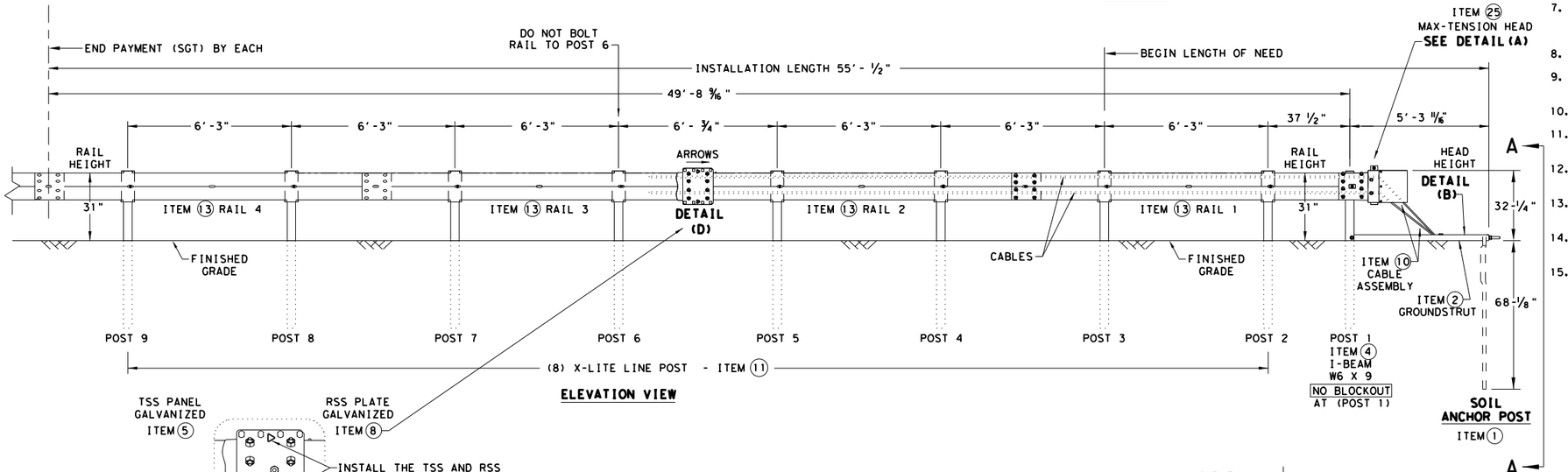

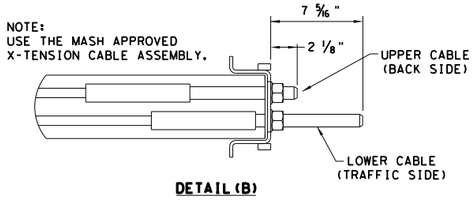

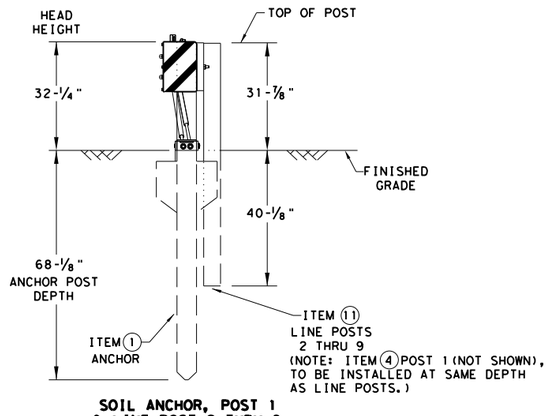

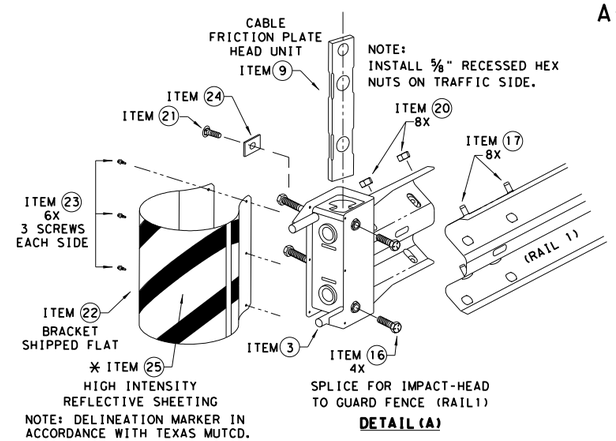

TRAFFIC FLOW

GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
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	ODA	REEVES		65

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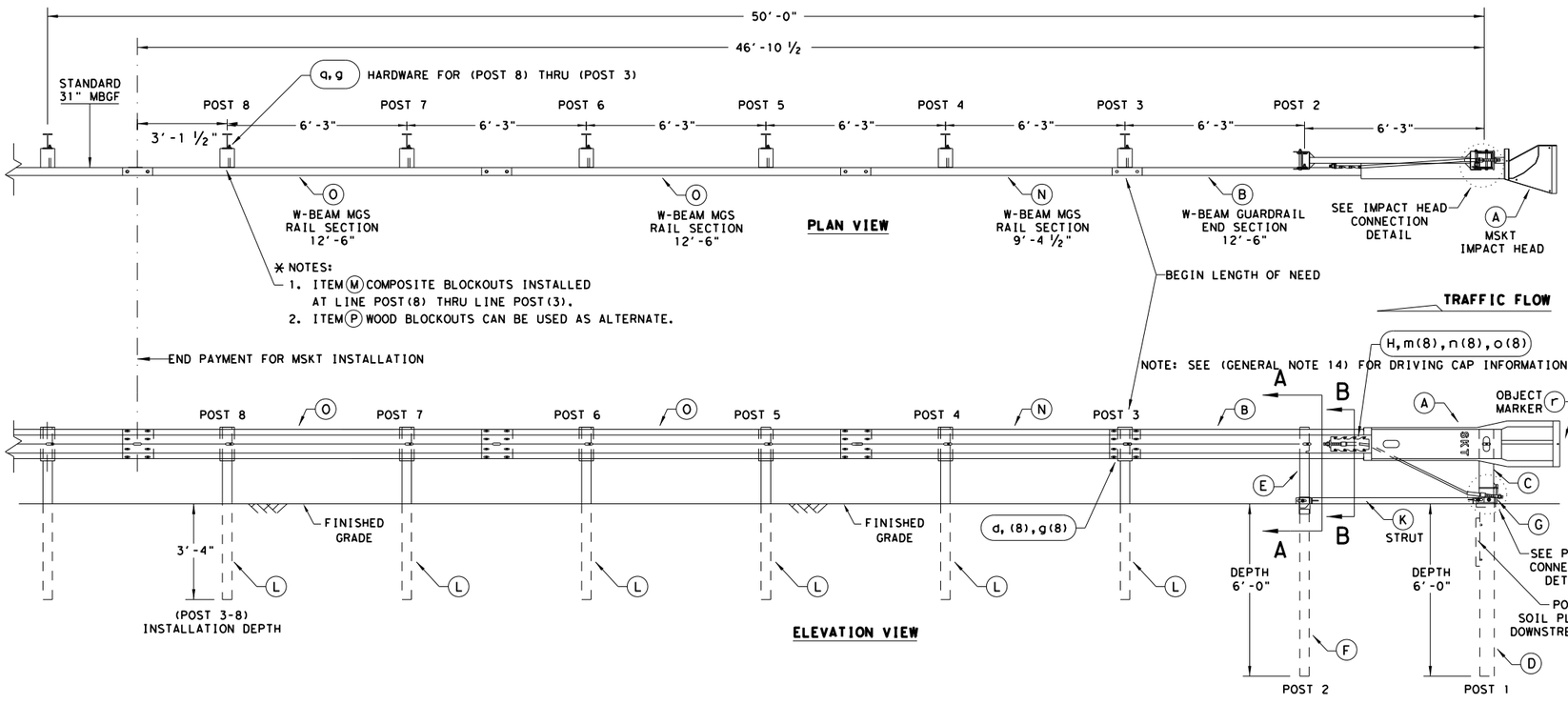


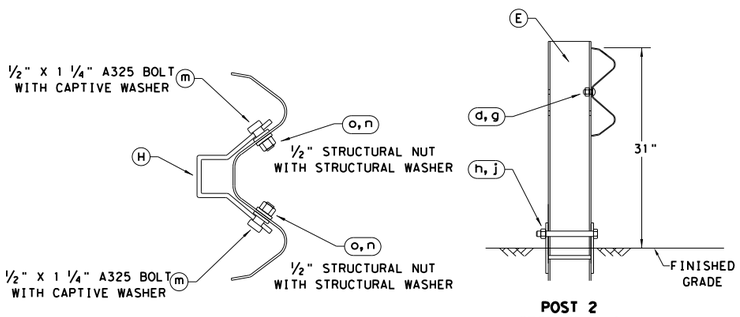
GENERAL NOTES

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

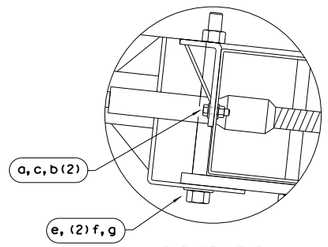
SEE NOTES: *

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

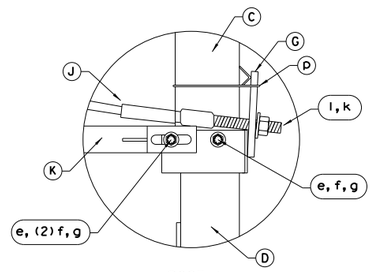


SECTION B-B
ANCHOR BRACKET

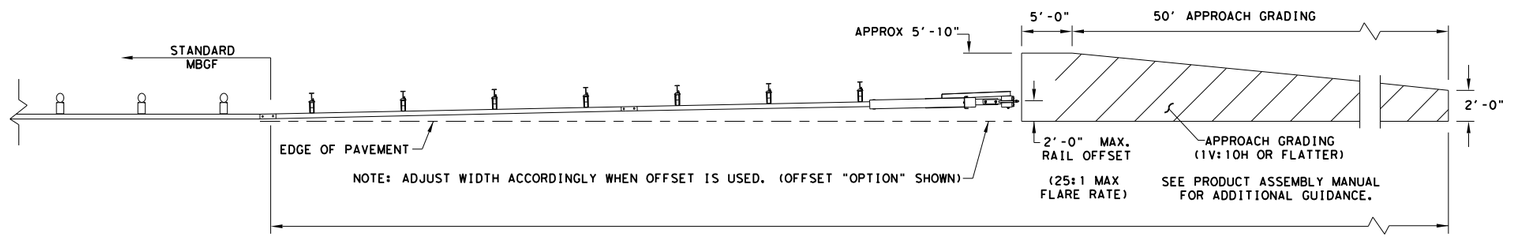
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



TRAFFIC FLOW

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.

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	0003	05	055	IH 20, ETC	
	DIST	COUNTY		SHEET NO.	
	ODA	REEVES		66	

DATE: 12/22/2022
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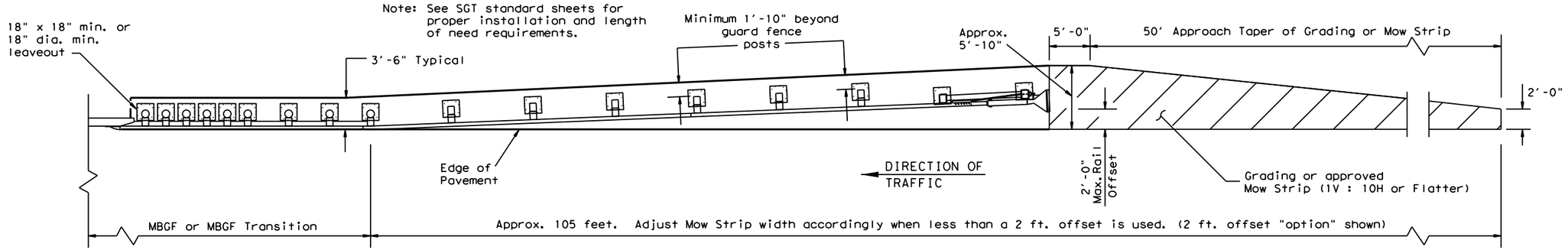
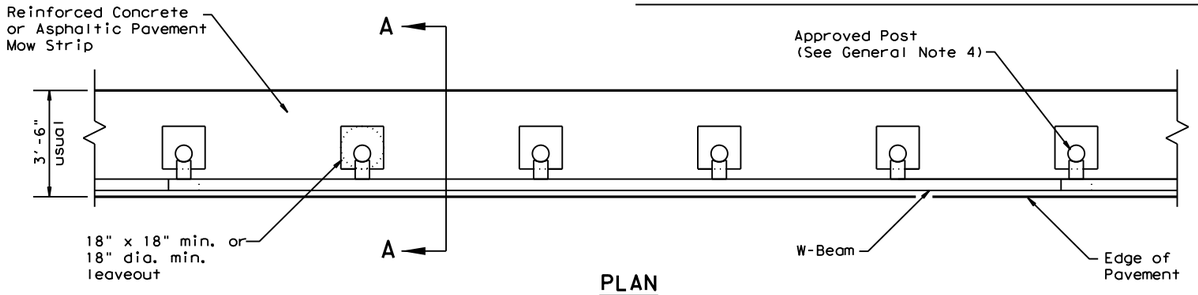
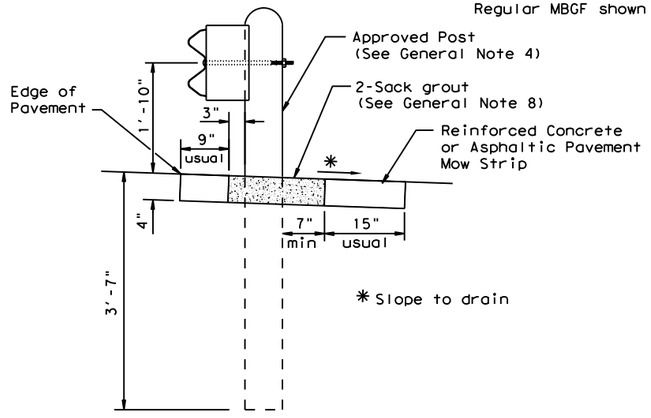


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



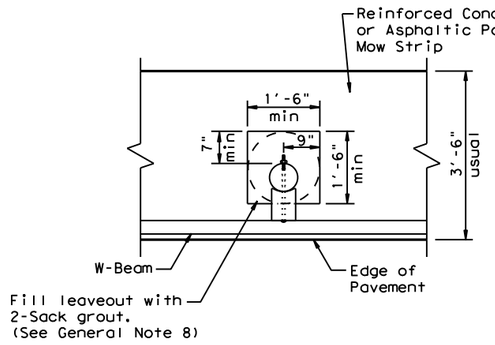
PLAN

Regular MBGF shown with Mow Strip



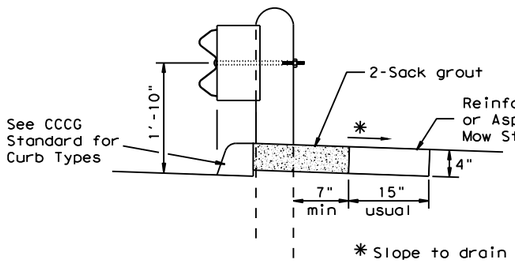
SECTION A-A

Typical



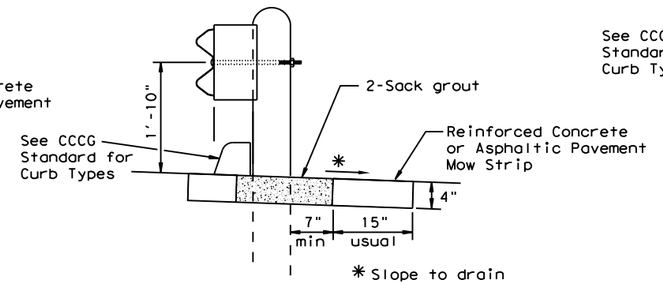
MOW STRIP DETAIL

Reinforced Concrete or Asphaltic Pavement Mow Strip with 18" x 18" or 18" dia. minimum leaveout.



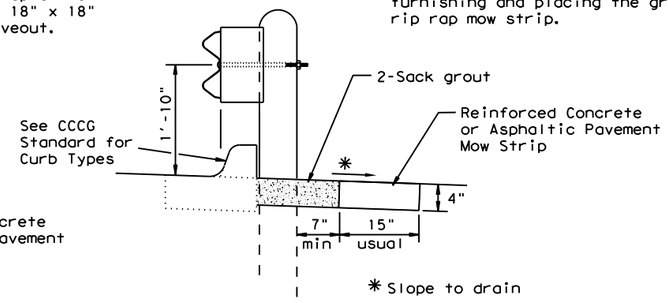
CURB OPTION (1)

This option will increase the post embedment through out 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 SGT standards for proper SGT installation).
2. Mow strips shall be asphaltic pavement or reinforced concrete (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item of work. Asphaltic pavement shall meet the requirements of the item, and be placed in accordance with the pertinent bid item as shown on the plans. 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 leaveout behind the post shall be a minimum of 7".
4. The type of approved post will be shown elsewhere in the plans. See the applicable standard sheets for additional details and information.
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. Depth of mow strip will be 4".
7. The limits of payment for asphaltic pavement or reinforced concrete will include leaveouts for posts.
8. The leave-outs shall be filled with no more than a 2-sack grout mixture (1 part cement, 5 parts water, and 14 parts sand by volume) with a 28-day compressive strength of approximately 120 psi or less. Provide grout of a consistency that will flow into and completly 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 rip rap mow strip.

ONLY FOR USE IN MAINTENANCE REPAIRS.

Texas Department of Transportation | Design Division Standard

METAL BEAM GUARD FENCE

(MOW STRIP)

MBGF (MS) - 19

FILE: mbgfms19.dgn	DN: TxDOT	CK: KM	DW: TXDOT	CK: CL
© TxDOT NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH 20, ETC
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		67

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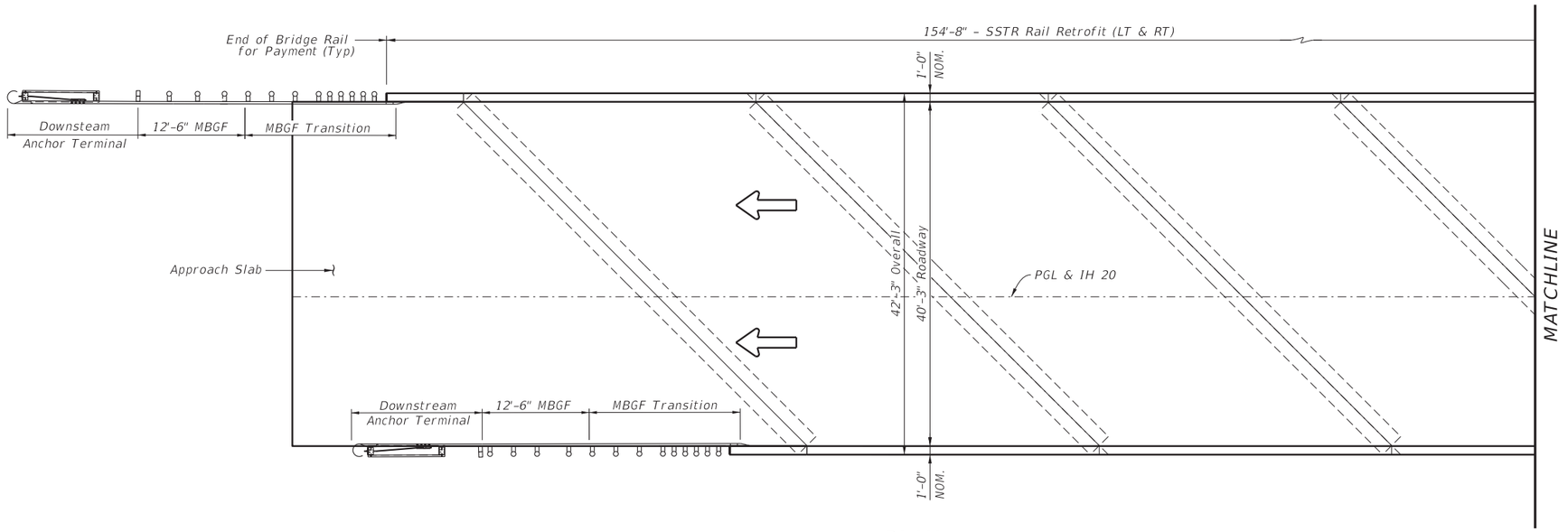
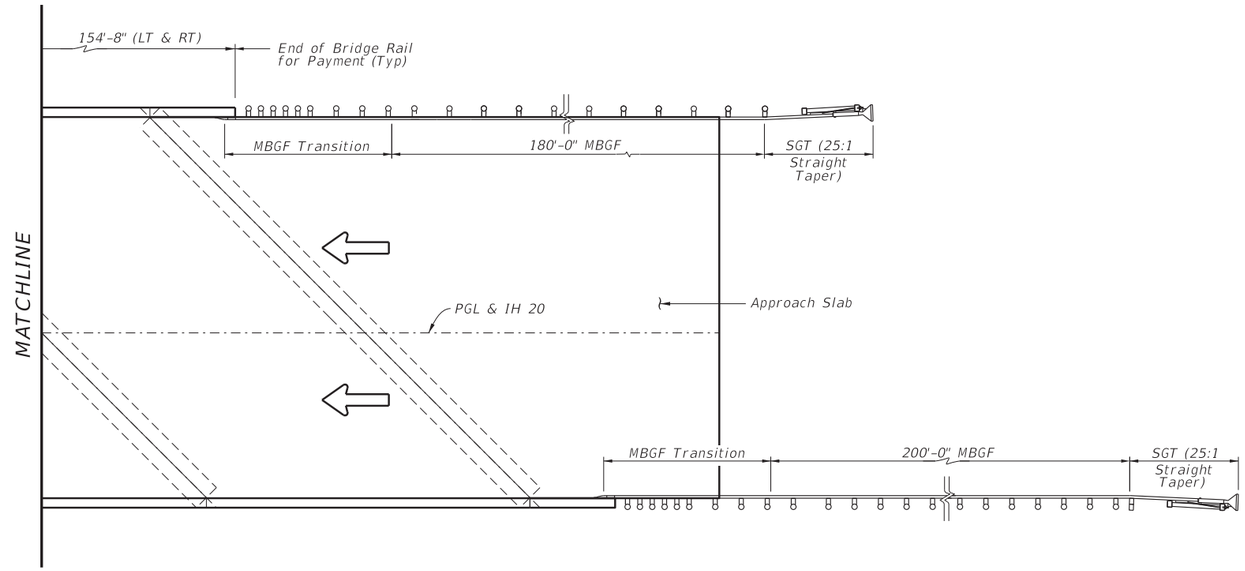
0540 6002	MTL W-BEAM GD FEN (STEEL POST)	405.0
		EA
0540 6006	MTL BEAM GD FEN TRANS (THRIE BEAM)	4
0544 6001	GUARDRAIL END TREATMENT (INSTALL)	4



PLAN



PLAN

STATE OF TEXAS
BLANCA M. PATTEE
90338
LICENSED PROFESSIONAL ENGINEER

12/06/2022

NBI #06-195-0-0003-05-088

Texas Department of Transportation | Bridge Division

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 20 WESTBOUND AT COWAN DRAW

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©TxDOT SEPT. 2022	CONT	SECT	JOB	HIGHWAY
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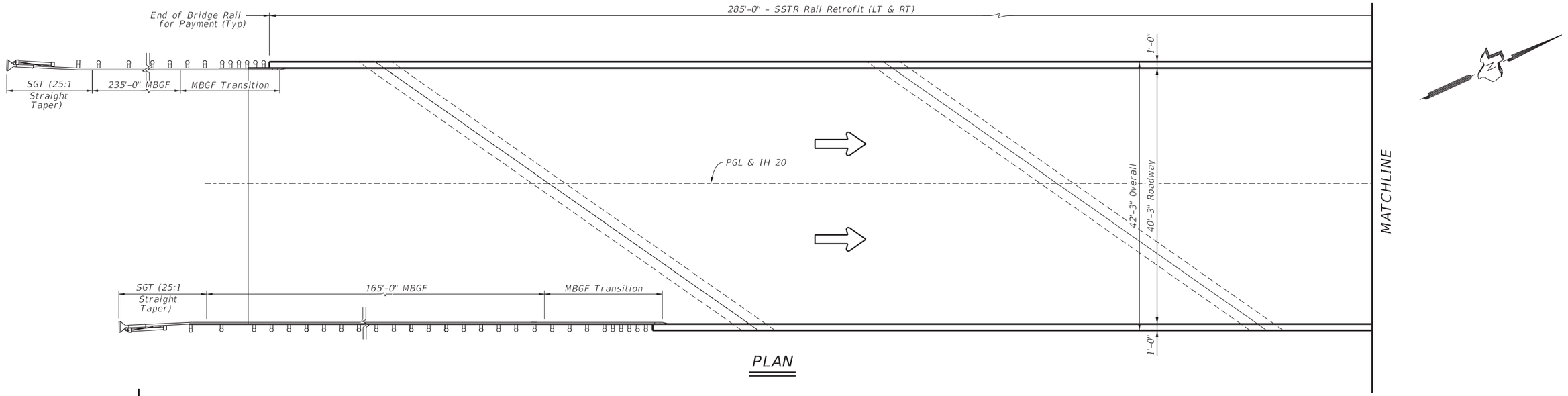
0544 6001	GUARDRAIL END TREATMENT (INSTALL)	4



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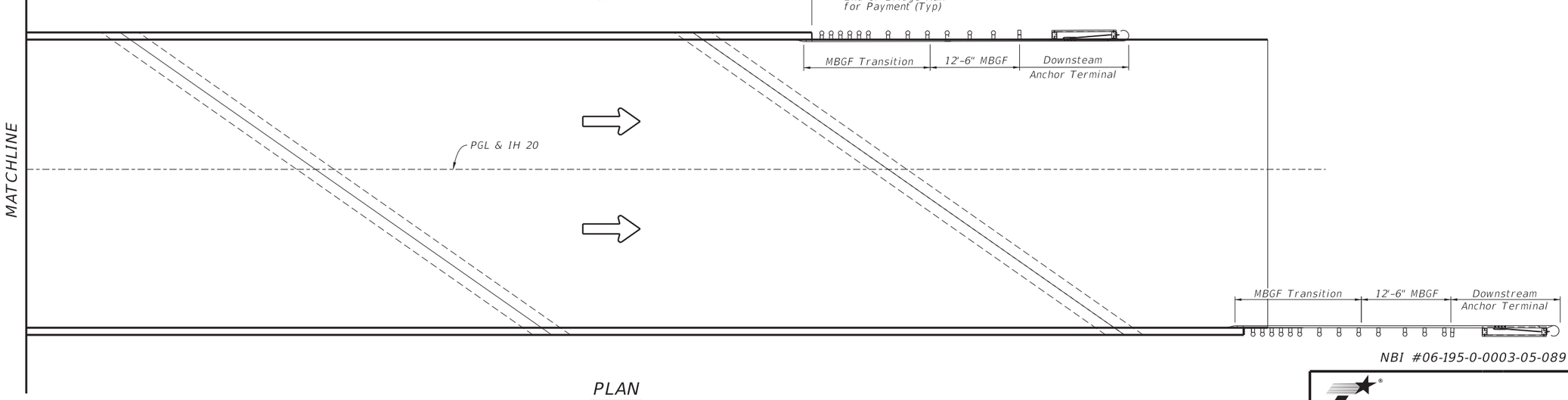

PLAN

NBI #06-195-0-0003-05-089

STATE OF TEXAS
JONATHAN J. BOLEWARE
128307
LICENSED PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation

Bridge Division

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 20 EASTBOUND AT NINE MILE DRAW

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0451 6025	RETROFIT RAIL (TY SSTR) (HPC)	442.0
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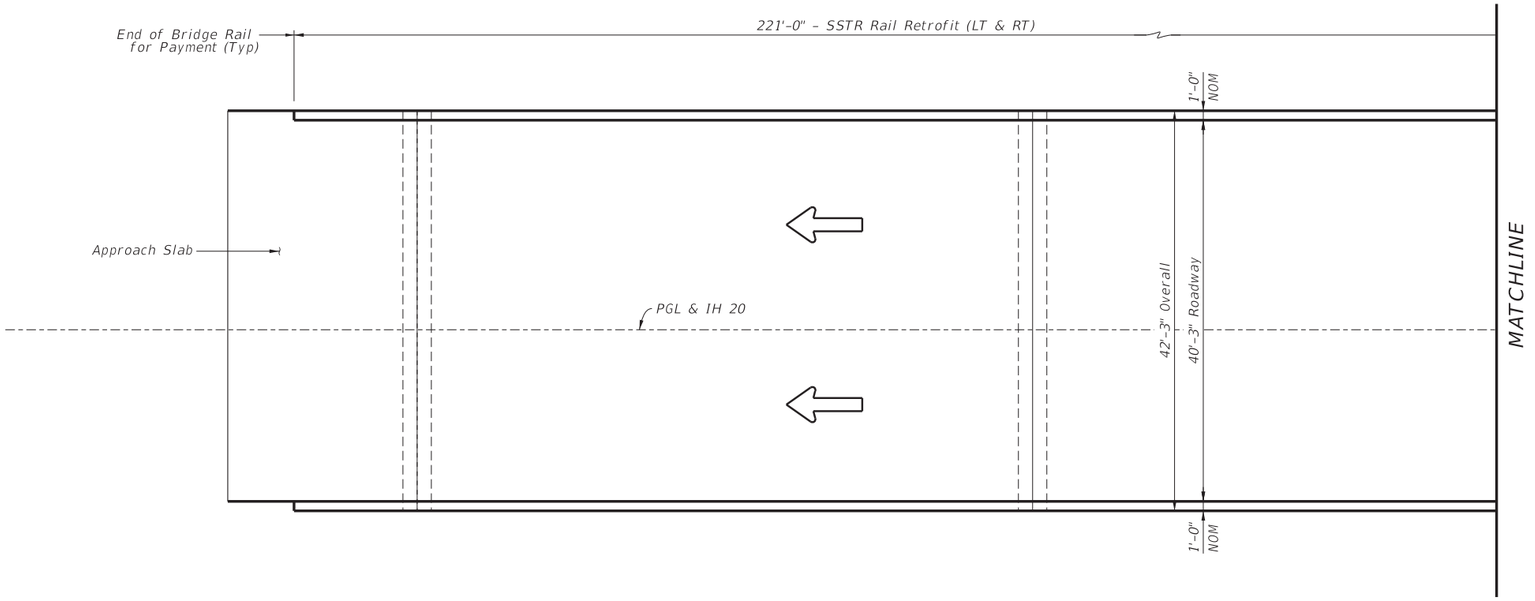
0540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	2
0544 6001	GUARDRAIL END TREATMENT (INSTALL)	2



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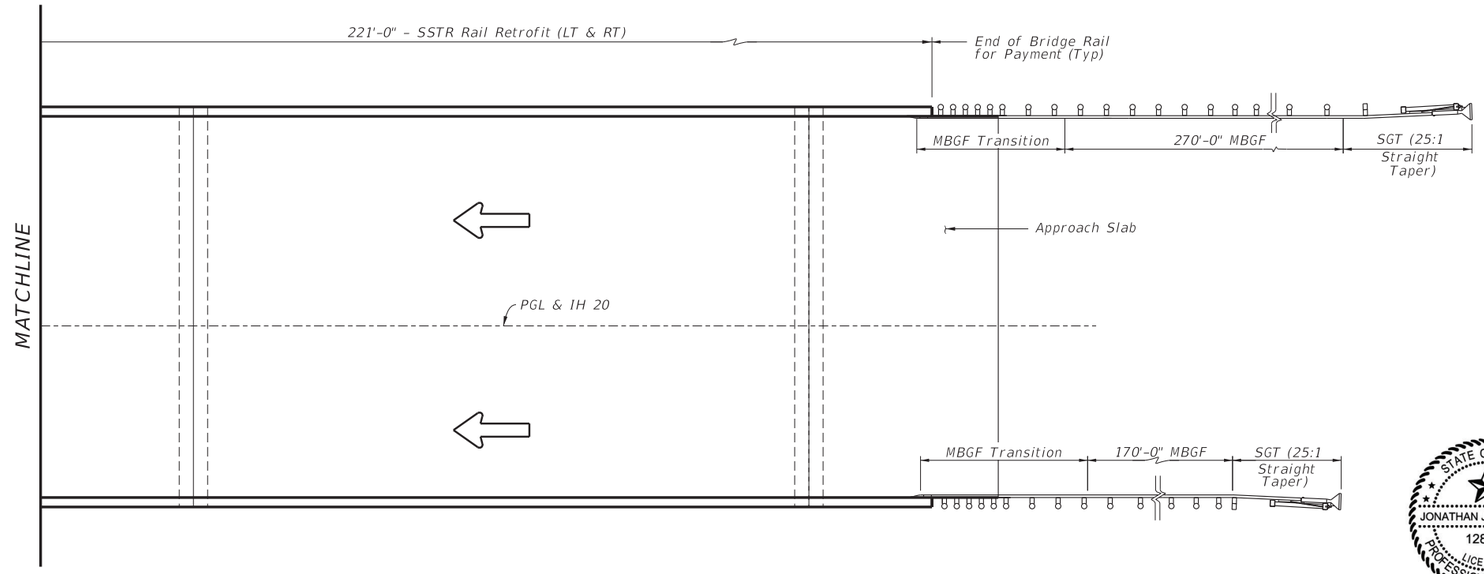

PLAN

STATE OF TEXAS
JONATHAN J. BOLEWARE
128307
LICENSED PROFESSIONAL ENGINEER

12/06/2022

NBI #06-195-0-0003-05-125

Texas Department of Transportation | Bridge Division

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 20 WESTBOUND AT STOCKS ROAD

FILE: IH0020_BRG_RL494ly03.dgn	DN: FWA	CK: OA	DW: ESE	CK: FWA
©TxDOT SEPT. 2022	CONT	SECT	JOB	HIGHWAY
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DATE: 9/12/2022 6:58:48 AM
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BID CODE	BID DESCRIPTION	LF
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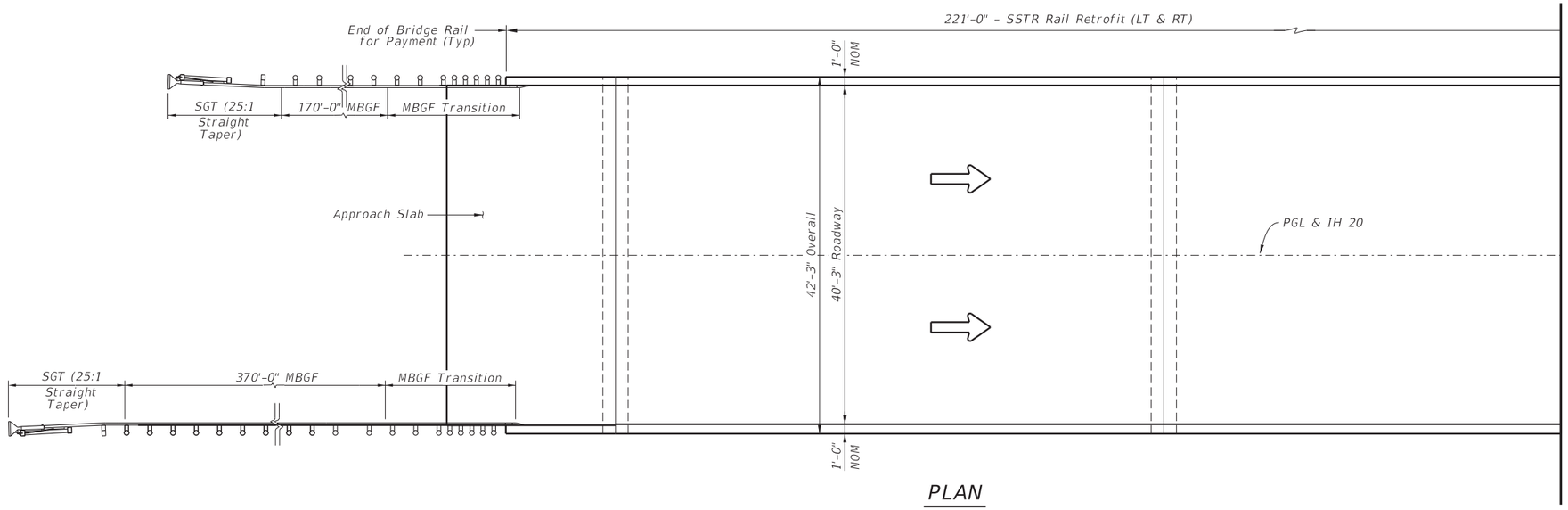

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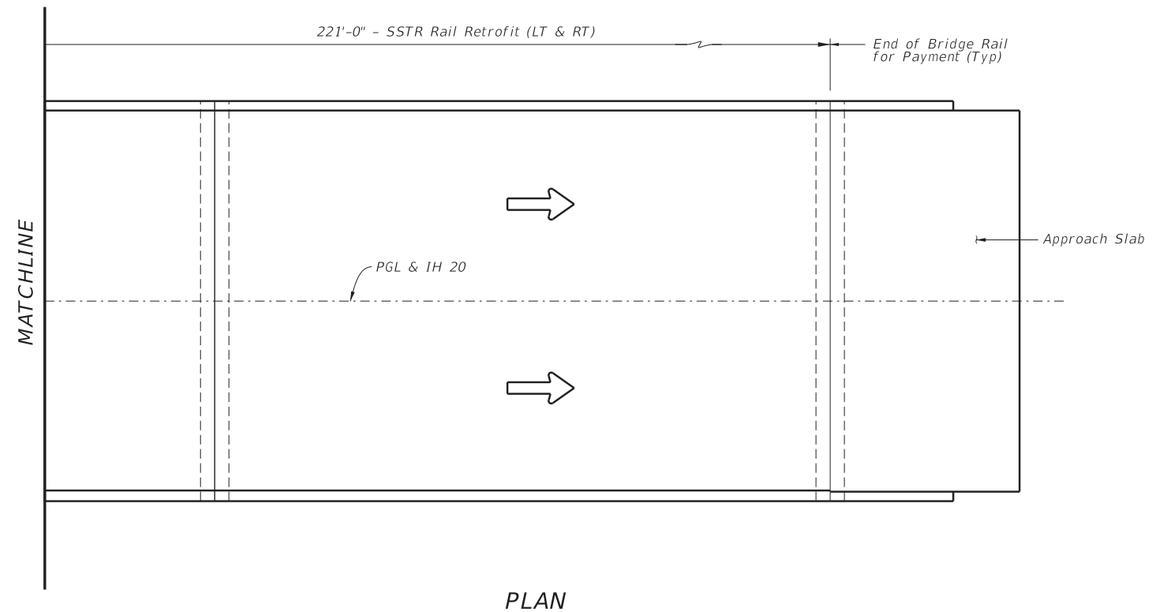

PLAN

NBI #06-195-0-0003-05-126

STATE OF TEXAS
BLANCA M. PATTEE
90338
LICENSED PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation | Bridge Division

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 20 EASTBOUND AT STOCKS ROAD

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0451 6025	RETROFIT RAIL (TY SSTR) (HPC)	390.0
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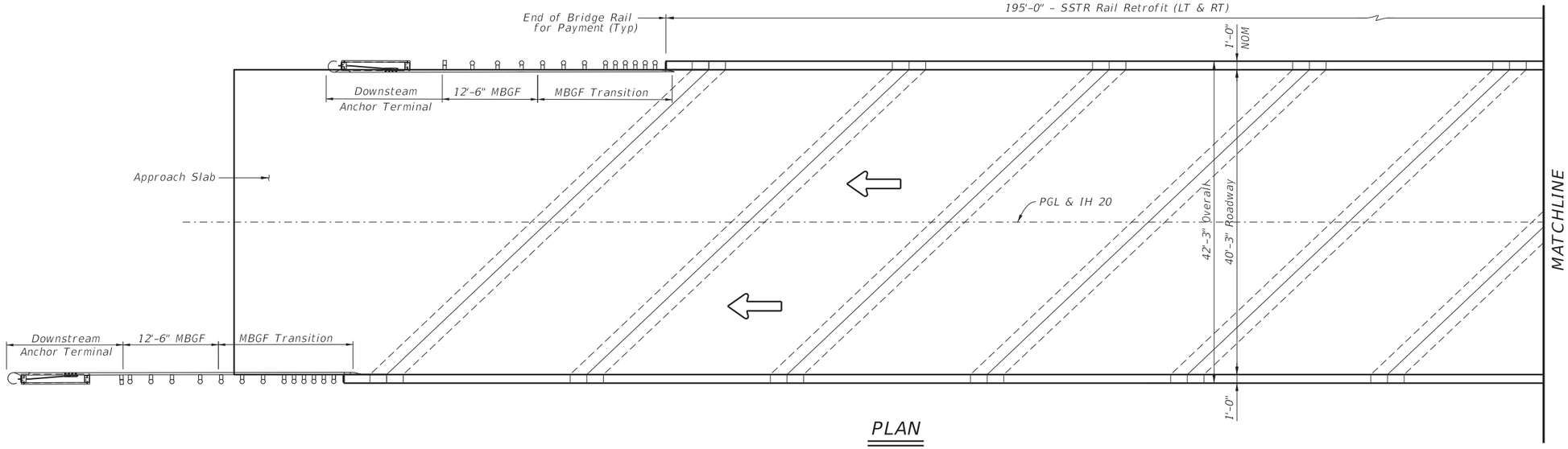

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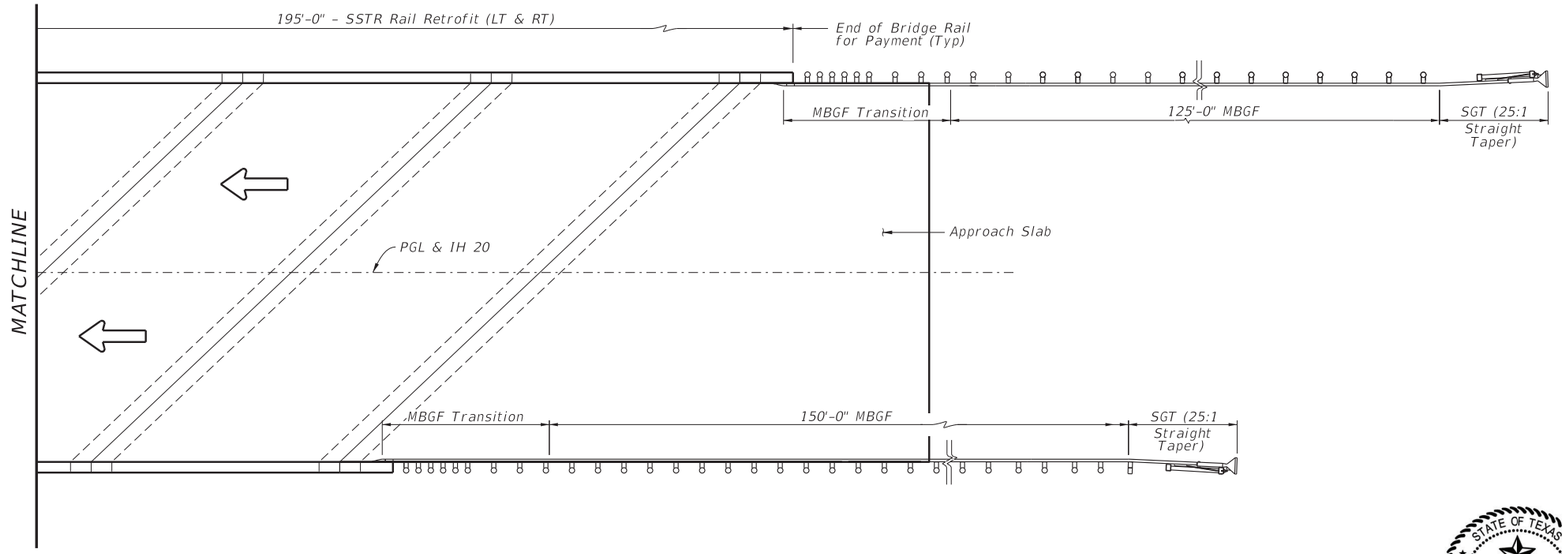

PLAN

NBI #06-195-0-0003-05-129

STATE OF TEXAS
BLANCA M. PATTEE
90338
LICENSED PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation | Bridge Division

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 20 WESTBOUND AT COWAN DRAW

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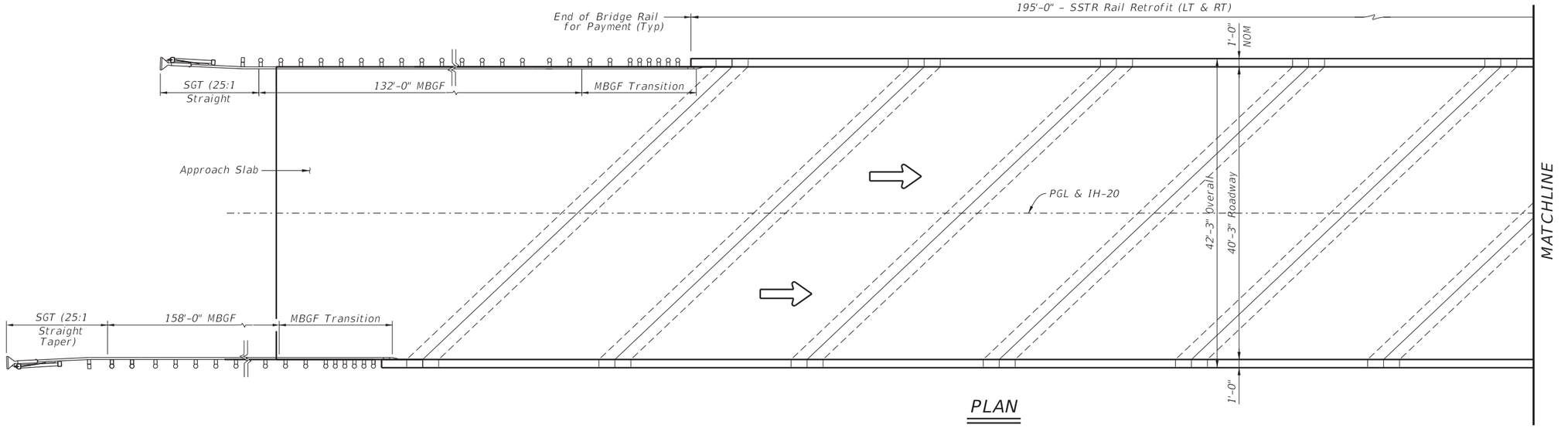

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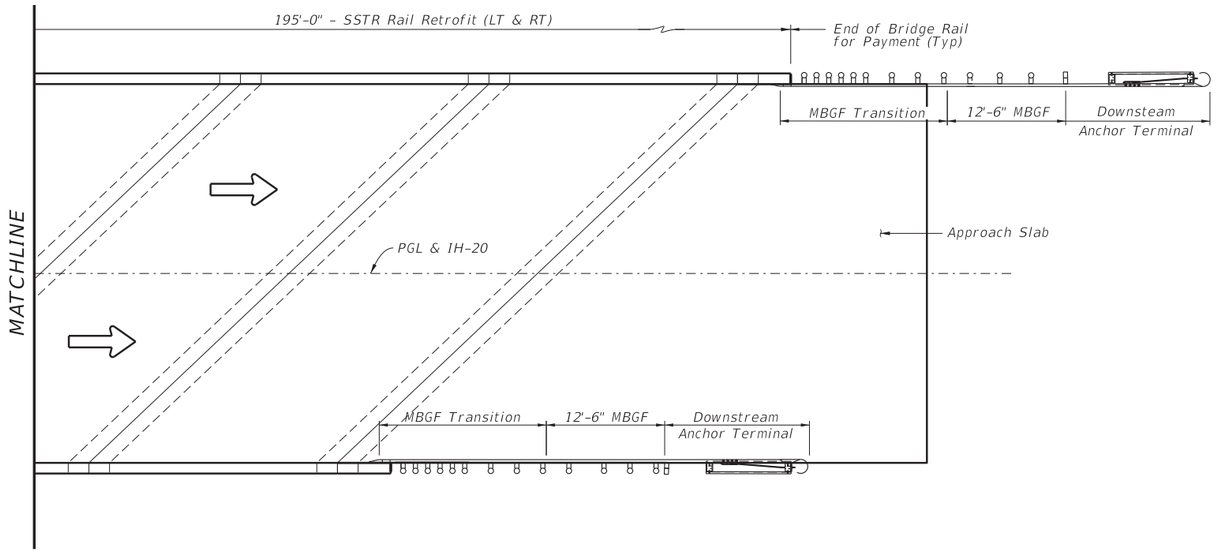

PLAN

NBI #06-195-0-0003-05-130

STATE OF TEXAS
BLANCA M. PATTEE
90338
LICENSED PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation

Bridge Division

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 10 EASTBOUND AT COWAN DRAW

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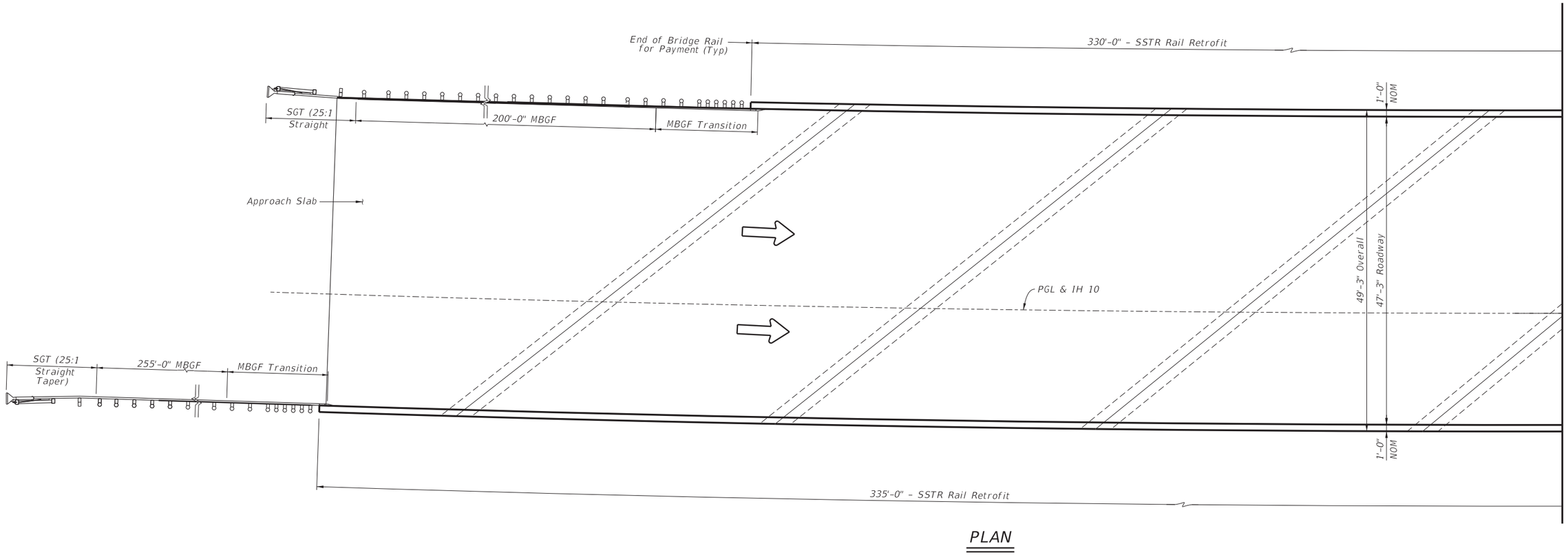

PLAN

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NBI #06-195-0-0441-09-056 SHEET 1 OF 2

STATE OF TEXAS
JONATHAN J. BOLEWARE
128307
LICENSED PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation | Bridge Division

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 10 EASTBOUND AT WEST COWAN DRAW

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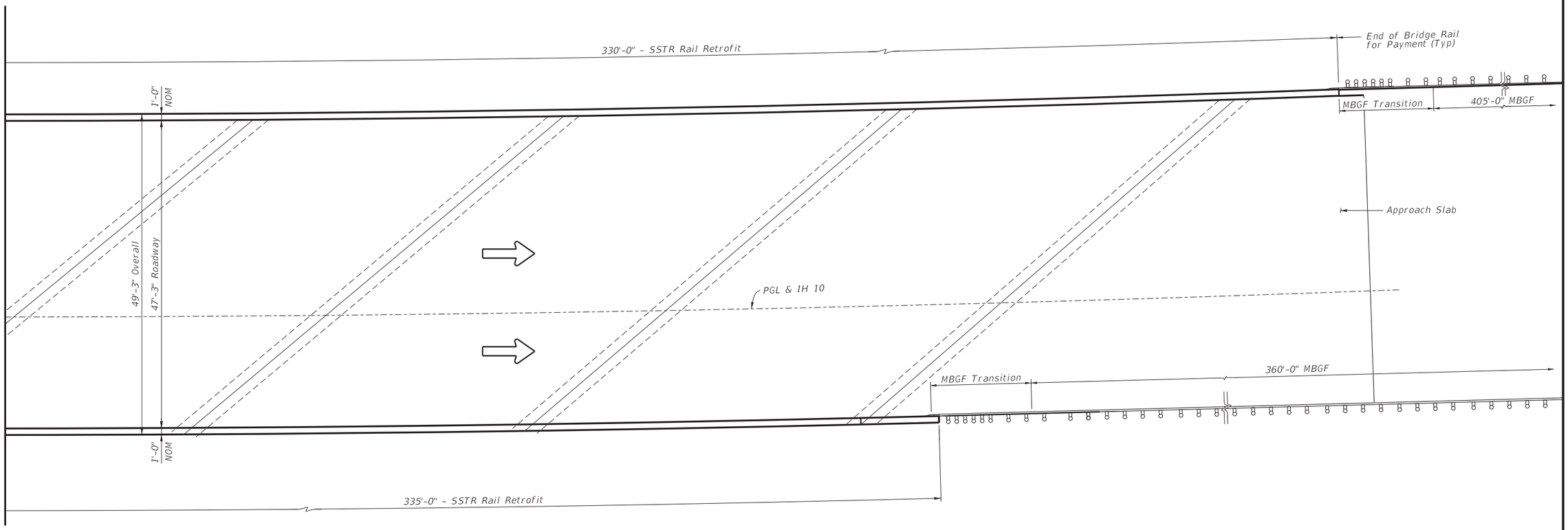


PLAN

NBI #06-195-0-0441-09-056 SHEET 2 OF 2

STATE OF TEXAS
JONATHAN J. BOLEWARE
128307
LICENSED
PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation | Bridge Division

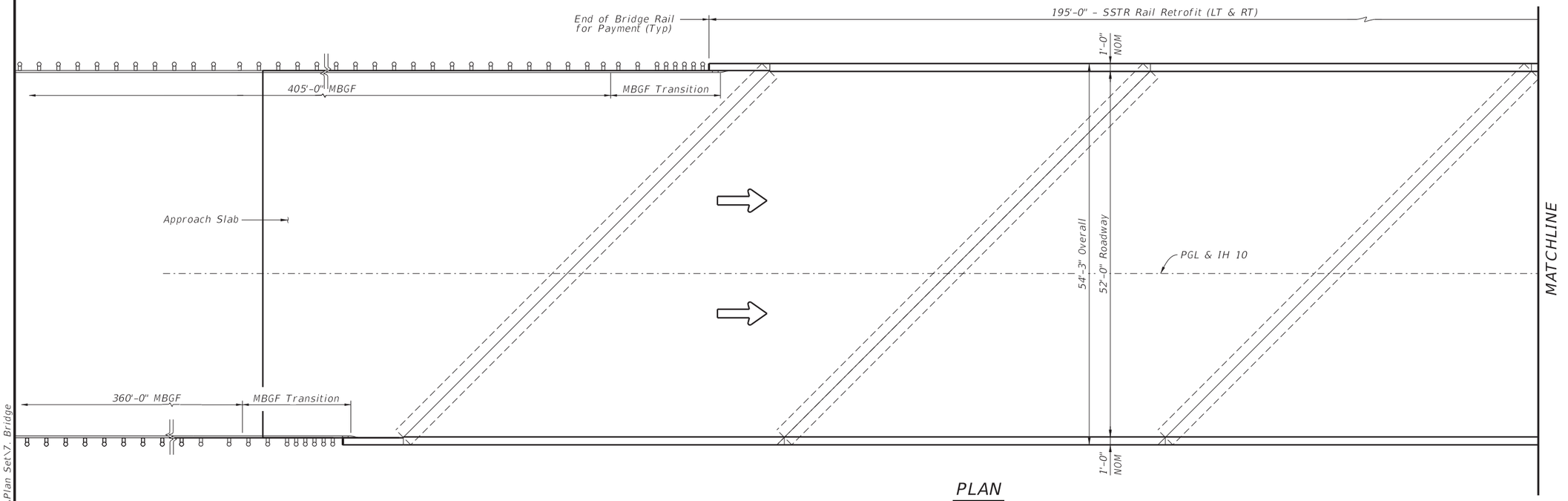
BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 10 EASTBOUND AT WEST COWAN DRAW

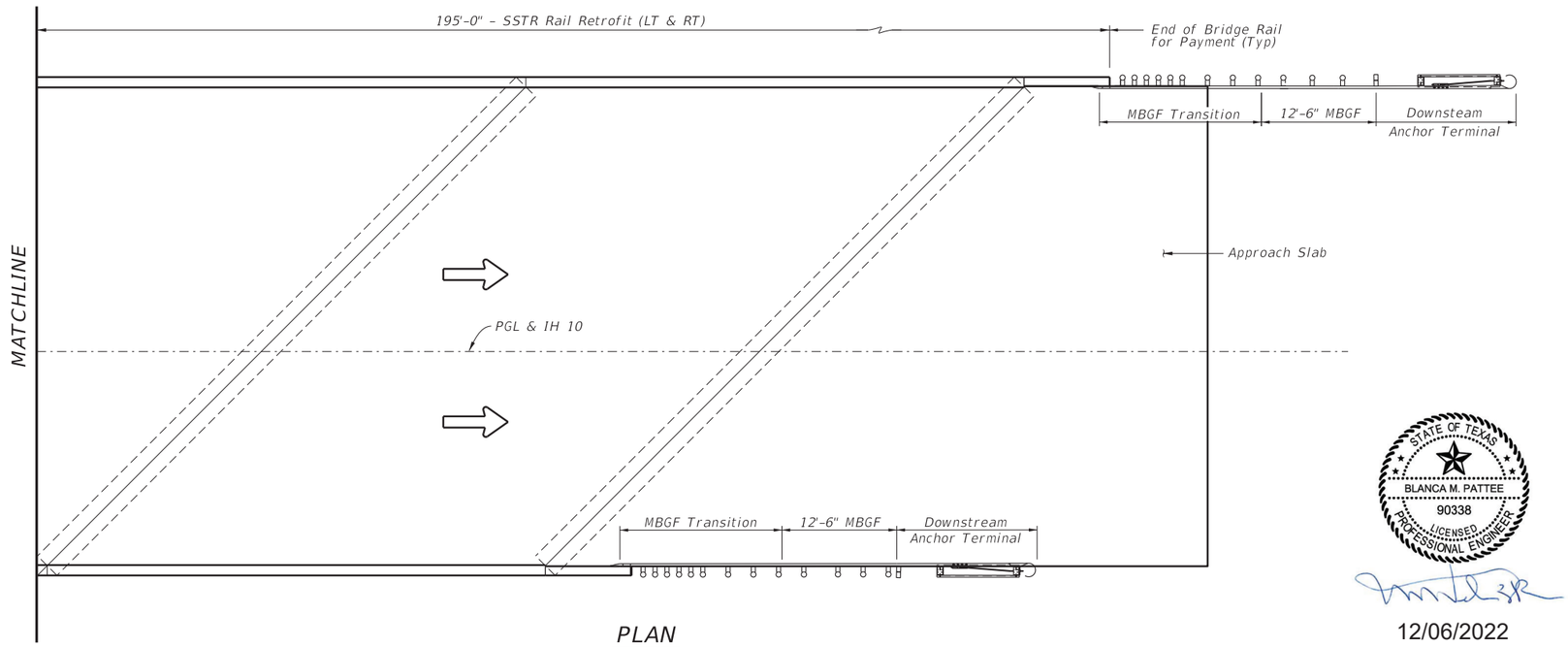
FILE: 1H0020_BRG_RL494ly07.dgn	DN: FWA	CK: OA	DW: ESE	CK: FWA
©TxDOT SEPT, 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	1H0010
	DIST	COUNTY		SHEET NO.
	0DA	REEVES		75

DATE: 9/12/2022 6:58:48 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\06 - ODA\Design Projects\000305055\4 - Design\Plan Set\7. Bridge

BID CODE	BID DESCRIPTION	LF
0451 6025	RETROFIT RAIL (TY SSTR) (HPC)	390.0
0540 6002	MTL W-BEAM GD FEN (STEEL POST)	790.0
		EA
0540 6006	MTL BEAM GD FEN TRANS (THRIE BEAM)	4
0544 6001	GUARDRAIL END TREATMENT (INSTALL)	2



PLAN



PLAN

NBI #06-195-0-0441-09-057

STATE OF TEXAS
BLANCA M. PATTEE
90338
LICENSED PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation | Bridge Division

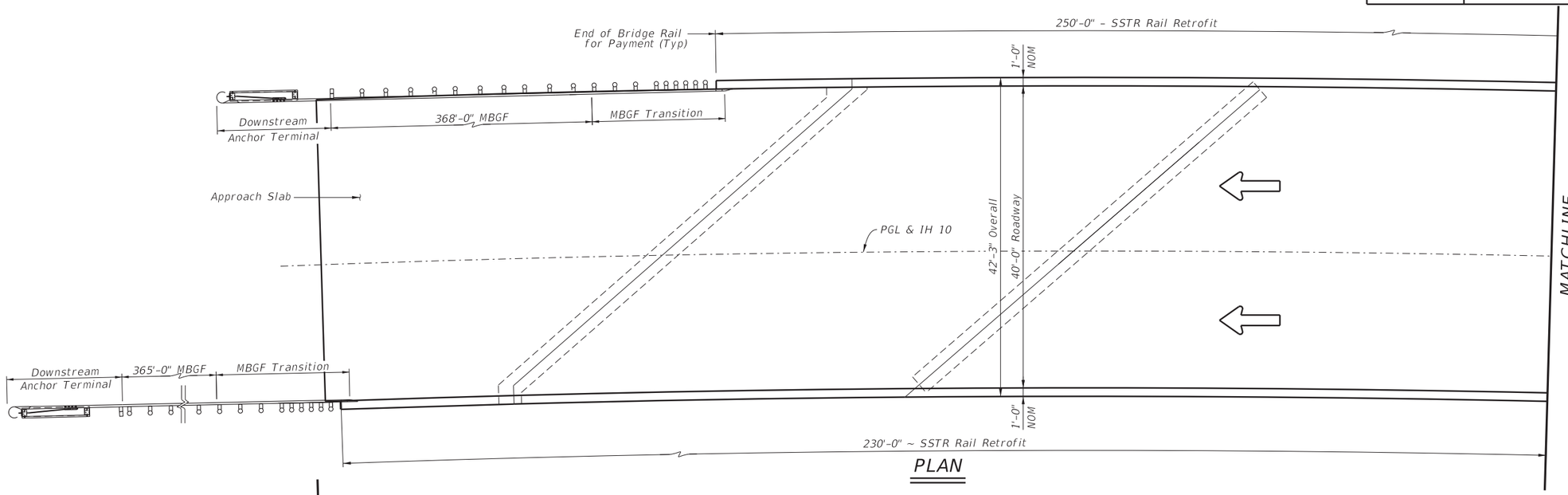
BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 10 EASTBOUND AT EAST COWAN DRAW

FILE: 1H0020_BRG_RL494ly08.dgn	DN: BMP	CK: OA	DW: ESE	CK: BMP
©TxDOT SEPT, 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	1H0020
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		76

DATE: 9/12/2022 7:38:17 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\06 - ODA\Design Projects\000305055\4 - Design\Plan Set\7. Bridge

BID CODE	BID DESCRIPTION	LF
0451 6025	RETROFIT RAIL (TY SSTR) (HPC)	480.0
0540 6002	MTL W-BEAM GD FEN (STEEL POST)	1988.0
		EA
0540 6006	MTL BEAM GD FEN TRANS (THRIE BEAM)	4
0544 6001	GUARDRAIL END TREATMENT (INSTALL)	2



PLAN

PLAN

NBI #06-195-0-0441-09-058

STATE OF TEXAS
BLANCA M. PATTEE
90338
LICENSED PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation

Bridge Division

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 10 WESTBOUND AT COWAN DRAW

FILE: 1H0020_BRG_RL494ly09.dgn	DN: BMP	CK: OA	DW: ESE	CK: BMP
©TxDOT SEPT. 2022	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	0DA	REEVES		77

DATE: 9/12/2022 6:41:13 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\06 - 0DA\Design Projects\00305055\4 - Design\Plan Set\7. Bridge

BID CODE	BID DESCRIPTION	LF
0451 6025	RETROFIT RAIL (TY SSTR) (HPC)	285.9
0540 6002	MTL W-BEAM GD FEN (STEEL POST)	375.0
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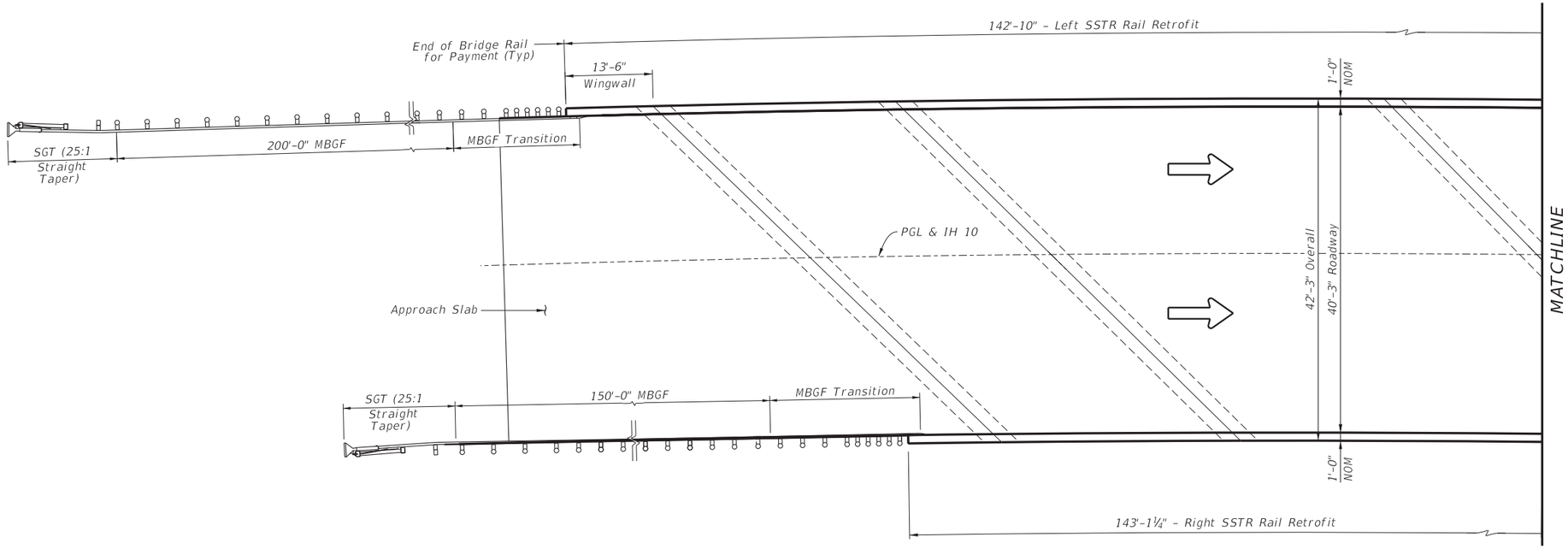
0540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	4
0544 6001	GUARDRAIL END TREATMENT (INSTALL)	4



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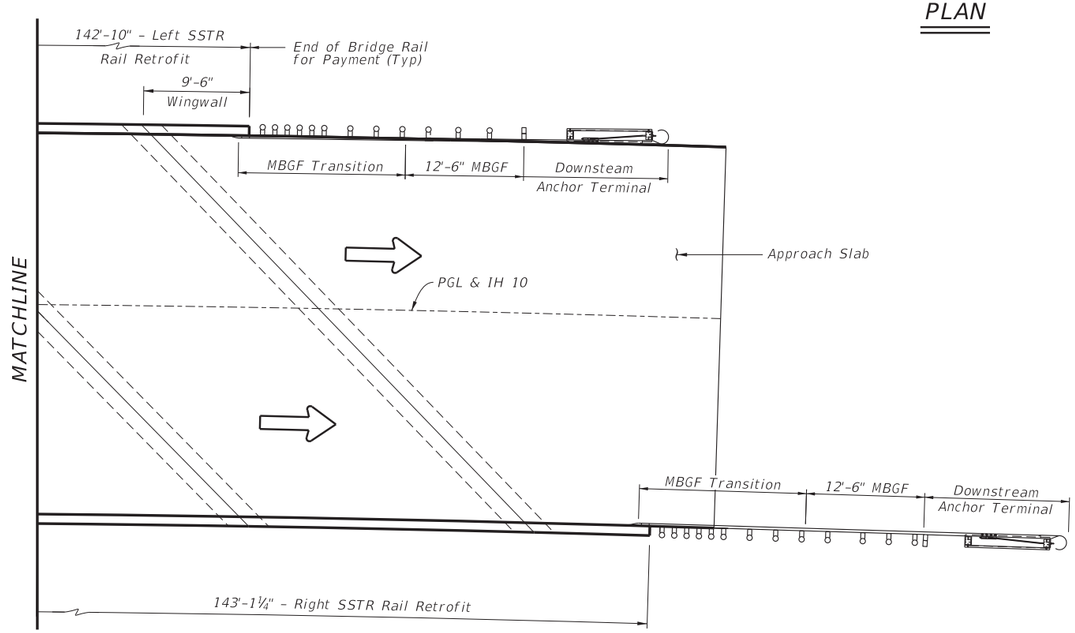


PLAN

NBI #06-195-0-0441-09-060

STATE OF TEXAS
JONATHAN J. BOLEWARE
128307
LICENSED PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation

Bridge Division

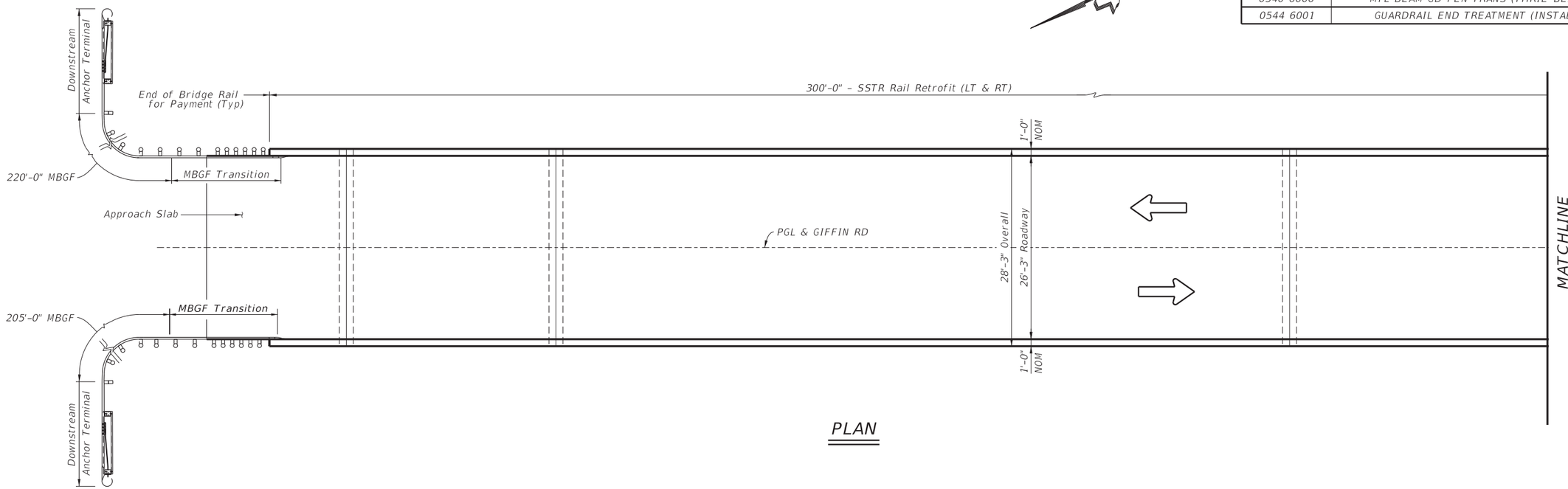
BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 10 EASTBOUND AT COLD SPRINGS DRAW

FILE: IH0020_BRG_RL494ly10.dgn	DN: FWA	CK: OA	DW: ESE	CK: FWA
©TxDOT SEPT. 2022	CONT.	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH0010
	DIST	COUNTY		SHEET NO.
	0DA	REEVES		78

DATE: 9/12/2022 6:43:41 AM
FILE: pw:\\txdot.projectwiseonline.com:TXDOT2\Documents\06 - 0DA Design Projects\000305055\4 - Design\Plan Set\7. Bridge

BID CODE	BID DESCRIPTION	LF
0451 6025	RETROFIT RAIL (TY SSTR) (HPC)	600.0
0540 6002	MTL W-BEAM GD FEN (STEEL POST)	901.0
		EA
0540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	4
0544 6001	GUARDRAIL END TREATMENT (INSTALL)	4



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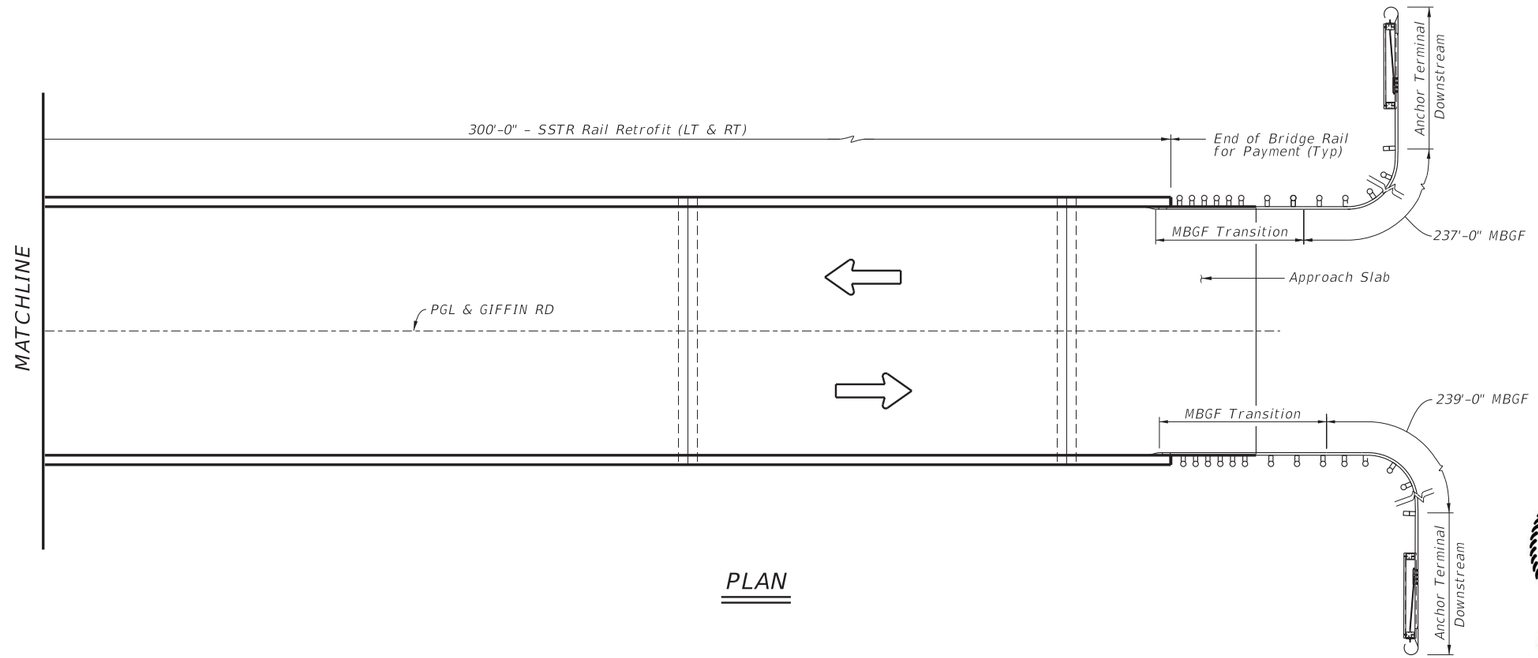

PLAN

NBI #06-195-0-0441-09-061

STATE OF TEXAS
JONATHAN J. BOLEWARE
128307
LICENSED
PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation

Bridge Division

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 10 WESTBOUND AT GIFFIN ROAD

FILE: IH0020_BRG_RL494ly11.dgn	DN: FWA	CK: OA	DW: ESE	CK: FWA
©TxDOT SEPT. 2022	CONT.	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH0010
	DIST	COUNTY		SHEET NO.
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DATE: 9/12/2022 6:45:45 AM
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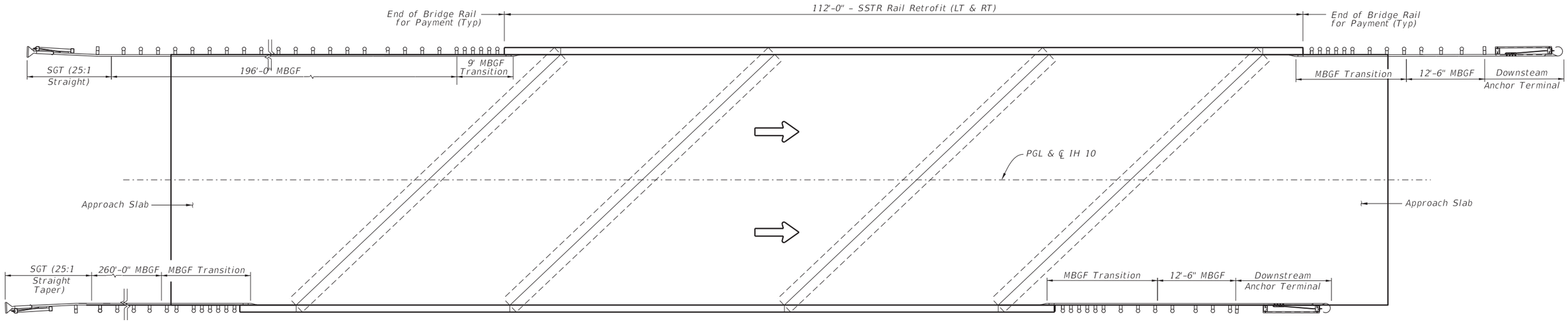
BID CODE	BID DESCRIPTION	LF
0451 6025	RETROFIT RAIL (TY SSTR) (HPC)	224.0
0540 6002	MTL W-BEAM GD FEN (STEEL POST)	481.0
		EA
0540 6006	MTL BEAM GD FEN TRANS (THRIE BEAM)	4
0544 6001	GUARDRAIL END TREATMENT (INSTALL)	4



PLAN

NBI #06-195-0-0441-09-063

STATE OF TEXAS
BLANCA M. PATTEE
90338
LICENSED PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation | Bridge Division

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 10 EASTBOUND AT SERVICE ROAD

FILE: IH0020_BRG_RL494ly12.dgn	DN: BMP	CK: OA	DW: ESE	CK: BMP
©TxDOT SEPT., 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH0020
	DIST	COUNTY		SHEET NO.
	0DA	REEVES		80

DATE: 9/12/2022 6:58:48 AM
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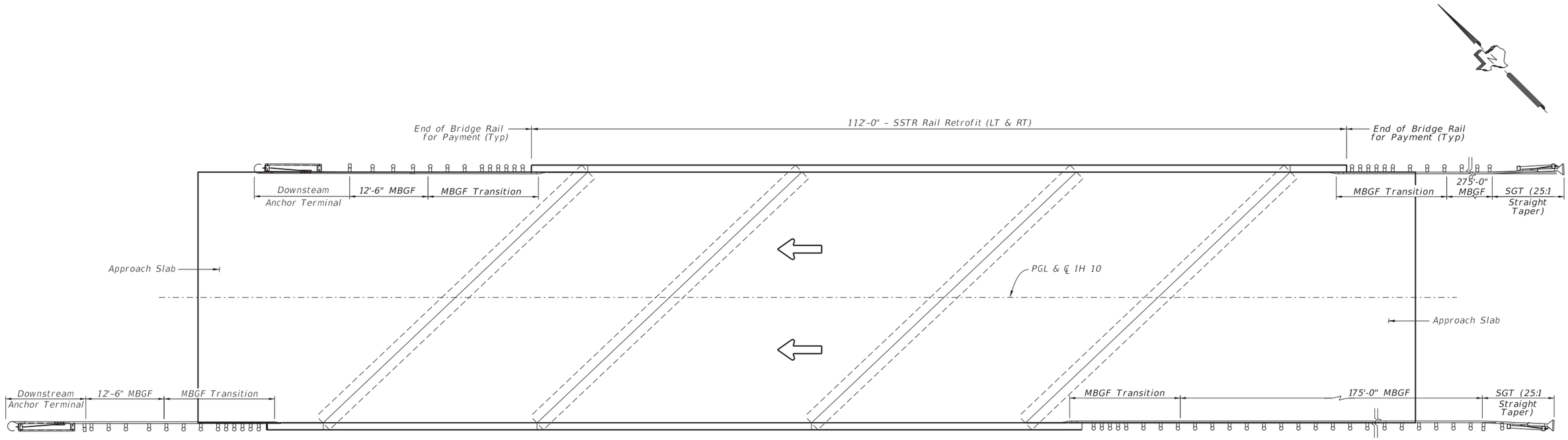
BID CODE	BID DESCRIPTION	LF
0451 6025	RETROFIT RAIL (TY SSTR) (HPC)	224.0
0540 6002	MTL W-BEAM GD FEN (STEEL POST)	475.0
		EA
0540 6006	MTL BEAM GD FEN TRANS (THRIE BEAM)	4
0544 6001	GUARDRAIL END TREATMENT (INSTALL)	4



PLAN

NBI #06-195-0-0441-09-064

STATE OF TEXAS
BLANCA M. PATTEE
90338
LICENSED PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation — Bridge Division

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 10 EASTBOUND AT SERVICE ROAD

FILE: IH0020_BRG_RL494ly12.dgn	DN: BMP	CK: OA	DW: ESE	CK: BMP
©TxDOT SEPT. 2022	CONT	SECT	JOB	HIGHWAY
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DATE: 9/12/2022 6:58:48 AM
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BID CODE	BID DESCRIPTION	LF
0451 6025	RETROFIT RAIL (TY SSTR) (HPC)	544.0
0540 6002	MTL W-BEAM GD FEN (STEEL POST)	1000.0
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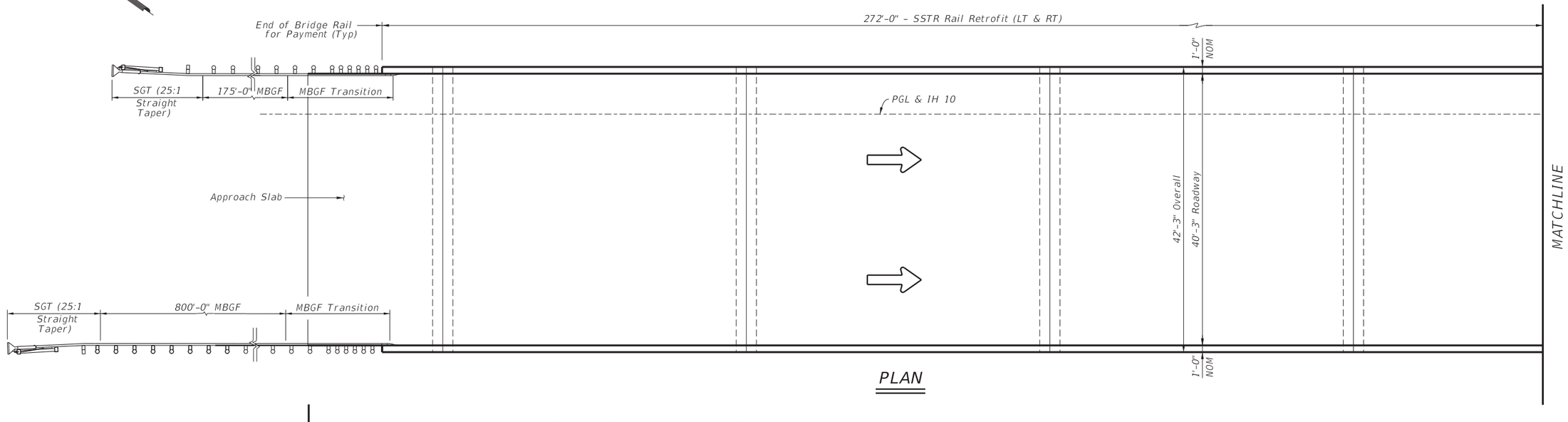
0540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	4
0544 6001	GUARDRAIL END TREATMENT (INSTALL)	4



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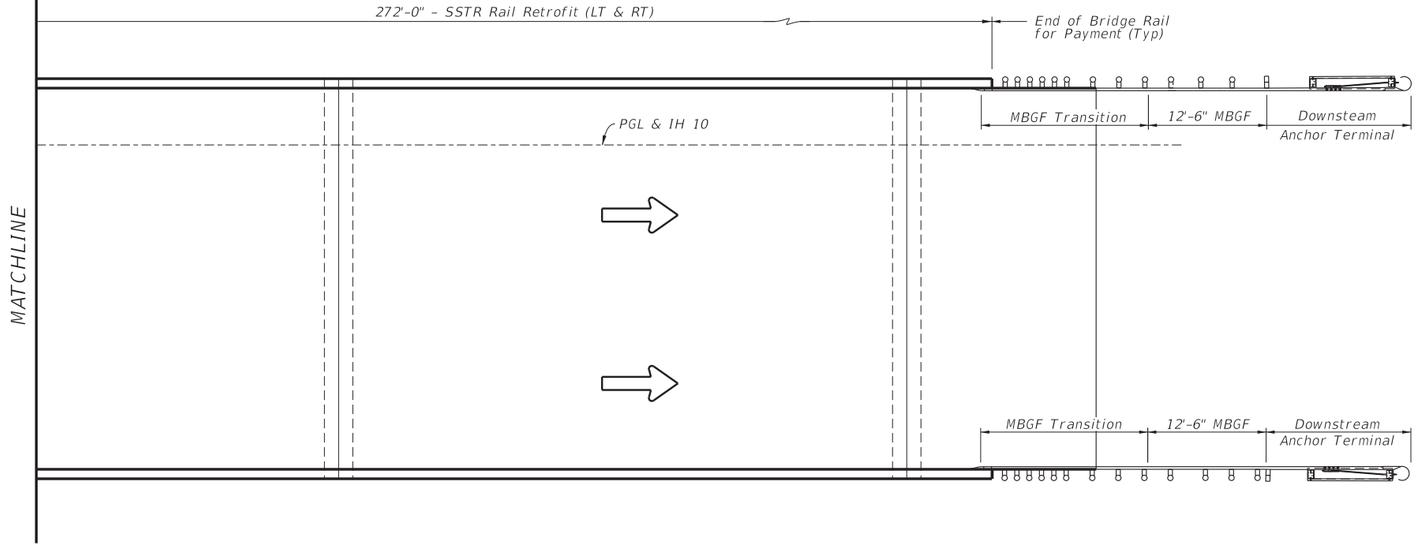

PLAN

NBI #06-195-0-0441-09-067

STATE OF TEXAS
JONATHAN J. BOLEWARE
128307
LICENSED PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation | Bridge Division

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 10 EASTBOUND AT JONES DRAW

FILE: IH0020_BRG_RL494ly13.dgn	DN: FHA	CK: OA	DW: ESE	CK: FHA
©TxDOT SEPT. 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH0010
	DIST	COUNTY		SHEET NO.
	0DA	REEVES		82

DATE: 9/12/2022 6:51:03 AM
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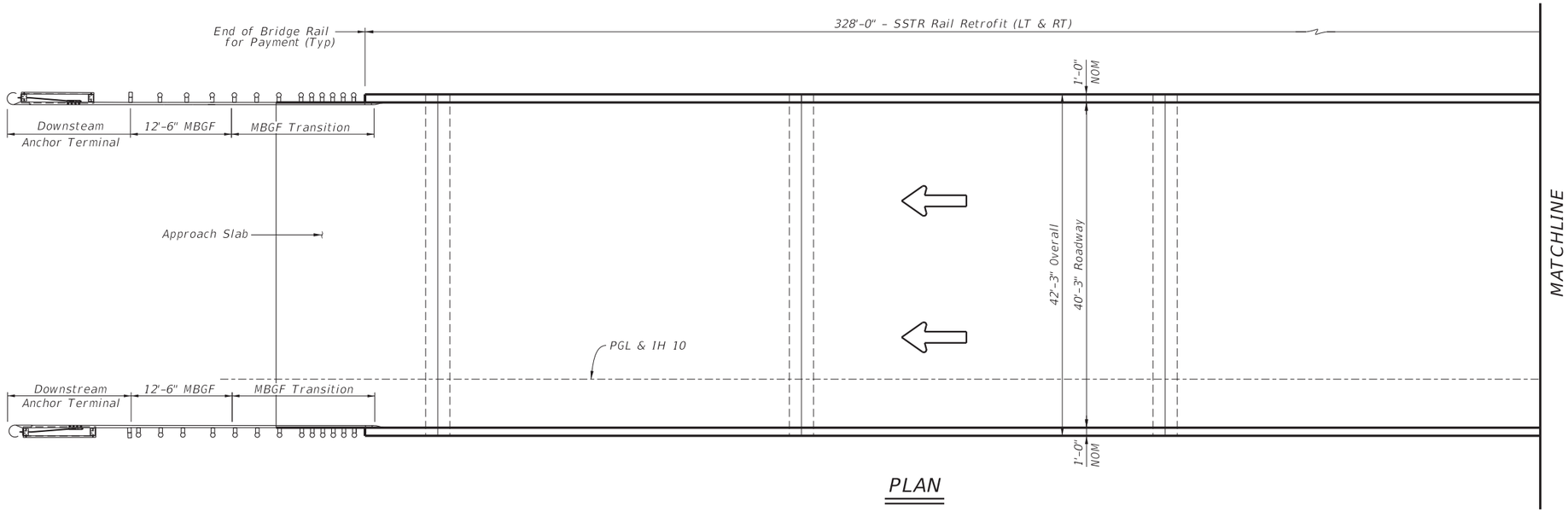
BID CODE	BID DESCRIPTION	LF
0451 6025	RETROFIT RAIL (TY SSTR) (HPC)	656.0
0540 6002	MTL W-BEAM GD FEN (STEEL POST)	575.0
		EA
0540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	4
0544 6001	GUARDRAIL END TREATMENT (INSTALL)	2



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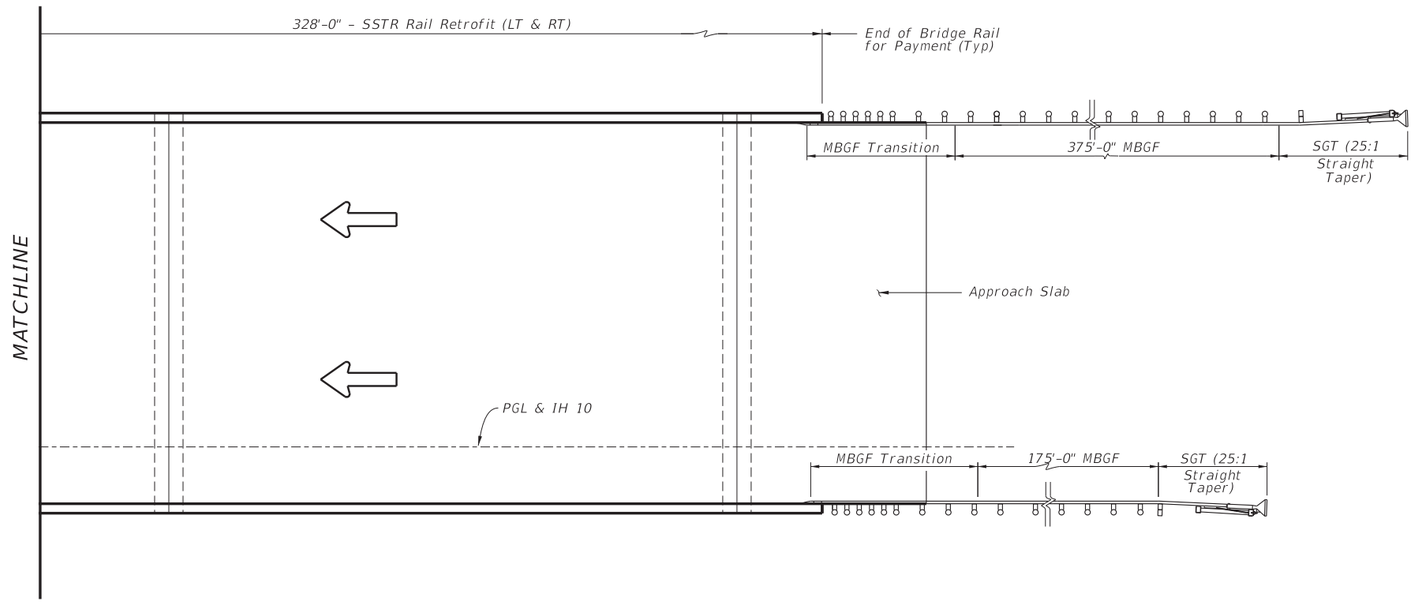

PLAN

STATE OF TEXAS
JONATHAN J. BOLEWARE
128307
LICENSED PROFESSIONAL ENGINEER

12/06/2022

NBI #06-195-0-0441-09-068

Texas Department of Transportation — Bridge Division

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 10 WESTBOUND AT JONES DRAW

FILE: IH0020_BRG_RL494ly14.dgn	DN: FHA	CK: OA	DW: ESE	CK: FHA
©TxDOT SEPT. 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH0010
	DIST	COUNTY		SHEET NO.
	0DA	REEVES		83

DATE: 9/12/2022 6:53:15 AM
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BID CODE	BID DESCRIPTION	LF
0451 6025	RETROFIT RAIL (TY SSTR) (HPC)	654.0
0540 6002	MTL W-BEAM GD FEN (STEEL POST)	672.0
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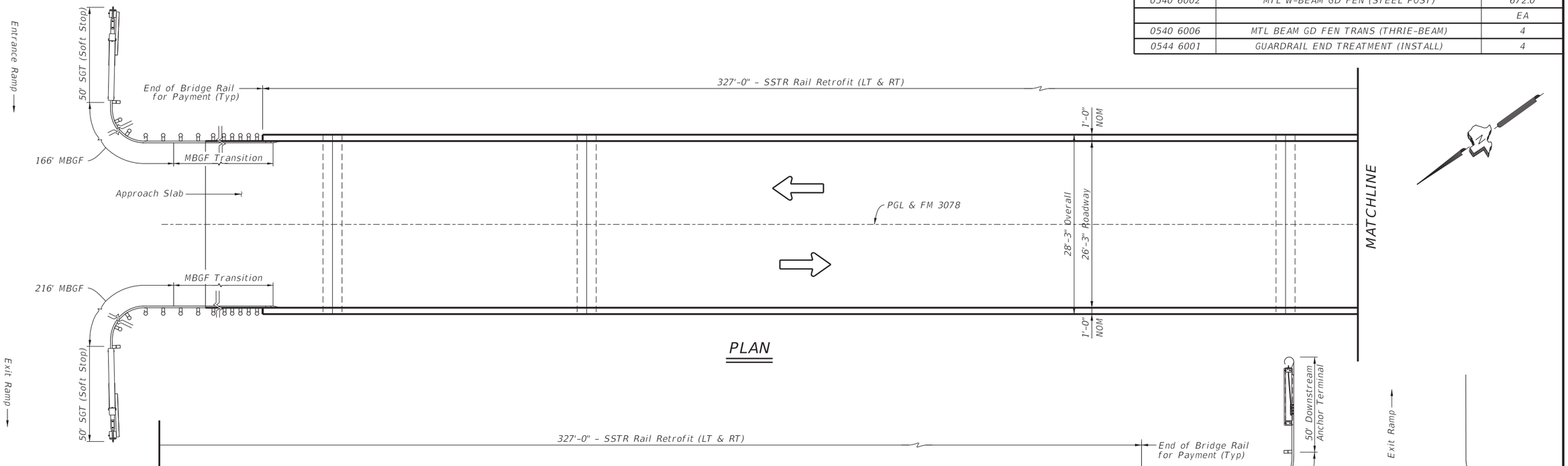
0540 6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	4
0544 6001	GUARDRAIL END TREATMENT (INSTALL)	4



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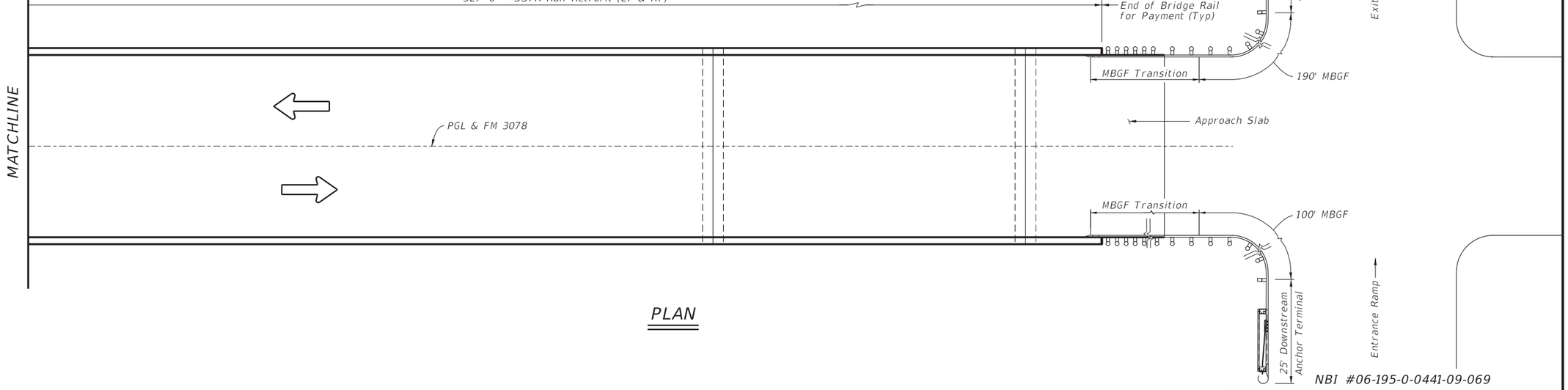

PLAN

NBI #06-195-0-0441-09-069

STATE OF TEXAS
JONATHAN J. BOLEWARE
128307
LICENSED PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation — Bridge Division

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 10 UNDERPASS AT FM 3078

FILE: IH0020_BRG_RL494ly15.dgn	DN: FHA	CK: OA	DW: ESE	CK: FHA
©TxDOT SEPT, 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH0010
	DIST	COUNTY		SHEET NO.
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DATE: 9/12/2022 6:54:50 AM
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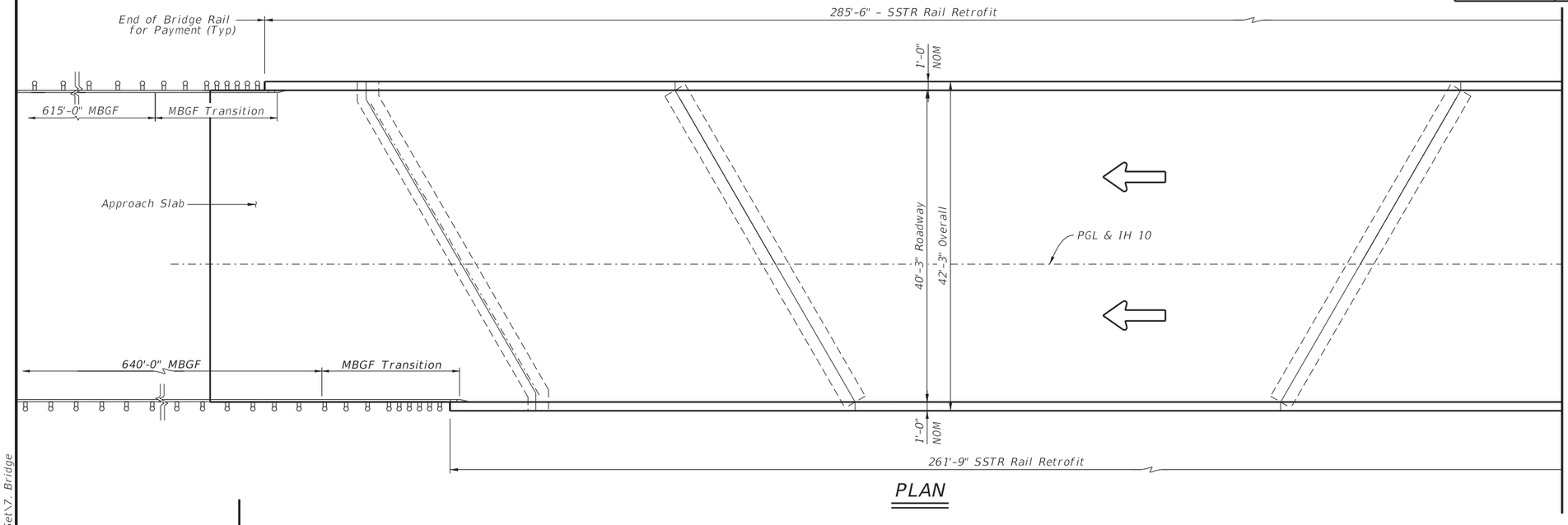
BID CODE	BID DESCRIPTION	LF
0451 6025	RETROFIT RAIL (TY SSTR) (HPC)	547.3
0540 6002	MTL W-BEAM GD FEN (STEEL POST)	500.0
		EA
0540 6006	MTL BEAM GD FEN TRANS (THRIE BEAM)	4
0544 6001	GUARDRAIL END TREATMENT (INSTALL)	2



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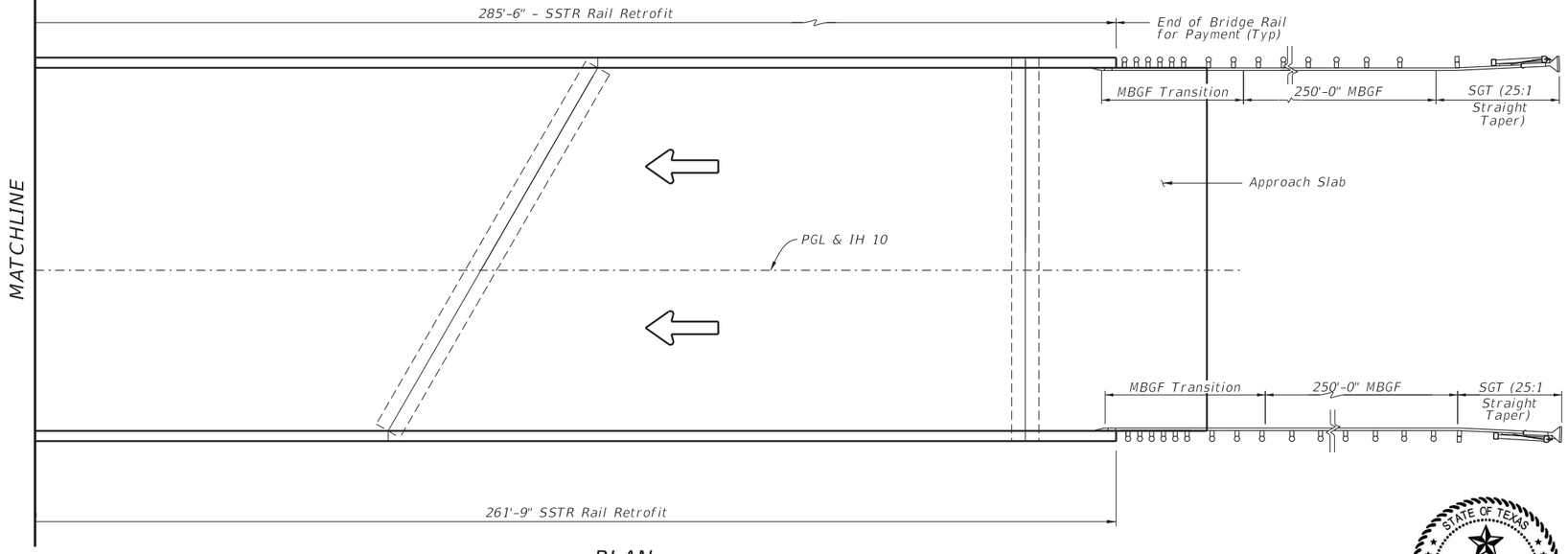

PLAN

NBI #06-195-0-0441-09-176

STATE OF TEXAS
BLANCA M. PATTEE
90338
LICENSED PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation | Bridge Division

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

IH 10 WESTBOUND AT COLD SPRING DRAW

FILE: 1H0020_BRG_RL494ly16.dgn	DN: BMP	CK: OA	DW: ESE	CK: BMP
©TxDOT SEPT. 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	1H0020
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DATE: 9/12/2022 7:46:50 AM
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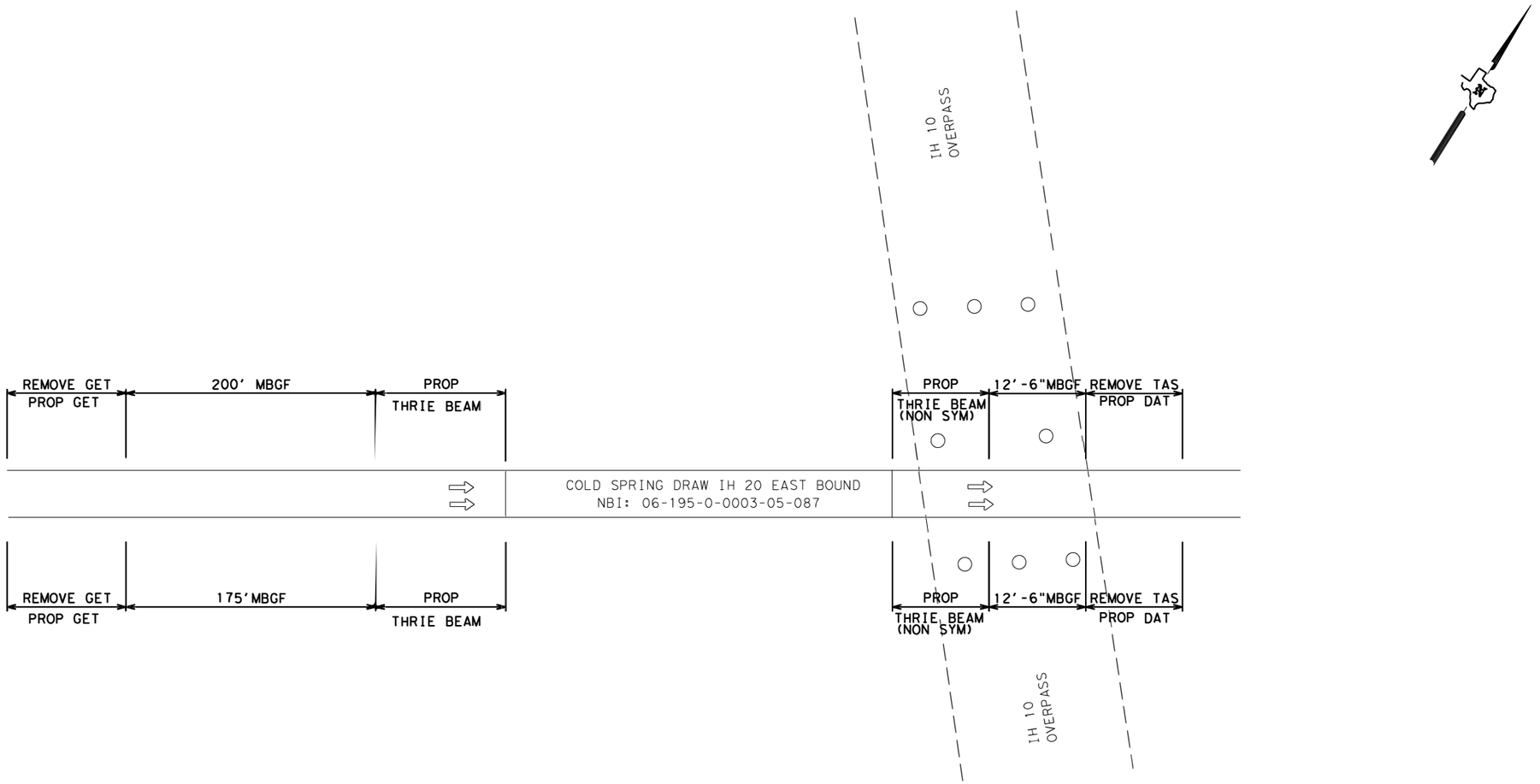


MBGF SUMMARY

	REMOVAL			PROPOSED							
	0542 6001	0542 6002	0544 6003	0540 6002	0540 6006	0540 6018	0544 6001	0658 6015	0658 6028	0658 6099	0432 6045
	REMOVE METAL BEAM GUARD FENCE	REMOVE TERMINAL ANCHOR SECTION	GUARDRAIL END TREATMENT (REMOVE)	MTL W-BEAM GD FEN (STEEL POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	MTL BM GD FEN TRANS (NON - SYM)	GUARDRAIL END TREATMENT (INSTALL)	INSTL DEL ASSM (D-SW)SZ (BRF)GF1	INSTL DEL ASSM (D-SY)SZ (BRF)GF1	INSTL OM ASSM (OM-2Z)(WFLX)GND	RIPRAP (MOW STRIP)(4 IN)
	LF	EA	EA	LF	EA	EA	EA	EA	EA	EA	CY
IH 20 WB	213	1	1	213	1	1	1	3		2	10
IH 20 WB	162	1	1	162	1	1	1		3		9
SHEET TOTAL	375	2	2	375	2	2	2	3	3	2	19

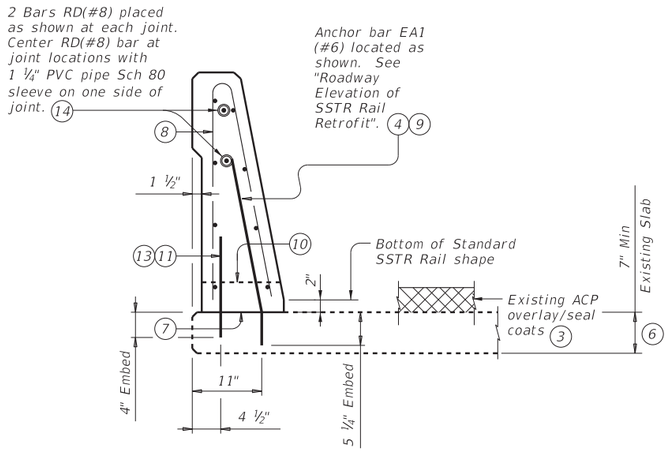
STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

RICARDO C BETANCOURT, P.E. 12/19/22

BRIDGE LAYOUT (SSTR RAIL RETROFIT)

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			86
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



SSTR RAIL

RAIL RETROFIT SECTIONS ON CONCRETE SLABS USING ADHESIVE ANCHORS (2)

NBI #06-195-0-0003-05-089
NBI #06-195-0-0003-05-125
NBI #06-195-0-0003-05-126
NBI #06-195-0-0003-05-129
NBI #06-195-0-0003-05-130
NBI #06-195-0-0441-09-056
NBI #06-195-0-0441-09-058
NBI #06-195-0-0441-09-060
NBI #06-195-0-0441-09-061
NBI #06-195-0-0441-09-067
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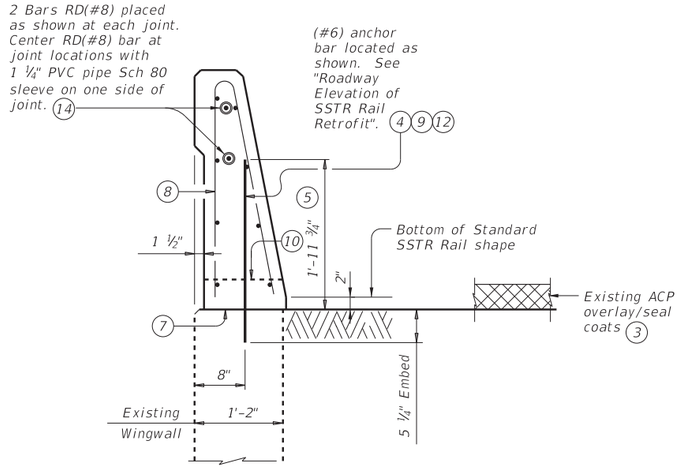
NBI #06-195-0-0441-09-069
NBI #06-195-0-0441-09-176



SSTR RAIL

RAIL RETROFIT SECTIONS ON CONCRETE WINGWALLS USING ADHESIVE ANCHORS (2)

ALL BRIDGES

(1) Remove existing T1 rail. Cut and grind flush all existing anchor bolts extending from top of slab and wingwall. Paint exposed bolt ends with two coats of zinc-rich paint conforming to Item 445, "Galvanizing". For concrete rails, do the same to existing reinforcing steel as detailed for existing anchor bolts.

(2) See Traffic Rail Standard Type SSTR for notes and details not shown.

(3) Remove ACP overlay/seal coats as needed for SSTR rail retrofit. If thickness of overlay/seal coat exceeds 2" at toe of rail, taper overlay at 1:10 slope or flatter along shoulder width to ensure the final overlay/seal coat thickness at the toe of the rail does not exceed 2".

(4) 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) Increase by amount of existing overlay/seal coat thickness, not to exceed 2".

(6) Use drill equipped with depth gauge stop device to keep from drilling through bottom of slab. If hole extends to bottom of slab, plug bottom of hole prior to placing epoxy anchor system. Do not drill substitute hole next to drilled through hole.

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

(8) 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.

(9) See "Roadway Elevation of SSTR Rail Retrofit" for EA1(#6) bar spacing.

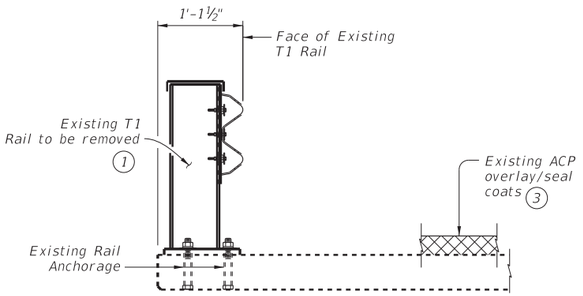
(10) See "Roadway Elevation of SSTR Rail Retrofit" for side slot drain spacing. Provide 8'-0" min. clear spacing between drain slots. Provide drainage slots on the low side rail only. Do not place drainage slots over lower roadways.

(11) 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).

(12) (#6) anchor bars need to be rotated slightly to fit in designated area, as shown.

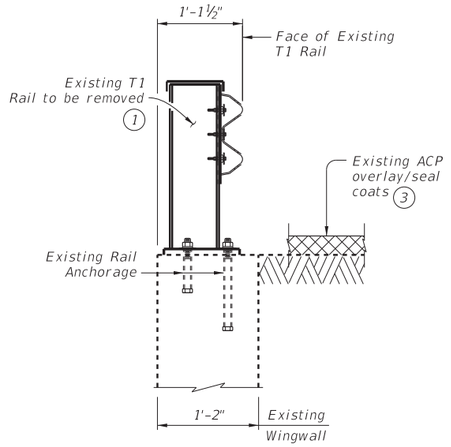
(13) Secondary (#4) adhesive anchor in rail retrofit not shown for clarity in "Roadway Elevation of SSTR Rail Retrofit".

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



EXISTING T1 RAIL ON SLAB

(T101 Rail is similar)



EXISTING T1 RAIL ON WINGWALL

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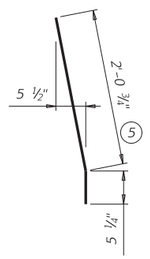

ANCHOR BAR EA1 (#6)

SHEET 1 OF 3

STATE OF TEXAS
BLANCA M. PATTEE
90338
LICENSED PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation — Bridge Division

SSTR RAIL RETROFIT DETAILS

FILE: 1H0020_BRG_RL494mi01.dgn	DN: BMP	CK: OA	DW: ESE	CK: BMP
©TxDOT SEPT. 2022	CONT	SECT	JOB	HIGHWAY
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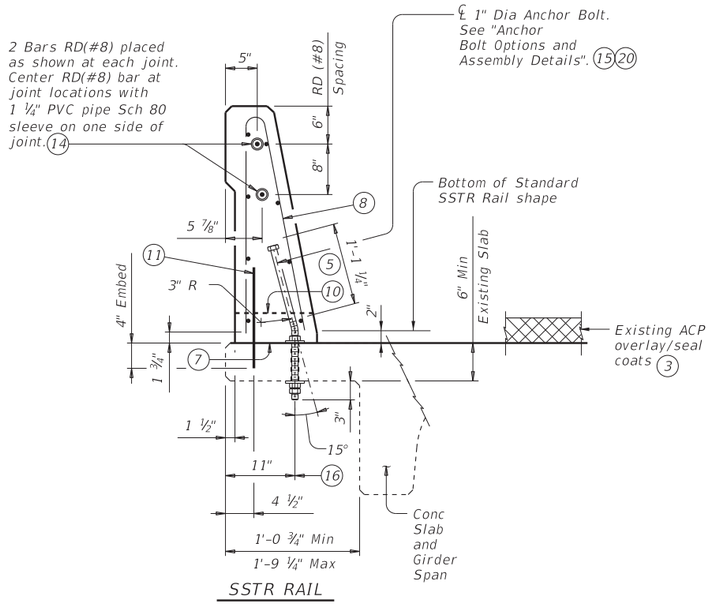
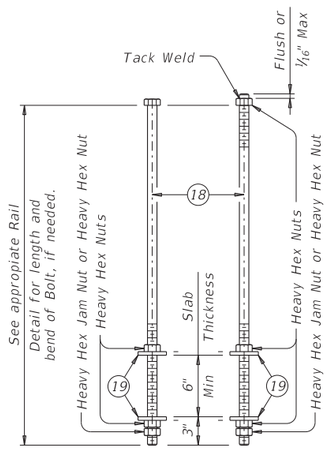


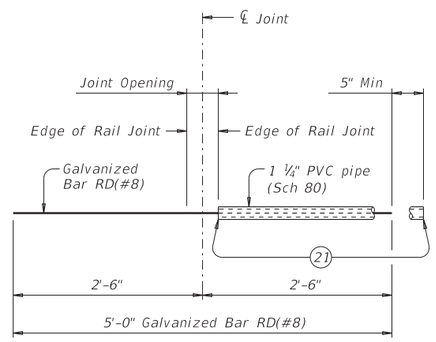
SSTR RAIL

RAIL RETROFIT SECTIONS ON CG (PAN FORM) SPANS USING ANCHOR BOLTS (17)

NBI #06-195-0-0003-05-088
NBI #06-195-0-0441-09-057
NBI #06-195-0-0441-09-063
NBI #06-195-0-0441-09-064



ANCHOR BOLT OPTIONS AND ASSEMBLY DETAILS (20)



BAR RD(#8) ASSEMBLY DETAIL (14)

(3) Remove ACP overlay/seal coats as needed for SSTR rail retrofit. If thickness of overlay/seal coat exceeds 2" at toe of rail, taper overlay at 1:10 slope or flatter along shoulder width to ensure the final overlay/seal coat thickness at the toe of the rail does not exceed 2".

(5) Increase by amount of existing overlay/seal coat thickness, not to exceed 2".

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

(8) 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.

(10) See "Roadway Elevation of SSTR Rail Retrofit" for side slot drain spacing. Provide 8'-0" min. clear spacing between drain slots. Provide drainage slots on the low side rail only. Do not place drainage slots over lower roadways.

(11) 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).

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

(15) ℄ 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).

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

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

(18) ℄ 1" Dia ASTM F1554 Gr 55 Anchor Bolt or Threaded Rod. Nuts must conform to ASTM A563 requirements.

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

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

(21) Tape ends of 1 ¼" PVC pipe Sch 80 to prevent concrete or mortar from seeping in.

STATE OF TEXAS
BLANCA M. PATTEE
90338
LICENSED PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation — Bridge Division

SSTR RAIL RETROFIT DETAILS

FILE: 1H0020_BRG_RL494mi01.dgn	DN: BMP	CK: OA	DW: ESE	CK: BMP
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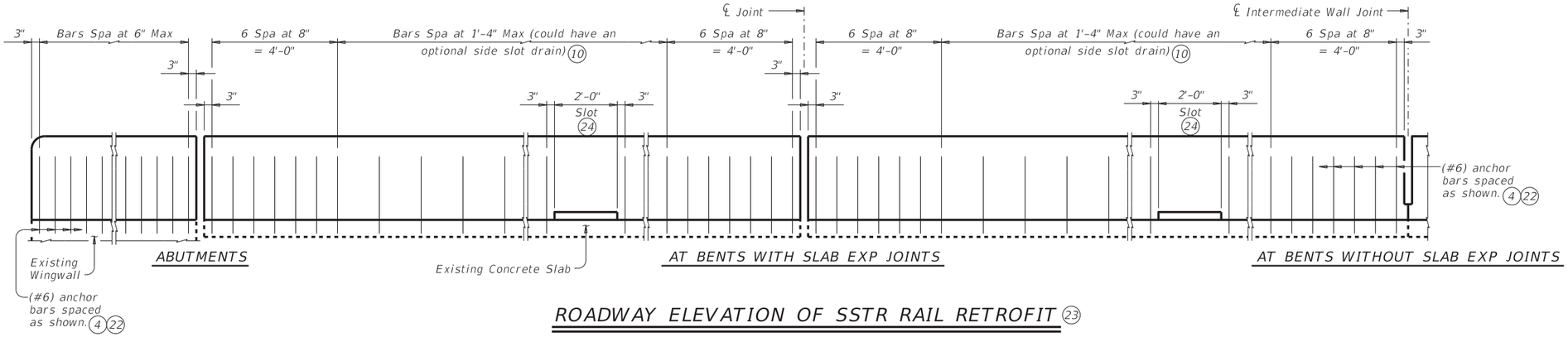
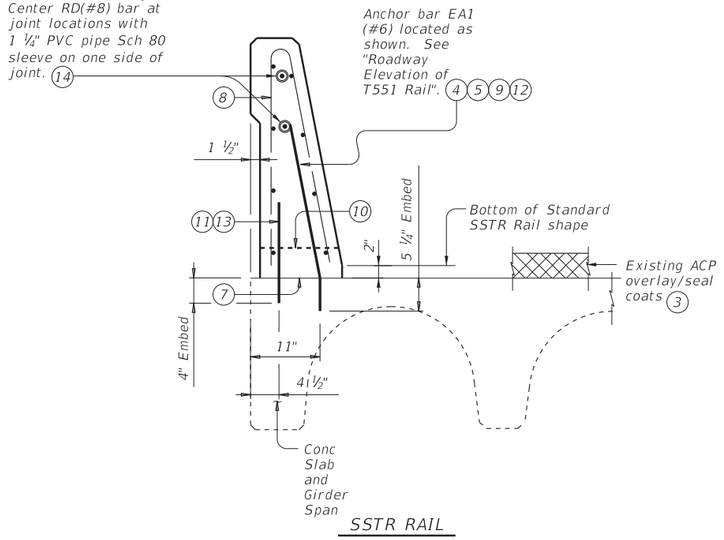


ROADWAY ELEVATION OF SSTR RAIL RETROFIT (23)



SSTR RAIL

RAIL RETROFIT SECTIONS ON CG (PAN FORM) SPANS USING ADHESIVE ANCHORS (2)

(2) See Traffic Rail Standard Type SSTR for notes and details not shown.

(4) Embed (#6) anchor bars with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 5 1#4". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

(5) Increase by amount of existing overlay/seal coat thickness, not to exceed 2".

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

(8) 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.

(9) See "Roadway Elevation of SSTR Rail Retrofit" for EA1(#6) bar spacing.

(10) See "Roadway Elevation of SSTR Rail Retrofit" for side slot drain spacing. Provide 8'-0" min. clear spacing between drain slots. Provide drainage slots on the low side rail only. Do not place drainage slots over lower roadways.

(11) 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).

(12) (#6) anchor bars need to be rotated slightly to fit in designated area, as shown.

(13) Secondary (#4) adhesive anchor in rail retrofit not shown for clarity in "Roadway Elevation of SSTR Rail Retrofit".

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

(22) See SSTR Rail Retrofit Sections.

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

(24) Place side slot drains as shown. See appropriate rail standard for side slot drains, except as noted.

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 all reinforcing steel.

(#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 SSTR rail standard.

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

Removal and replacement of backfill, subgrade, and asphalt or concrete pavement necessary for this installation is considered subsidiary to the retrofit railing.

Payment for a rail retrofit will be as per Item 451, "Retrofit Railing", by the type of the rail retrofit. All details shown herein are subsidiary to rail retrofit.

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

STATE OF TEXAS
BLANCA M. PATTEE
90338
LICENSED PROFESSIONAL ENGINEER

12/06/2022

Texas Department of Transportation — Bridge Division

SSTR RAIL RETROFIT DETAILS

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©TxDOT SEPT. 2022	CONT	SECT	JOB	HIGHWAY
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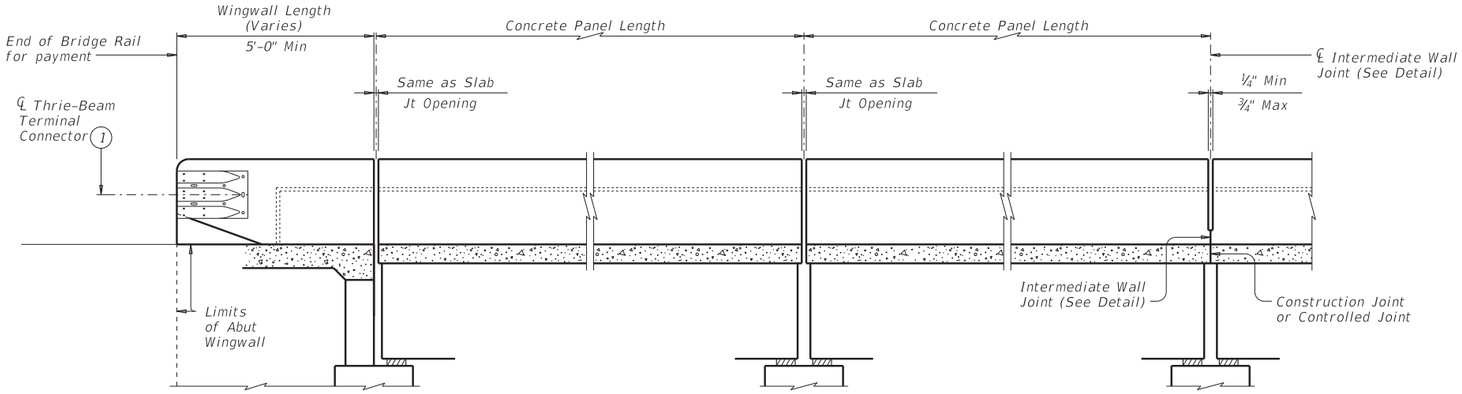
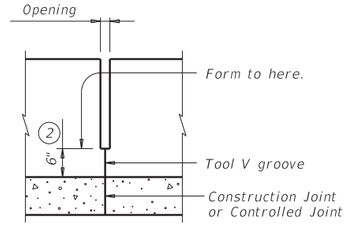


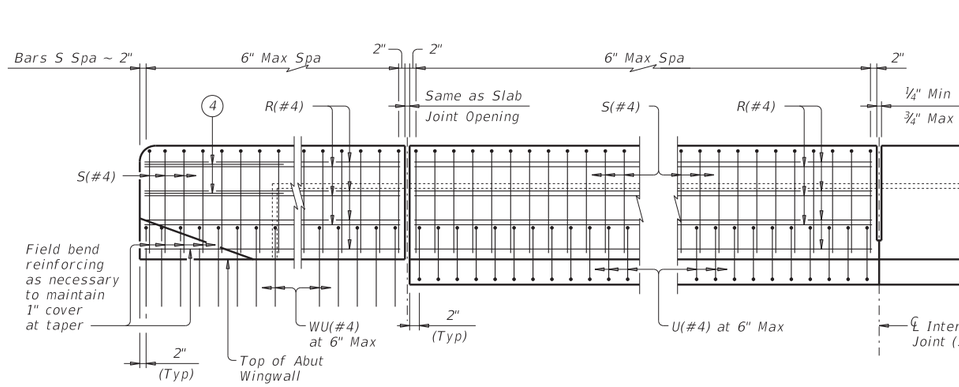
AT ABUTMENTS | AT BENTS WITH SLAB EXP JOINTS | AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL

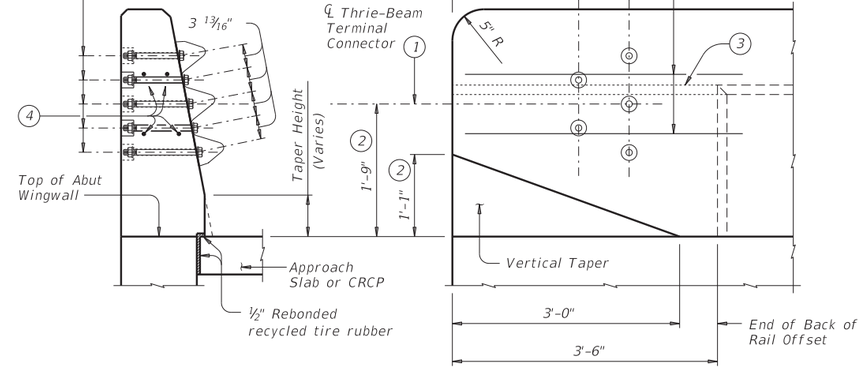


INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.

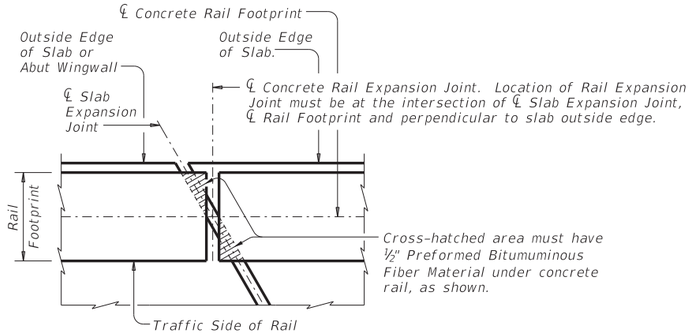


ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



SECTION | ELEVATION

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
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	ODA	REEVES		90

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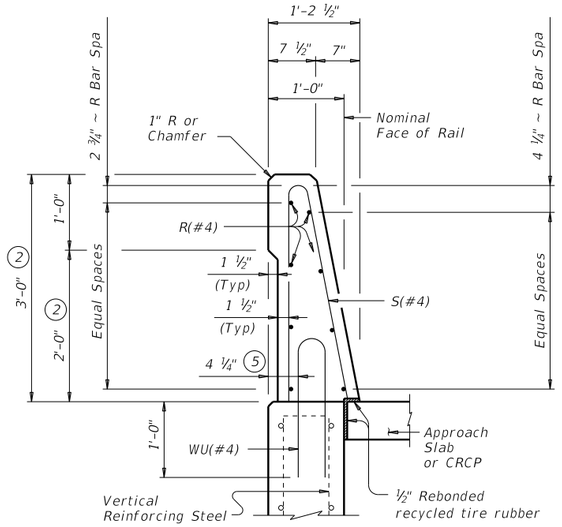
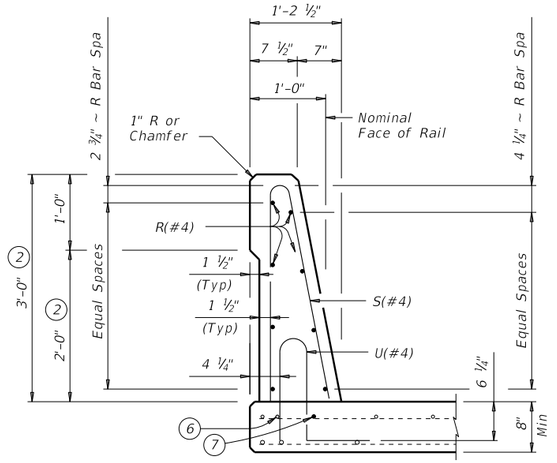


ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON BRIDGE SLAB

SECTIONS THRU RAIL

(2) Increase 2" for structures with Overlay.

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

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

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

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

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

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

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.

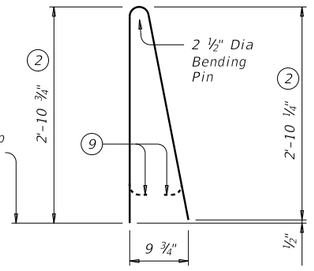
Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Shop drawings will not be required for this rail.

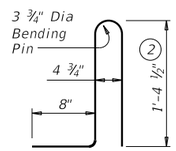
Average weight of railing with no overlay is 376 plf.

Cover dimensions are clear dimensions, unless noted otherwise.

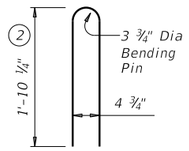
Reinforcing bar dimensions shown are out-to-out of bar.



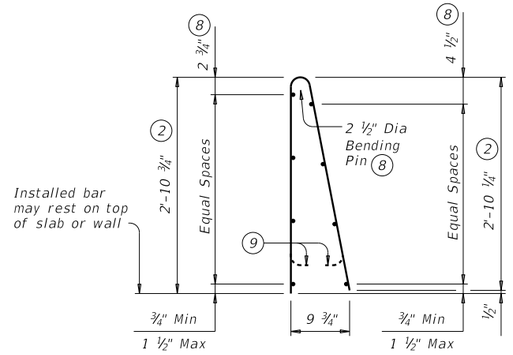
BARS S (#4)



BARS U (#4)

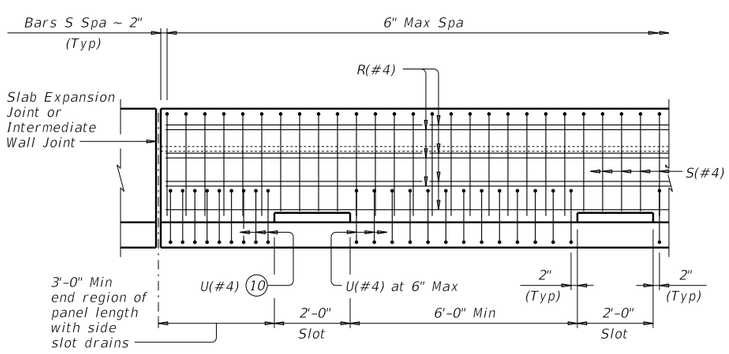


BARS WU (#4)



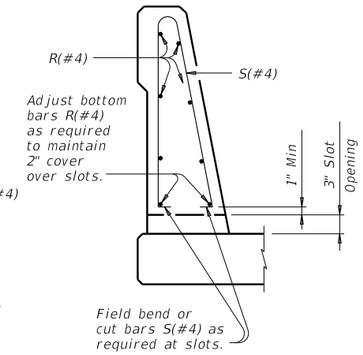
OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

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

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL SINGLE SLOPE

TYPE SSTR

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©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
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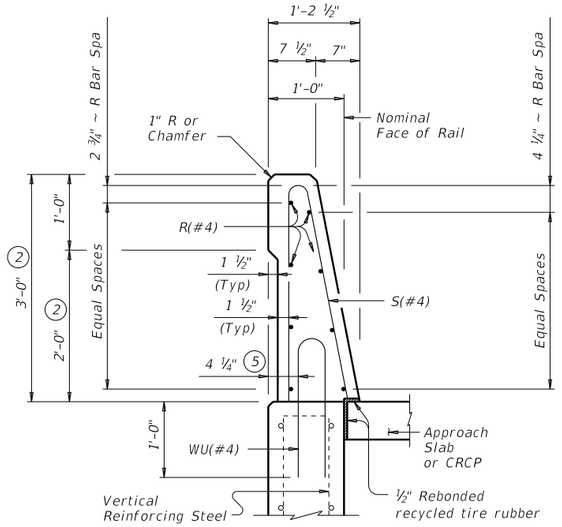
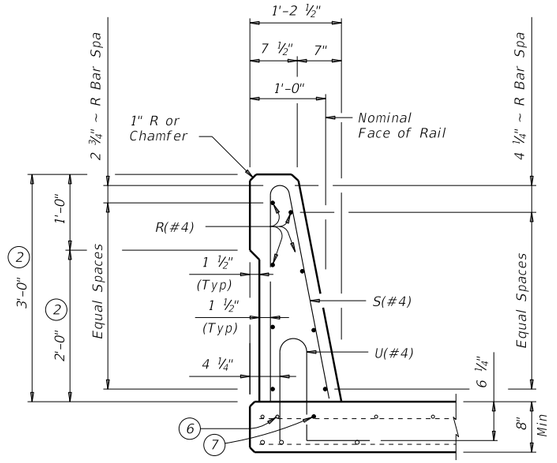


ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON BRIDGE SLAB

SECTIONS THRU RAIL

(2) Increase 2" for structures with Overlay.

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

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

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

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

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

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

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.

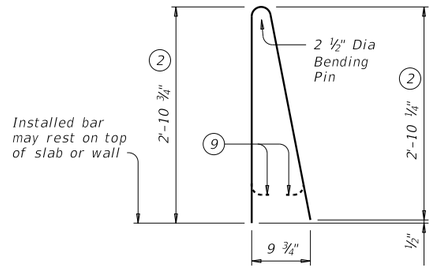
Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Shop drawings will not be required for this rail.

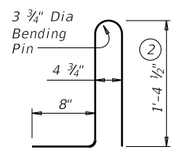
Average weight of railing with no overlay is 376 plf.

Cover dimensions are clear dimensions, unless noted otherwise.

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



BARS S (#4)



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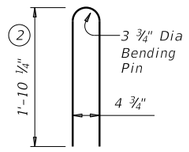

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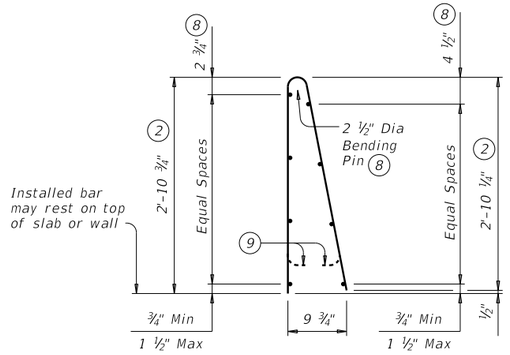
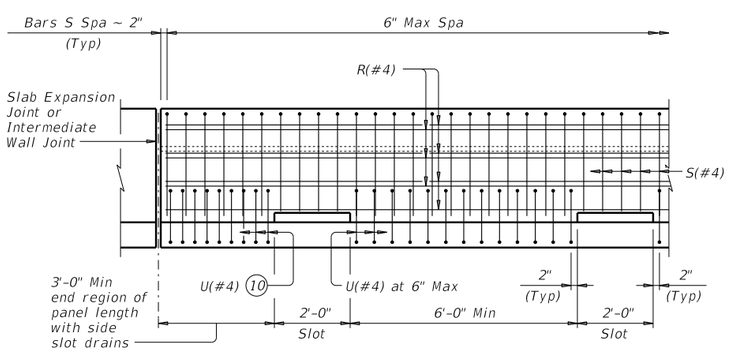


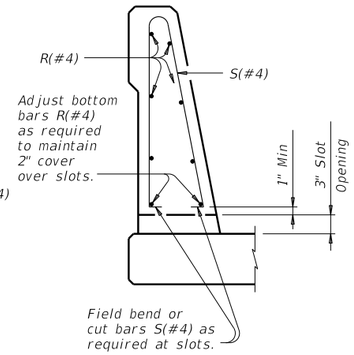
OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

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

SHEET 2 OF 2

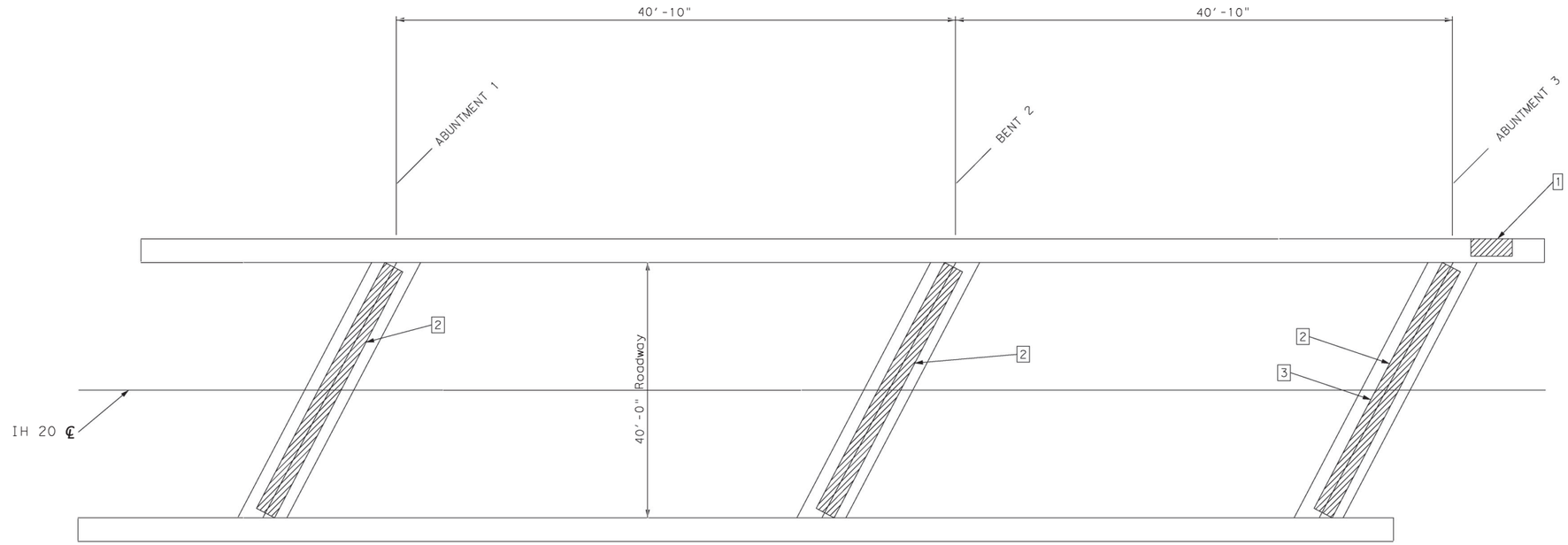
Texas Department of Transportation

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	0003	05	055	IH0020
	DIST	COUNTY		SHEET NO.
	0DA	REEVES		92



Note:

Contractor must field verify current conditions and immediately contact Engineer if any discrepancies are present.

Sound permeter of the repair to determine whether the concrete removal operations caused damage beyond the intended perimeter. If that is the case, extend the repair perimeter.

As directed by Engineer, remove any loose debris from cracks. Repair cracks and spalled areas to a neat condition matching the original profile in accordance with Item 429.

Repair the concrete deck in accordance with Item 429, "Concrete Structure Repair". Finish of repaired concrete surfaces must match the finish of exisiting concrete, as approved by the Engineer.

LOCATION OF REPAIR	ITEM	DESCRIPTION	UNIT	QTY
1	429 6008	CONC STR REPAIR (VERT AND OVERHEAD)	SF	20
2	438 6002	CLEANING AND SEALING EXIS JOINTS(CL3)	LF	120
3	0780 6002	CONC CRACK REPAIR (DISCETE)(INJECT)	LF	38

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

BRIDGE REPAIR DETAILS

NBI#06-195-0-0003-05-087
COLD SPRING DRAW
@IH 20 & IH 10 JUNCTION
SHEET 1 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			93
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FIGURE 1: TYPICAL MODERATE DELAMINATION CRACKS IN ABUTMENT CAPS. NE CAP SHOWN.

FIGURE 2: MODERATE SPALL IN NORTH END OF NE BACKWALL.

FIGURE 3: EXCESSIVE GRAVEL ACCUMULATION ALONG NW RAIL.

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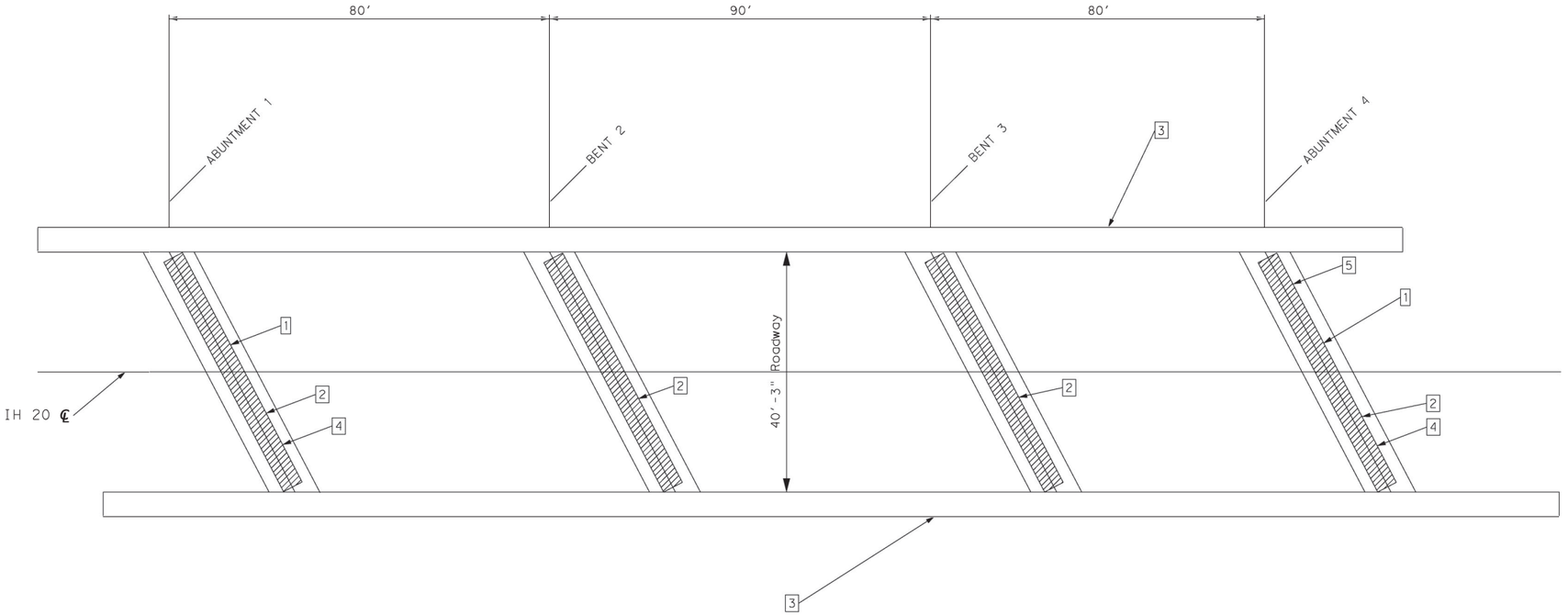
BRIDGE REPAIR DETAILS

NBI#06-195-0-0003-05-087
COLD SPRING DRAW
@IH 20 & IH 10 JUNCTION
SHEET 2 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			94
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



Note:

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Sound permeter of the repair to determine whether the concrete removal operations caused damage beyond the intended perimeter. If that is the case, extend the repair perimeter.

As directed by Engineer, remove any loose debris from cracks. Repair cracks and spalled areas to a neat condition matching the original profile in accordance with Item 429.

Repair the concrete deck in accordance with Item 429, "Concrete Structure Repair". Finish of repaired concrete surfaces must match the finish of exisiting concrete, as approved by the Engineer.

LOCATION OF REPAIR	ITEM	DESCRIPTION	UNIT	QTY
1	429 6008	CONC STR REPAIR (VERT AND OVERHEAD)	SF	100
2	438 6002	CLEANING AND SEALING EXIS JOINTS(CL3)	LF	161
3	0738 6010	CLEANING/SWEEEPING (SPOT)	MI	1
4	0780 6002	CONC CRACK REPAIR (DISCETE)(INJECT)	LF	10
5	0784 6010	REP STL BRIDGE MEMBER (BEARING)	EA	1

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BRIDGE REPAIR DETAILS

NBI#06-195-0-0003-05-089

NINEMILE DRAW

SHEET 3 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			95
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FIGURE 1: MODERATE SPALL WITH EXPOSED STIRRUPS IN SOFFIT OF NW END OF NE BENT CAP - LOOKING EAST

FIGURE 2: TYPICAL MODERATE DELAMINATION CRACKS IN ABUTMENT CAPS. NE CAP SHOWN.

FIGURE 3: MISSING COTTER PIN FOR SE BEARING AT SW ABUTMENT.

FIGURE 4: EXCESSIVE ASPHALT AROUND CENTER ROCKER BEARING AT WEST ABUTMENT.

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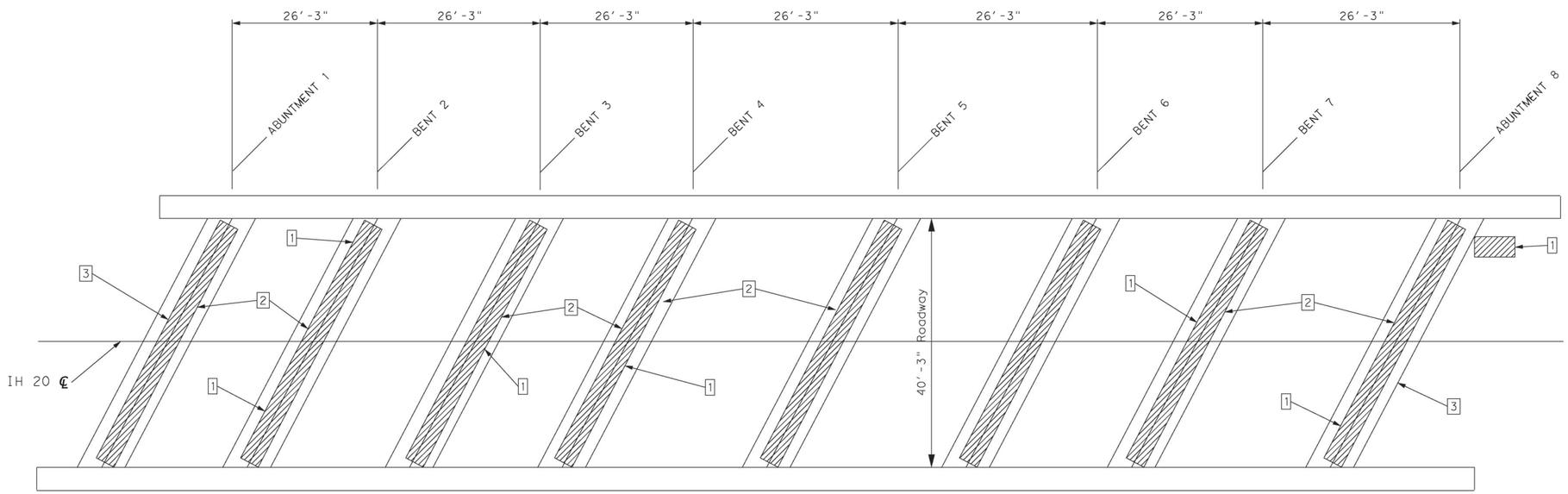
BRIDGE REPAIR DETAILS

NBI#06-195-0-0003-05-089
NINEMILE DRAW

SHEET 4 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			96
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



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Sound permeter of the repair to determine whether the concrete removal operations caused damage beyond the intended perimeter. If that is the case, extend the repair perimeter.

As directed by Engineer, remove any loose debris from cracks. Repair cracks and spalled areas to a neat condition matching the original profile in accordance with Item 429.

Repair the concrete deck in accordance with Item 429, "Concrete Structure Repair". Finish of repaired concrete surfaces must match the finish of exisiting concrete, as approved by the Engineer.

LOCATION OF REPAIR	ITEM	DESCRIPTION	UNIT	QTY
1	429 6008	CONC STR REPAIR (VERT AND OVERHEAD)	SF	270
2	438 6002	CLEANING AND SEALING EXIS JOINTS(CL3)	LF	322
3	0780 6002	CONC CRACK REPAIR (DISCETE)(INJECT)	LF	20

STATE OF TEXAS
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BRIDGE REPAIR DETAILS

NBI#06-195-0-0003-05-129

COWAN DRAW

SHEET 5 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			97
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FIGURE 1: TYPICAL SPALLS AND DELAMINATION IN BOTTOM OF BENTS CAPS

FIGURE 2: SPALL WITH EXPOSED REBAR IN CORNER OF FLAT SLAB AT NORTH END OF SW ABUTMENT.

FIGURE 3: SPALL WITH EXPOSED REBAR IN FACE OF SW ABUTMENT CAP.

FIGURE 4: TYPICAL SPALLS AND DELAMINAION IN BOTTOM OF BENT CAPS.

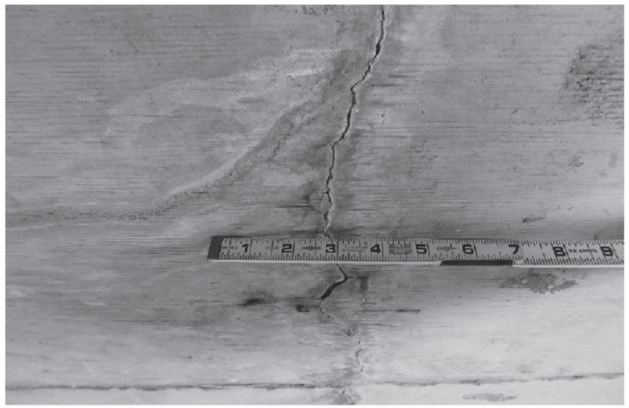

FIGURE 5: TYPICAL MINOR TO MODERATE LONGITUDINAL CRACKING IN SOFFIT OF FLAT SLABS.

FIGURE 6: TYPICAL SIGNIFICANT DELAMINATION CRACKS IN BOTTOM OF BENT CAPS.

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BRIDGE REPAIR DETAILS

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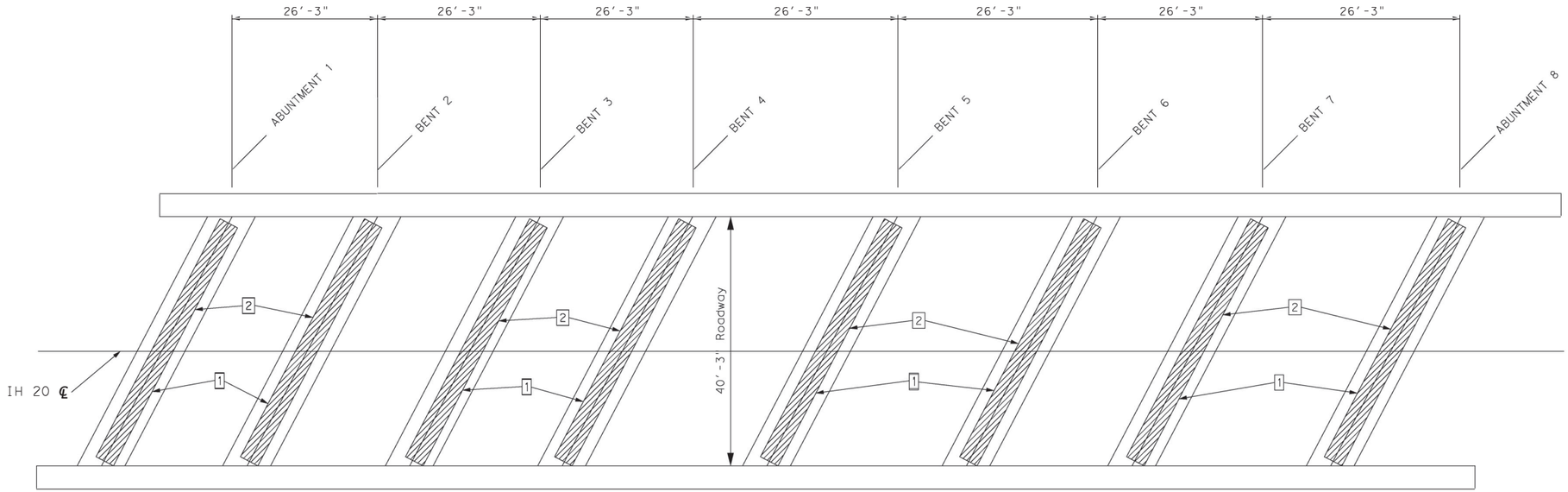
COWAN DRAW

SHEET 6 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			98
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



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As directed by Engineer, remove any loose debris from cracks. Repair cracks and spalled areas to a neat condition matching the original profile in accordance with Item 429.

Repair the concrete deck in accordance with Item 429, "Concrete Structure Repair". Finish of repaired concrete surfaces must match the finish of exisiting concrete, as approved by the Engineer.

LOCATION OF REPAIR	ITEM	DESCRIPTION	UNIT	QTY
1	429 6008	CONC STR REPAIR (VERT AND OVERHEAD)	SF	270
2	438 6002	CLEANING AND SEALING EXIS JOINTS(CL3)	LF	322
3	0780 6002	CONC CRACK REPAIR (DISCETE)(INJECT)	LF	20

STATE OF TEXAS
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BRIDGE REPAIR DETAILS

NBI#06-195-0-0003-05-130
COWAN DRAW
SHEET 7 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			99
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FIGURE 1: CORRODED REBAR IN SOFFIT OF NE BENT CAP.

FIGURE 2: SPALL IN BASE OF COLUMN #3 FROM SOUTH IN SW BENT.

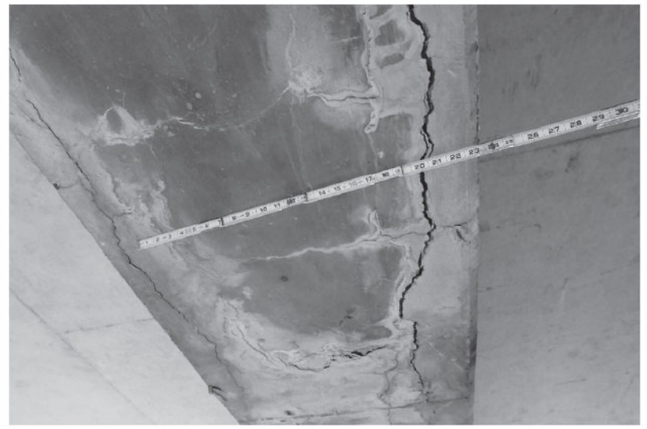

FIGURE 3: TYPICAL SIGNIFICANT DELAMINATION CRACKS IN BOTTOM OF BENT CAPS.

FIGURE 4: MODERATE SPALL WITH EXPOSED AND CORRODED REBAR IN SOFFIT OF NE BENT CAP.

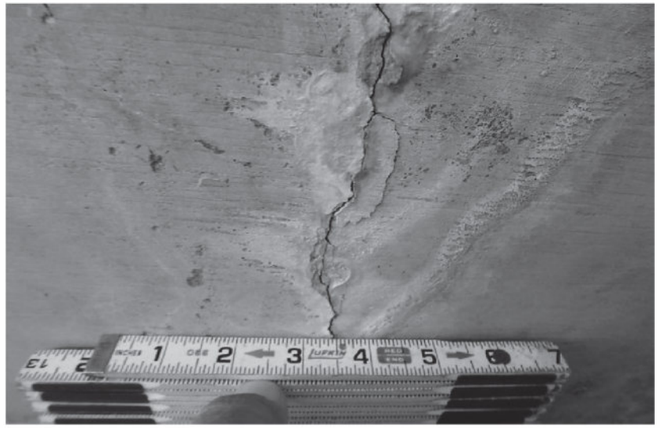

FIGURE 5: TYPICAL MINOR TO MODERATE LONGITUDINAL CRACKING IN SOFFIT OF FLAT SLABS.

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BRIDGE REPAIR DETAILS

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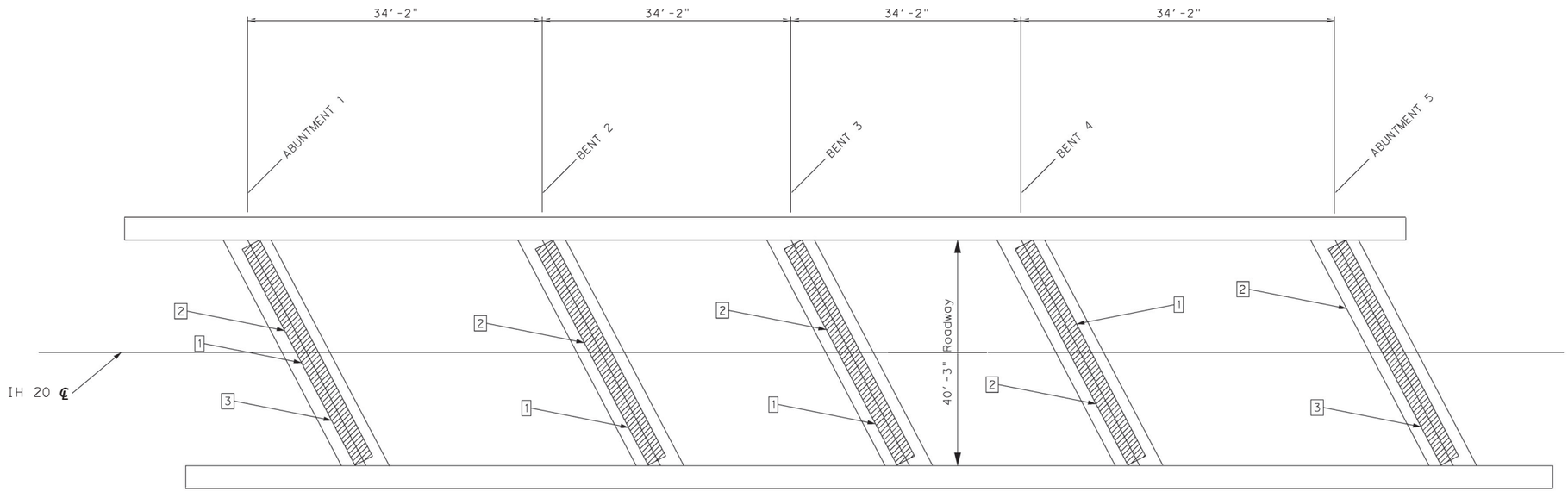
COWAN DRAW

SHEET 8 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			100
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



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As directed by Engineer, remove any loose debris from cracks. Repair cracks and spalled areas to a neat condition matching the original profile in accordance with Item 429.

Repair the concrete deck in accordance with Item 429, "Concrete Structure Repair". Finish of repaired concrete surfaces must match the finish of exisiting concrete, as approved by the Engineer.

LOCATION OF REPAIR	ITEM	DESCRIPTION	UNIT	QTY
1	429 6008	CONC STR REPAIR (VERT AND OVERHEAD)	SF	300
2	438 6002	CLEANING AND SEALING EXIS JOINTS(CL3)	LF	201
3	0780 6002	CONC CRACK REPAIR (DISCETE)(INJECT)	LF	15

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BRIDGE REPAIR DETAILS

NBI#06-195-0-0003-05-088
COWAN DRAW
SHEET 9 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			101
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FIGURE 1: SPALL IN EPOXY HEADER AT NE ABUTMENT JOINT.

FIGURE 2: TYPICAL MODERATE DELAMINATION CRACKING IN ABUTMENT CAP.

FIGURE 3: MODERATE DELAMINATION CRACKS IN COLUMN 2 FROM SE IN SW BENT.

FIGURE 4: MODERATE SPALL IN BASE OF COLUMN 2 FROM SE IN SW BENT.

FIGURE 5: TYPICAL MODERATE DELAMINATION CRACKING IN BENT CAPS.

FIGURE 6: HEAVY SPALL WITH EXPOSED AND CORRODED REBAR IN SOFFIT OF CENTER BENT CAP.

FIGURE 7: HEAVY CORROSION OF MAIN REBAR OF SPALL IN CENTER BENT CAP.

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REPAIR DETAILS

NBI#06-195-0-0003-05-088
COWAN DRAW

SHEET 10 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			102
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FIGURE 8: HEAVY SPALL WITH EXPOSED AND CORRODED REBAR IN SOFFIT OF NE BENT CAP.

FIGURE 9: TYPICAL MINOR SPALLS WITH EXPOSED REBAR IN BOTTOM OF GIRDERS AT ENDS (ISOLATED).

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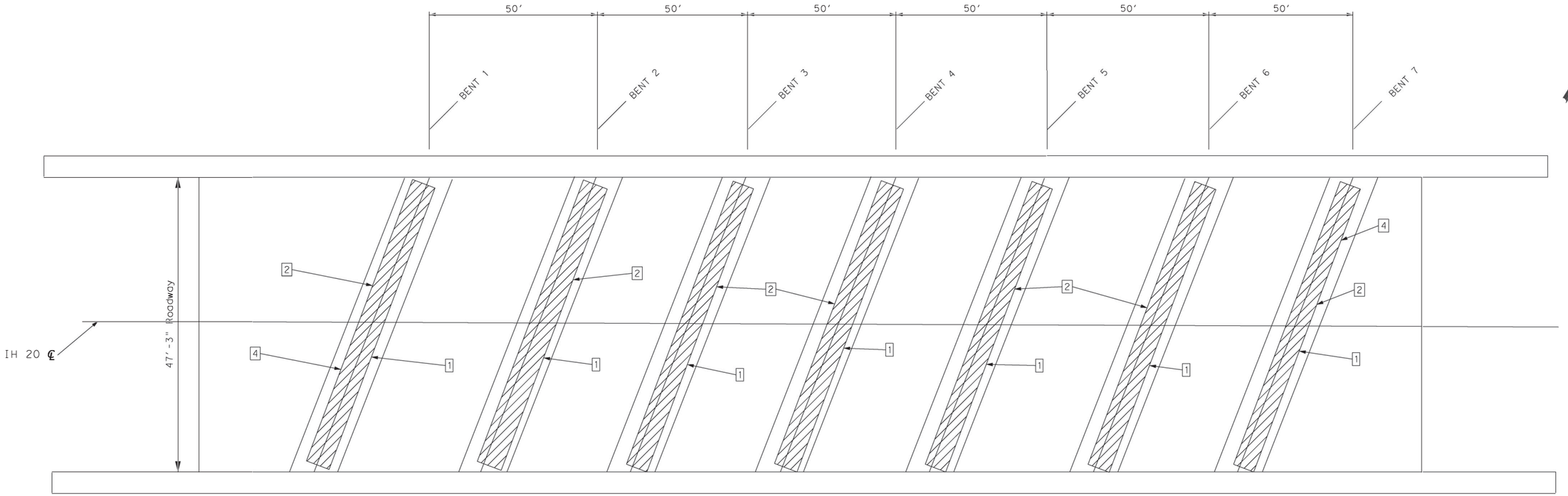
REPAIR DETAILS

NBI#06-195-0-0003-05-088
COWAN DRAW

SHEET 11 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			103
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



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Repair the concrete deck in accordance with Item 429, "Concrete Structure Repair". Finish of repaired concrete surfaces must match the finish of exisiting concrete, as approved by the Engineer.

LOCATION OF REPAIR	ITEM	DESCRIPTION	UNIT	QTY
1	429 6008	CONC STR REPAIR (VERT AND OVERHEAD)	SF	100
2	438 6002	CLEANING AND SEALING EXIS JOINTS(CL3)	LF	331
3	0780 6002	CONC CRACK REPAIR (DISCETE)(INJECT)	LF	12

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BRIDGE REPAIR DETAILS

NBI #06-195-0-0441-09-056
W COWAN DRAW
SHEET 12 OF 33

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			104
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FIGURE 1: PATCHED CENTER COLUMN OF EAST BENT - LOOKING EAST.

FIGURE 2: HEAVY DELAMINATIONS AND MODERATE SPALLS IN BENT CAP #4.

FIGURE 3: TYPICAL MODERATE CRACK ALONG TOP CORNERS OF BENT CAPS.

FIGURE 4: MINOR TO MODERATE SPALL IN BASE OF CENTER COLUMN OF WEST BENT.

FIGURE 5: MODERATE DELAMINATION CRACKING AND SPALL IN WEST ABUTMENT CAP.

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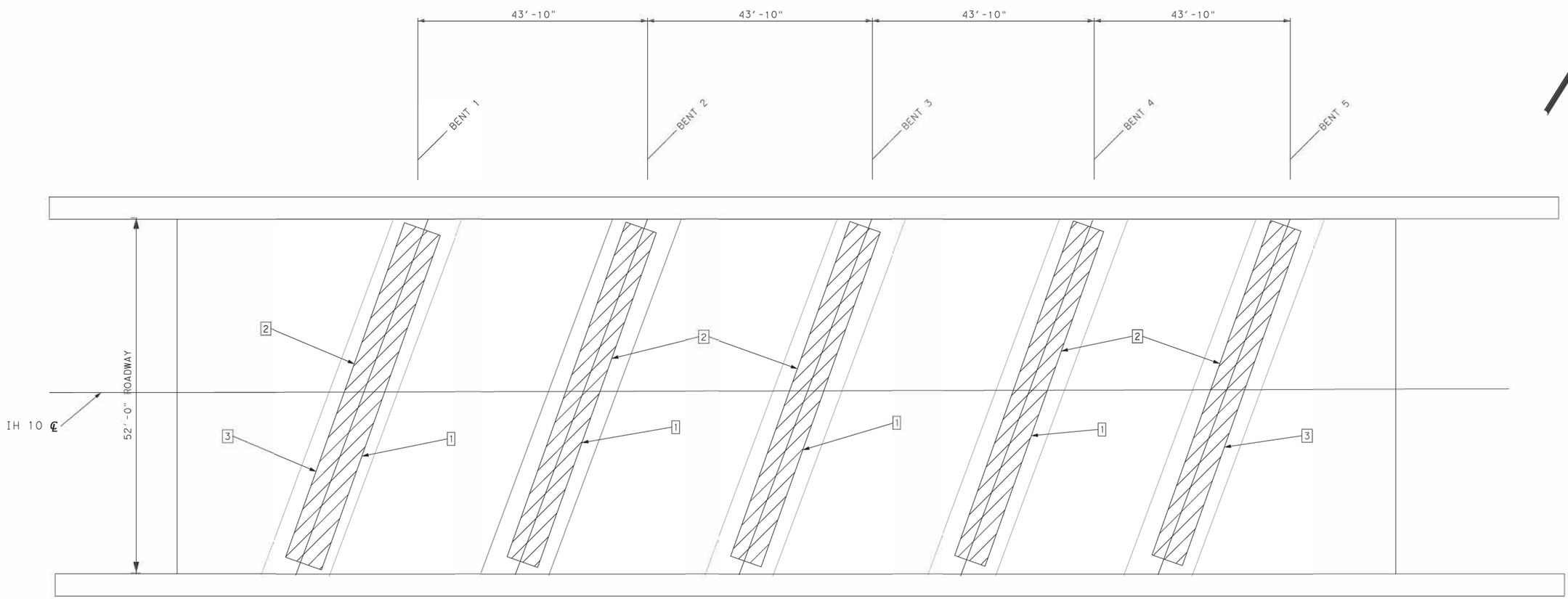
REPAIR DETAILS

NBI #06-195-0-0441-09-056
W COWAN DRAW

SHEET 13 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			105
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



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LOCATION OF REPAIR	ITEM	DESCRIPTION	UNIT	QTY
1	429 6008	CONC STR REPAIR (VERT AND OVERHEAD)	SF	100
2	438 6002	CLEANING AND SEALING EXIS JOINTS(CL3)	LF	260
3	0780 6002	CONC CRACK REPAIR (DISCETE)(INJECT)	LF	10

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BRIDGE REPAIR DETAILS

NBI #06-195-0-0441-09-057
E COWAN DRAW
SHEET 14 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			106
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FIGURE 1: MODERATE DELAMINATION CRACKING IN NORTH END OF NE ABUTMENT CAP.

FIGURE 2: TYPICAL MODERATE TO HEAVY DELAMINATION CRACKING ALONG BOTTOM CORNERS OF BENT CAPS.

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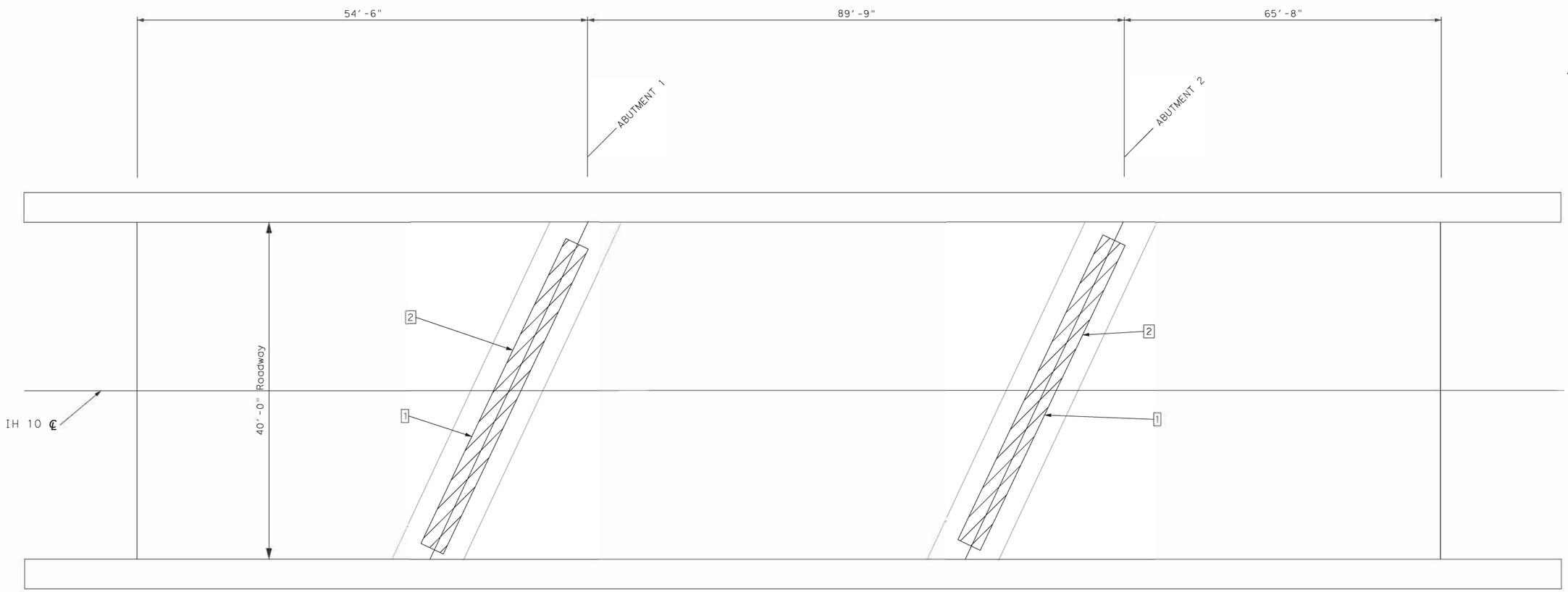
REPAIR DETAILS

NBI #06-195-0-0441-09-057
E COWAN DRAW

SHEET 15 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			107
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



LOCATION OF REPAIR	ITEM	DESCRIPTION	UNIT	QTY
1	429 6008	CONC STR REPAIR (VERT AND OVERHEAD)	SF	100
2	438 6002	CLEANING AND SEALING EXIS JOINTS(CL3)	LF	210
3	0780 6002	CONC CRACK REPAIR (DISCETE)(INJECT)	LF	12

Note:

Contractor must field verify current conditions and immediately contact Engineer if any discrepancies are present.

Sound permeter of the repair to determine whether the concrete removal operations caused damage beyond the intended perimeter. If that is the case, extend the repair perimeter.

As directed by Engineer, remove any loose debris from cracks. Repair cracks and spalled areas to a neat condition matching the original profile in accordance with Item 429.

Repair the concrete deck in accordance with Item 429, "Concrete Structure Repair". Finish of repaired concrete surfaces must match the finish of exisiting concrete, as approved by the Engineer.

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

BRIDGE REPAIR DETAILS

NBI#06-195-0-0441-09-058
COWAN DRAW
IH 10 WB
SHEET 16 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			108
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

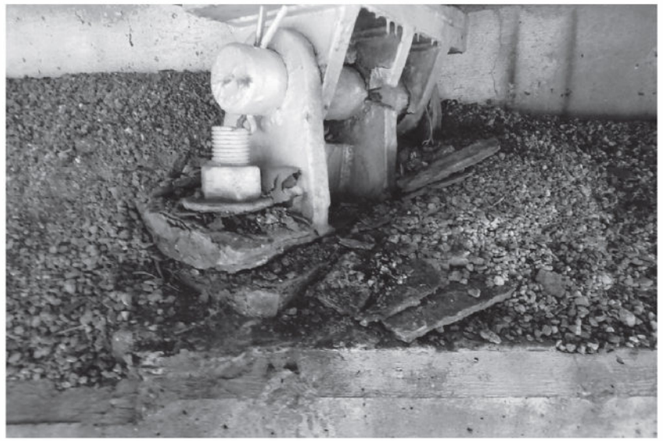


FIGURE 1: HEAVY CORROSION AND EXCESSIVE ASPHALT ACCUMULATION OF CENTER BEARING AT WEST ABUTMENT.

FIGURE 2: FAILED SEALANT IN ABUTMENT JOINTS.

FIGURE 3: TYPICAL MODERATE DELAMINATION CRACKING IN ABUTMENT CAPS.

FIGURE 4: MODERATE SPALL WITH EXPOSE REBAR - SOUTH EDGE DECK IN WEST SPAN.

FIGURE 5: MODERATE CRACKS IN SOUTH EDGE OF DECK AT RAIL POST IN CENTER SPAN.

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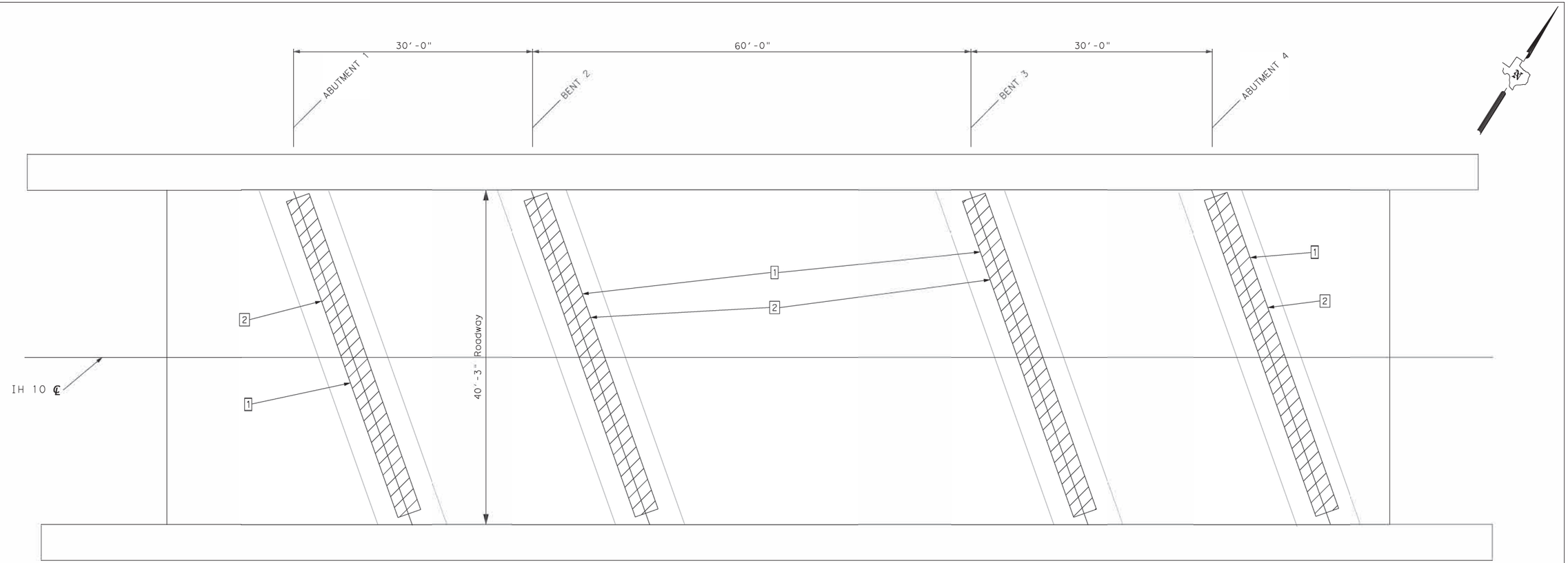
REPAIR DETAILS

NBI#06-195-0-0441-09-058
COWAN DRAW
IH 10 WB
SHEET 17 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			109
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



Note:

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Sound permeter of the repair to determine whether the concrete removal operations caused damage beyond the intended perimeter. If that is the case, extend the repair perimeter.

As directed by Engineer, remove any loose debris from cracks. Repair cracks and spalled areas to a neat condition matching the original profile in accordance with Item 429.

Repair the concrete deck in accordance with Item 429, "Concrete Structure Repair". Finish of repaired concrete surfaces must match the finish of exisiting concrete, as approved by the Engineer.

LOCATION OF REPAIR	ITEM	DESCRIPTION	UNIT	QTY
1	429 6008	CONC STR REPAIR (VERT AND OVERHEAD)	SF	100
2	438 6002	CLEANING AND SEALING EXIS JOINTS(CL3)	LF	121
3	0738 6010	CLEANING/SWEEEPING (SPOT)	MI	1
4	0780 6002	CONC CRACK REPAIR (DISCETE)(INJECT)	LF	13

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BRIDGE REPAIR DETAILS

NBI #06-195-0-0441-09-060
COLD SPRINGS DRAW
SHEET 18 OF 33

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			110
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FIGURE 1: MODERATE SPALL IN EPOXY HEADERE AT EAST ABUTMENT JOINT.

FIGURE 2: MODERATE VERTICAL DELAMINATION CRACKS IN WEST FACE OF CENTER COLUMN AT EAST BENT.

FIGURE 3: MODERATE SPALL IN SOUTH END IN EAST BENT CAP.

FIGURE 4: MODERATE DELAMINATION CRACK ALONG TOP CORNER- WEST ABUTMENT CAP.

FIGURE 5: TYPICAL MODERATE TO HEAVE DELAMINATION. CRACKING ALONG TOP CORNERS OF BENT CAPS.

FIGURE 6: MODERATE SPALL IN BEAM SEAT FOR CENTER BEAM OF EAST SPAN AT EAST BENT-LOOKING SW.

FIGURE 7: EXCESSIVE ASPHALT BUILDUP AROUND ENDS OF PRESTRESSED BEAMS.

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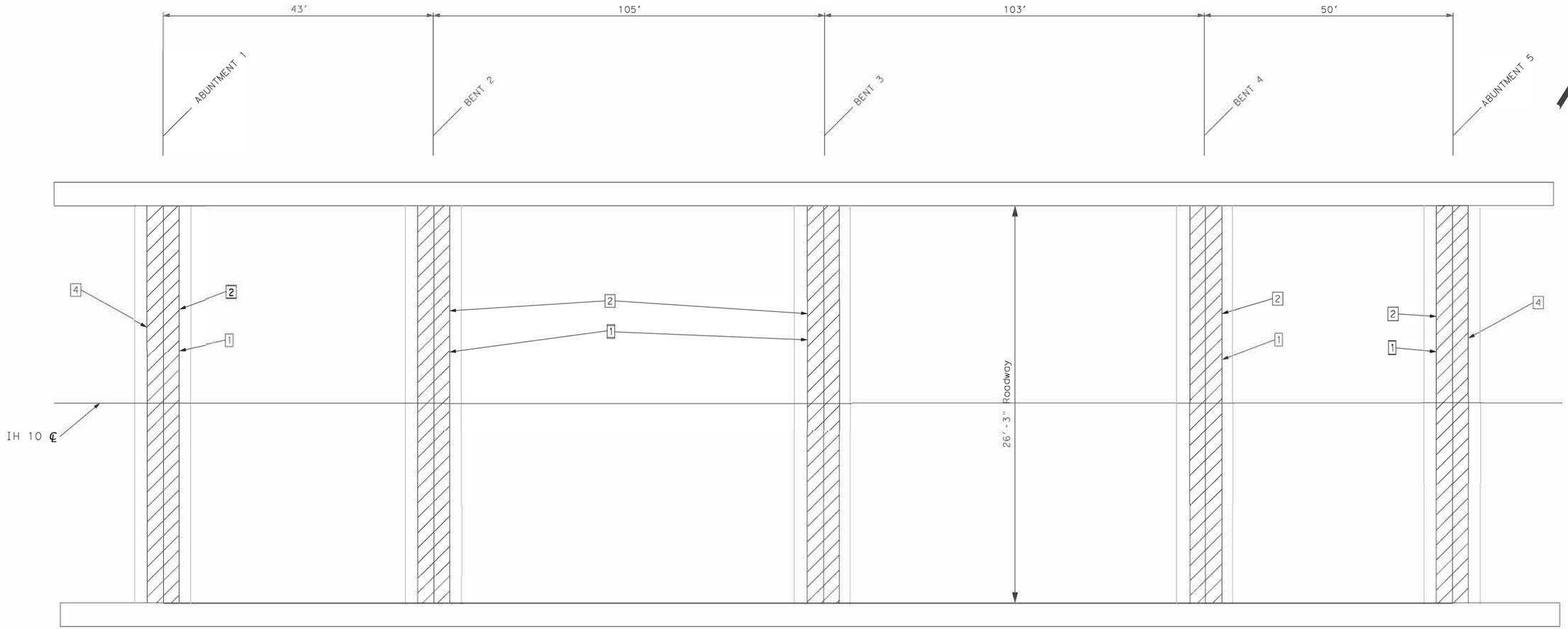
REPAIR DETAILS

NBI #06-195-0-0441-09-060
COLD SPRINGS DRAW

SHEET 19 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			111
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



LOCATION OF REPAIR	ITEM	DESCRIPTION	UNIT	QTY
1	429 6008	CONC STR REPAIR (VERT AND OVERHEAD)	SF	100
2	438 6002	CLEANING AND SEALING EXIS JOINTS(CL3)	LF	131
3	0780 6002	CONC CRACK REPAIR (DISCETE)(INJECT)	LF	20

Note:

Contractor must field verify current conditions and immediately contact Engineer if any discrepancies are present.

Sound permeter of the repair to determine whether the concrete removal operations caused damage beyond the intended perimeter. If that is the case, extend the repair perimeter.

As directed by Engineer, remove any loose debris from cracks. Repair cracks and spalled areas to a neat condition matching the original profile in accordance with Item 429.

Repair the concrete deck in accordance with Item 429, "Concrete Structure Repair". Finish of repaired concrete surfaces must match the finish of exisiting concrete, as approved by the Engineer.

STATE OF TEXAS
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BRIDGE REPAIR DETAILS

NBI #06-195-0-0441-09-061
GIFFIN RD
SHEET 20 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			112
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FIGURE 1: MODERATE VERTICAL DELAMINATION CRACKS IN NW COLUMN OF NE BENT-LOOKING SW.

FIGURE 2: MINOR DELAMINATION/SPALL IN END OF NW BEAM AT NE ABUTMENT.

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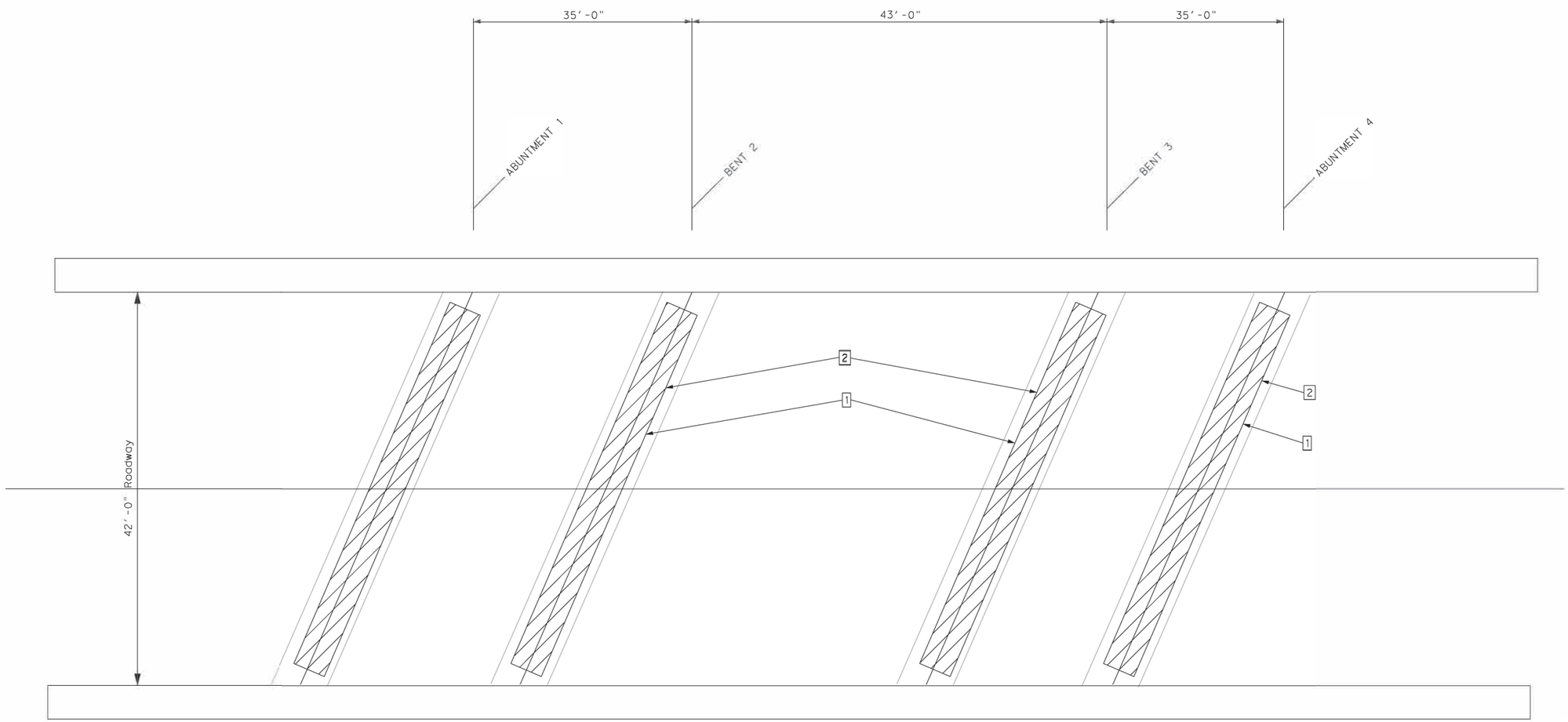
REPAIR DETAILS

NBI#06-195-0-0003-05-087
COLD SPRING DRAW
@IH 20 & IH 10 JUNCTION
SHEET 21 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			113
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



Note:

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Sound permeter of the repair to determine whether the concrete removal operations caused damage beyond the intended perimeter. If that is the case, extend the repair perimeter.

As directed by Engineer, remove any loose debris from cracks. Repair cracks and spalled areas to a neat condition matching the original profile in accordance with Item 429.

Repair the concrete deck in accordance with Item 429, "Concrete Structure Repair". Finish of repaired concrete surfaces must match the finish of exisiting concrete, as approved by the Engineer.

LOCATION OF REPAIR	ITEM	DESCRIPTION	UNIT	QTY
1	429 6008	CONC STR REPAIR (VERT AND OVERHEAD)	SF	100
2	438 6002	CLEANING AND SEALING EXIS JOINTS(CL3)	LF	168
3	0780 6002	CONC CRACK REPAIR (DISCETE)(INJECT)	LF	15

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BRIDGE REPAIR DETAILS

NBI #06-195-0-0441-09-063
IH 10 EB
SHEET 22 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			114
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FIGURE 1: MODERATE SPALL IN NW FACE OF NW BENT.

FIGURE 2: TYPICAL HEAVY DELAMINATION CRACK ALONG BOTTOM OF BENT CAPS.

FIGURE 3: MODERATE DELAMINATION IN EAST END OF NW BENT CAP LOOKING NORTH.

FIGURE 4: LOSS OF SEALANT IN NW ABUTMENT JOINT.

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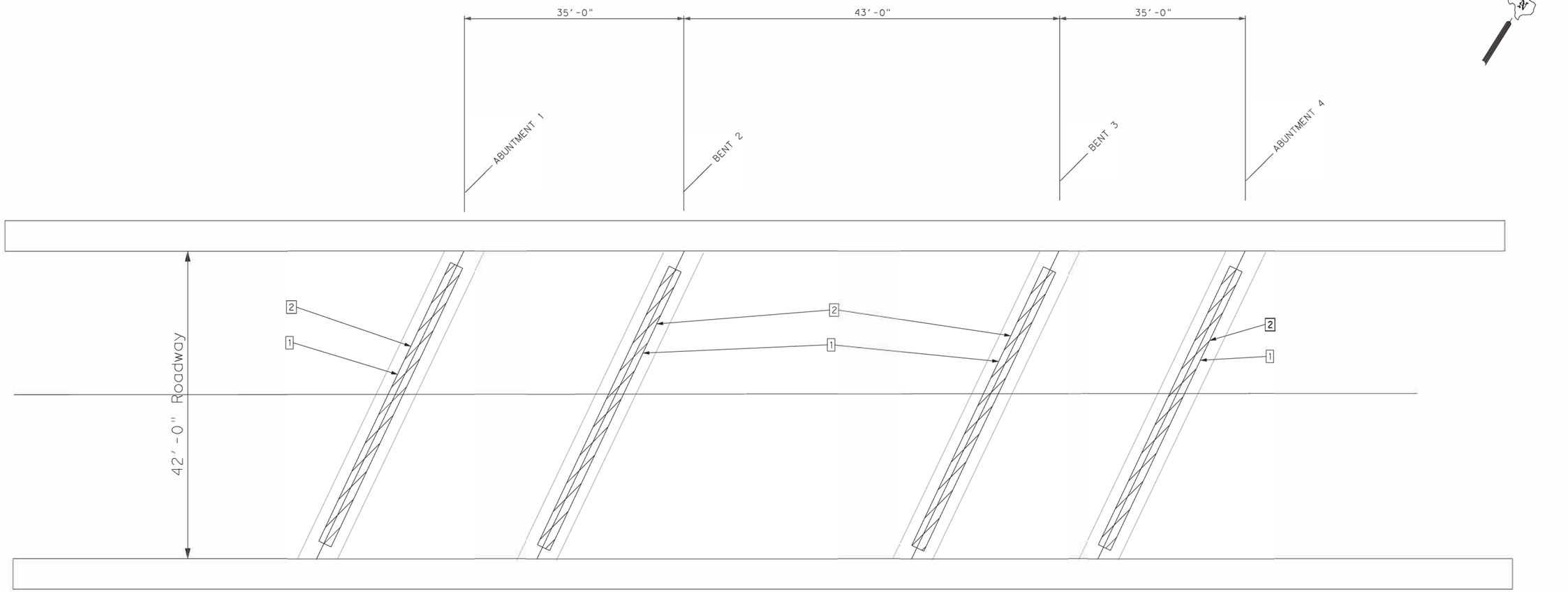
REPAIR DETAILS

NBI #06-195-0-0441-09-063
IH 10 EB

SHEET 23 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			115
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



Note:

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Sound permeter of the repair to determine whether the concrete removal operations caused damage beyond the intended perimeter. If that is the case, extend the repair perimeter.

As directed by Engineer, remove any loose debris from cracks. Repair cracks and spalled areas to a neat condition matching the original profile in accordance with Item 429.

Repair the concrete deck in accordance with Item 429, "Concrete Structure Repair". Finish of repaired concrete surfaces must match the finish of exisiting concrete, as approved by the Engineer.

LOCATION OF REPAIR	ITEM	DESCRIPTION	UNIT	QTY
1	429 6008	CONC STR REPAIR (VERT AND OVERHEAD)	SF	100
2	438 6002	CLEANING AND SEALING EXIS JOINTS(CL3)	LF	168
3	0780 6002	CONC CRACK REPAIR (DISCETE)(INJECT)	LF	14

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BRIDGE REPAIR DETAILS

NBI #06-195-0-0441-09-064

IH 10 WB

SHEET 24 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			116
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FIGURE 1: MODERATE DELAMINATION CRACK ALONG TOP CORNERS OF SE ABUTMENT CAP.

FIGURE 2: MODERATE DELAMINATION CRACKS AND HEAVY SCALING IN EAST END OF SE BENT CAP.

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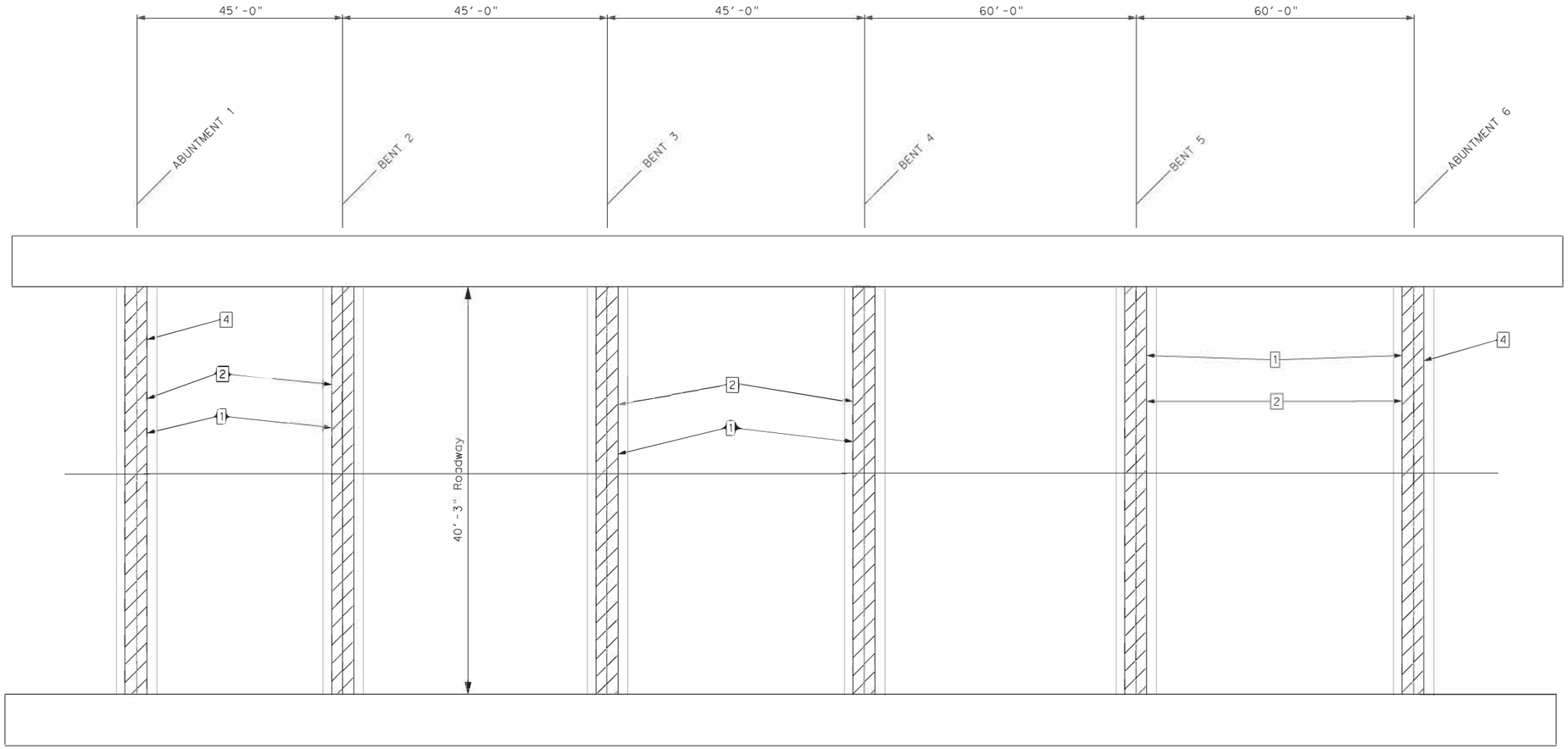
REPAIR DETAILS

NBI #06-195-0-0441-09-064
IH 10 WB

SHEET 25 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			117
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



Note:

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Sound permeter of the repair to determine whether the concrete removal operations caused damage beyond the intended perimeter. If that is the case, extend the repair perimeter.

As directed by Engineer, remove any loose debris from cracks. Repair cracks and spalled areas to a neat condition matching the original profile in accordance with Item 429.

Repair the concrete deck in accordance with Item 429, "Concrete Structure Repair". Finish of repaired concrete surfaces must match the finish of exisiting concrete, as approved by the Engineer.

LOCATION OF REPAIR	ITEM	DESCRIPTION	UNIT	QTY
1	429 6008	CONC STR REPAIR (VERT AND OVERHEAD)	SF	100
2	438 6002	CLEANING AND SEALING EXIS JOINTS(CL3)	LF	242
3	0780 6002	CONC CRACK REPAIR (DISCETE)(INJECT)	LF	12

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BRIDGE REPAIR DETAILS

NBI #06-195-0-0441-09-067
JONES DRAW EB
SHEET 26 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			118
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FIGURE 1: MAJOR DETERIORATION AND SPALLING WITH EXPOSED REBAR IN SW SECK OVERHANG IN SPAN #3 AT BENT #4.

FIGURE 2: MODERATE DELAMINATION CRACK IN SE BOTTOM CORNER OF NW BENT CAP.

FIGURE 3: MODERATE DELAMINATION CRACK - TOP CORNER OF SE BENT LOOKING NW.

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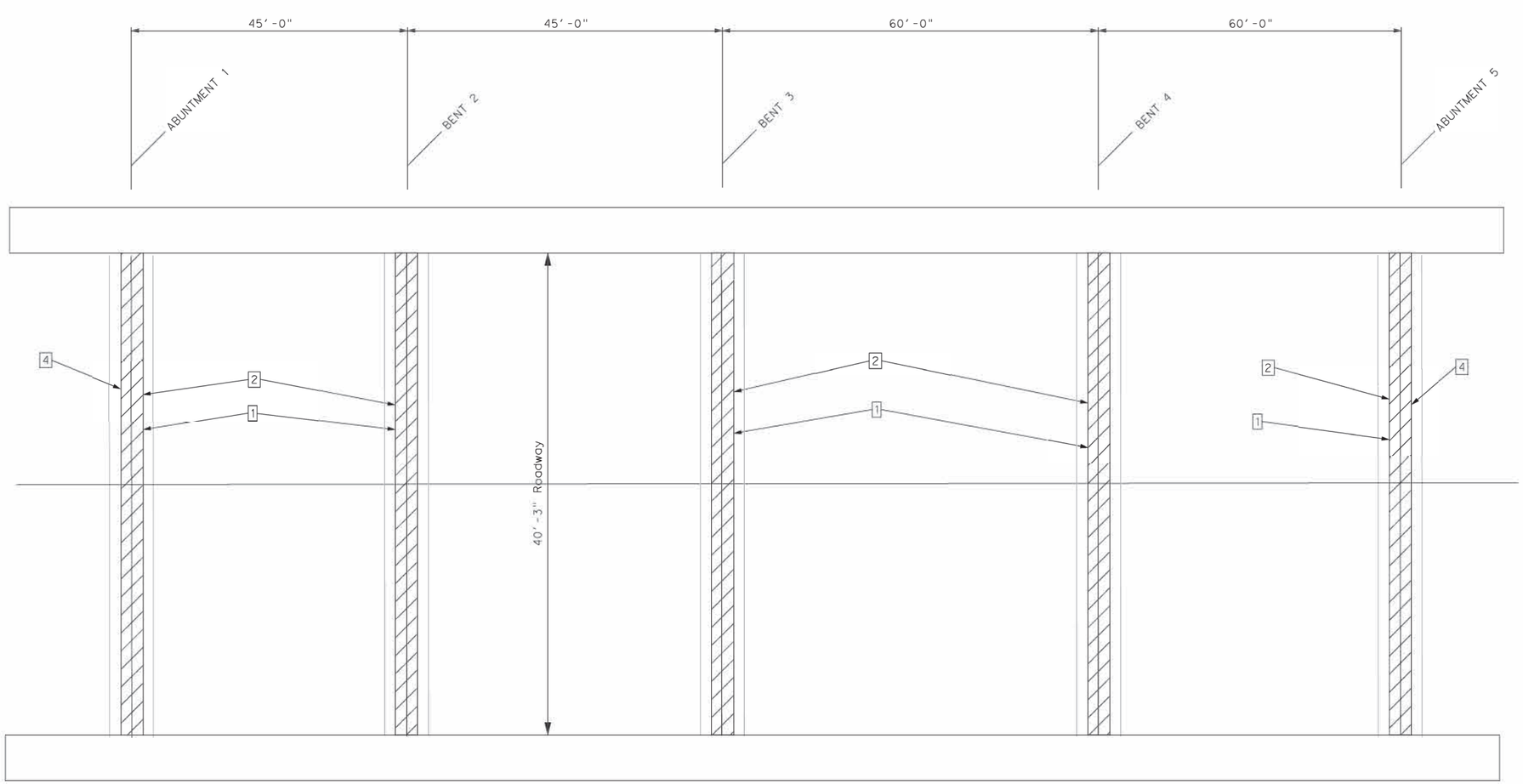
REPAIR DETAILS

NBI #06-195-0-0441-09-067
JONES DRAW EB
SHEET 27 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			119
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



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Repair the concrete deck in accordance with Item 429, "Concrete Structure Repair". Finish of repaired concrete surfaces must match the finish of exisiting concrete, as approved by the Engineer.

LOCATION OF REPAIR	ITEM	DESCRIPTION	UNIT	QTY
1	429 6008	CONC STR REPAIR (VERT AND OVERHEAD)	SF	100
2	438 6002	CLEANING AND SEALING EXIS JOINTS(CL3)	LF	202
3	0780 6002	CONC CRACK REPAIR (DISCETE)(INJECT)	LF	10

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BRIDGE REPAIR DETAILS

NBI #06-195-0-0441-09-068
JONES DRAW WB
SHEET 28 OF 33

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			120
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FIGURE 1: MODERATE SPALL IN SOFFIT OF SE BENT CAP.

FIGURE 2: MODERATE TO HEAVY DELAMINATION CRACK ALONG TOP NW CORNER OF NW BENT CAP.

FIGURE 3: MODERATE DELAMINATION CRACKING IN TIE BEAM AT SE BENT - LOOKING NORTH

FIGURE 4: MODERATE SPALL WITH EXPOSED STRAND IN NW END OF SW BEAM IN SE SPAN-LOOKING NORTH.

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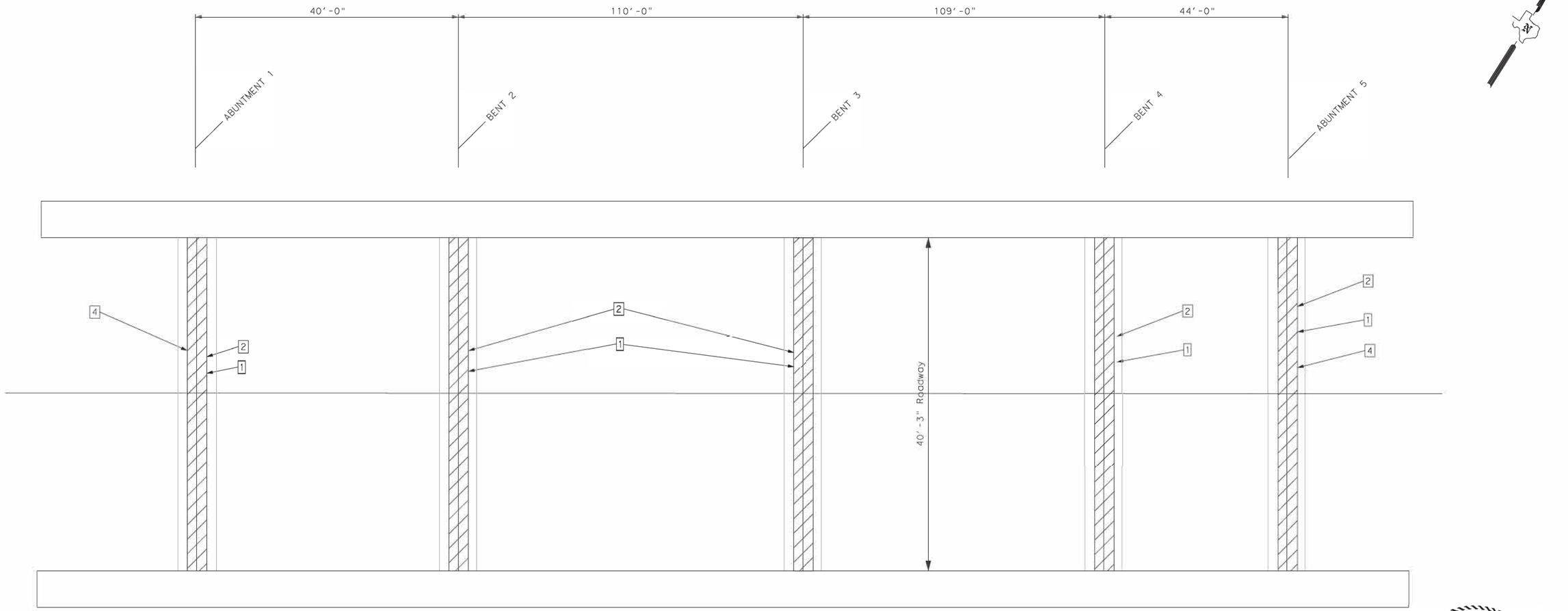
REPAIR DETAILS

NBI #06-195-0-0441-09-068
JONES DRAW WB
SHEET 29 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			121
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



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As directed by Engineer, remove any loose debris from cracks. Repair cracks and spalled areas to a neat condition matching the original profile in accordance with Item 429.

Repair the concrete deck in accordance with Item 429, "Concrete Structure Repair". Finish of repaired concrete surfaces must match the finish of exisiting concrete, as approved by the Engineer.

LOCATION OF REPAIR	ITEM	DESCRIPTION	UNIT	QTY
1	429 6008	CONC STR REPAIR (VERT AND OVERHEAD)	SF	293
2	438 6002	CLEANING AND SEALING EXIS JOINTS(CL3)	LF	202
3	0780 6002	CONC CRACK REPAIR (DISCETE)(INJECT)	LF	14

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BRIDGE REPAIR DETAILS

NBI #06-195-0-0441-09-069
FM 3078
SHEET 30 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			122
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FIGURE 1: MODERATE VERTICAL DELAMINATION CRACKS IN SE COLUMN OF NE BENT.

FIGURE 2: MODERATE SCALING AND MODERATE DELAMINATION CRACKS IN SOFFIT OF NE BENT CAP.

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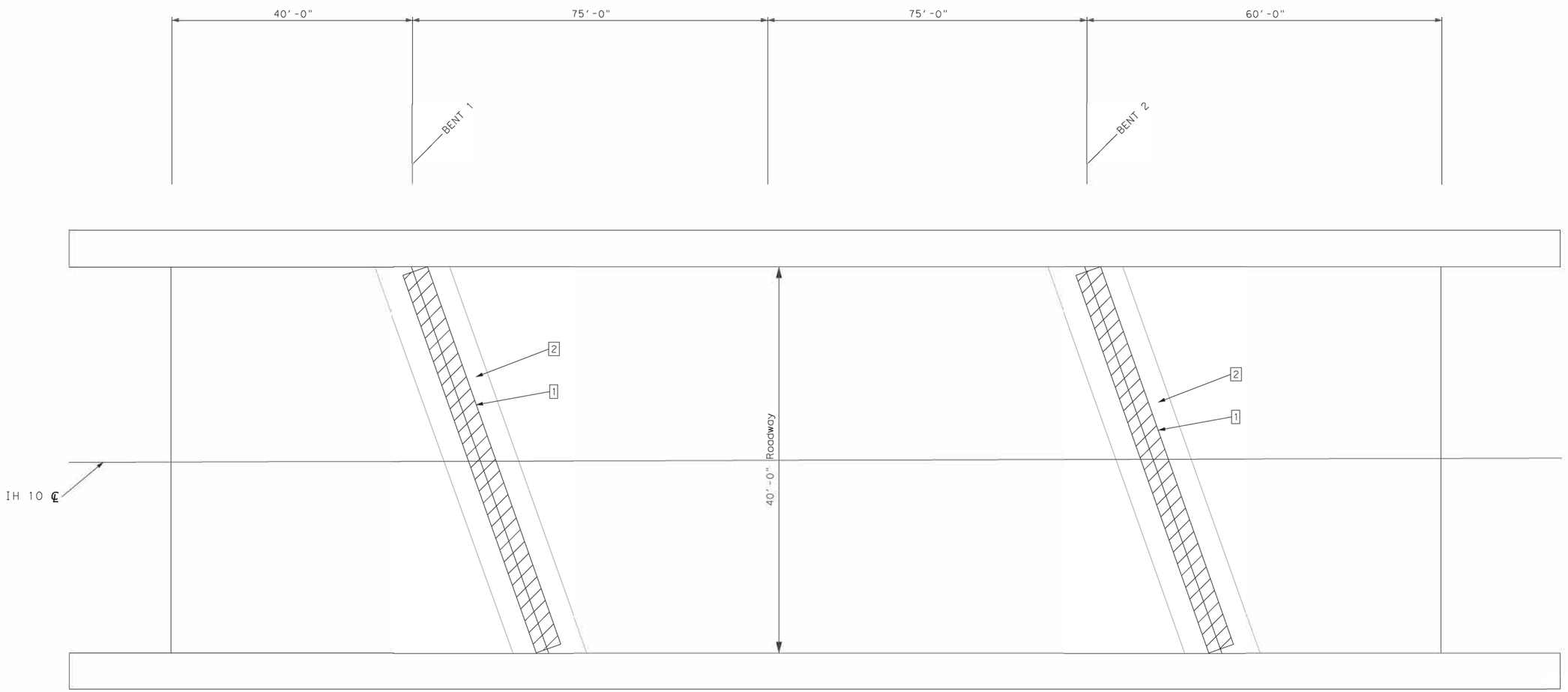
REPAIR DETAILS

NBI #06-195-0-0441-09-069
FM 3078

SHEET 31 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			123
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



Note:

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Repair the concrete deck in accordance with Item 429, "Concrete Structure Repair". Finish of repaired concrete surfaces must match the finish of exisiting concrete, as approved by the Engineer.

LOCATION OF REPAIR	ITEM	DESCRIPTION	UNIT	QTY
1	429 6008	CONC STR REPAIR (VERT AND OVERHEAD)	SF	80
2	438 6002	CLEANING AND SEALING EXIS JOINTS(CL3)	LF	250
3	0738 6010	CLEANING/SWEEEPING (SPOT)	MI	1
4	0780 6002	CONC CRACK REPAIR (DISCETE)(INJECT)	LF	12
5	0784 6010	REP STL BRIDGE MEMBER (BEARING)	EA	1

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BRIDGE REPAIR DETAILS

NBI #06-195-0-0441-09-176
IH 10 WB
IH 20 EB & COLD SPRING DRAW
SHEET 32 OF 33

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			124
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

FIGURE 1: EXCESSIVE ASPHALT AROUND CENTER ROCKER BEARING AT WEST ABUTMENT.

FIGURE 2: MODERATE DELAMINATION CRACKS ALONG TOP CORNER OF WEST ABUTMENT CAP. SIMILAR FOR EAST ABUTMENT CAP.

FIGURE 3: MISSING COTTER PIN AT SOUTH BEARING AT WEST ABUTMENT.

FIGURE 4: PATCHED HEADERS AND FAILED SEALANT AT WEST ABUTMENT JOINT.

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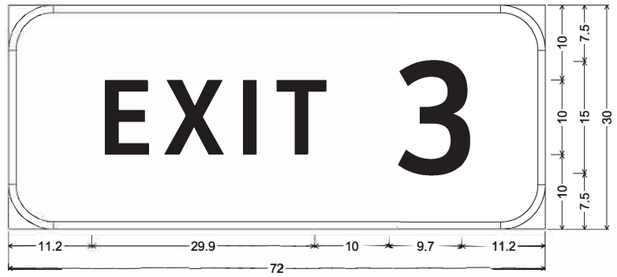
REPAIR DETAILS

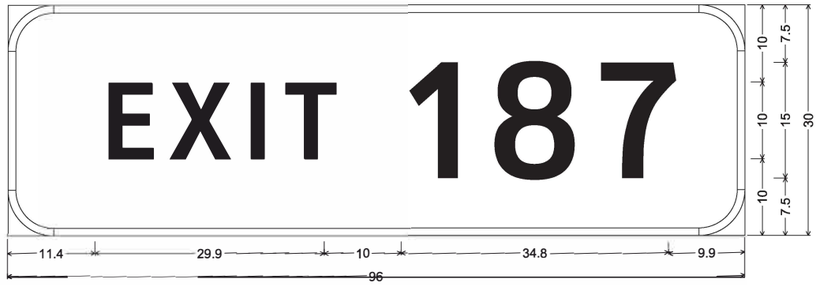
NBI #06-195-0-0441-09-176
IH 10 WB
IH 20 EB & COLD SPRING DRAW
SHEET 33 OF 33

Texas Department of Transportation

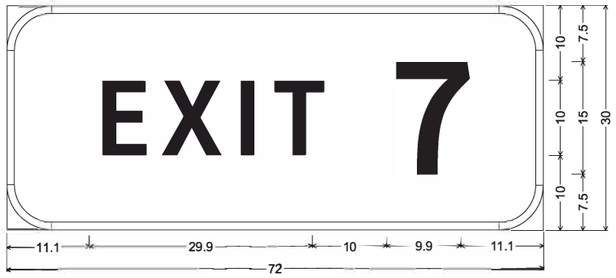
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			125
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



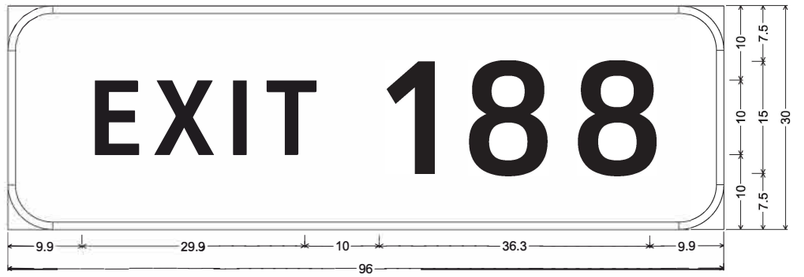
E1-5P_72x30;
6.0" Radius, 1.0" Border, White on, Green;
"EXIT", ClearviewHwy-4-W; "3", ClearviewHwy-4-W;



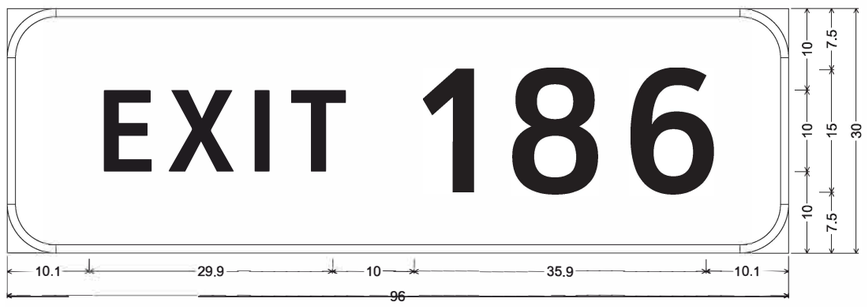
E1-5P_72x30;
6.0" Radius, 1.0" Border, White on, Green;
"EXIT", ClearviewHwy-4-W; "187", ClearviewHwy-4-W;



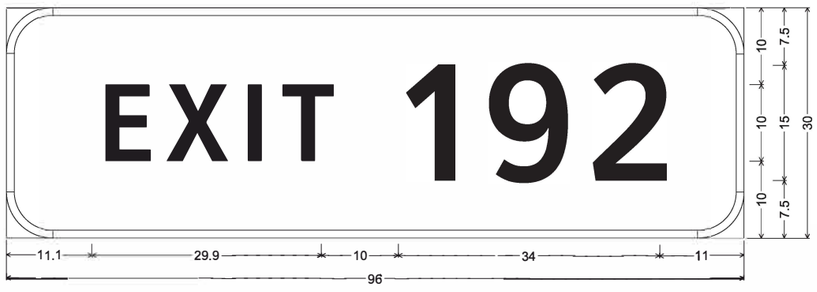
E1-5P_72x30;
6.0" Radius, 1.0" Border, White on, Green;
"EXIT", ClearviewHwy-4-W; "7", ClearviewHwy-4-W;



E1-5P_72x30;
6.0" Radius, 1.0" Border, White on, Green;
"EXIT", ClearviewHwy-4-W; "188", ClearviewHwy-4-W;



E1-5P_72x30;
6.0" Radius, 1.0" Border, White on, Green;
"EXIT", ClearviewHwy-4-W; "186", ClearviewHwy-4-W;



E1-5P_72x30;
6.0" Radius, 1.0" Border, White on, Green;
"EXIT", ClearviewHwy-4-W; "192", ClearviewHwy-4-W;

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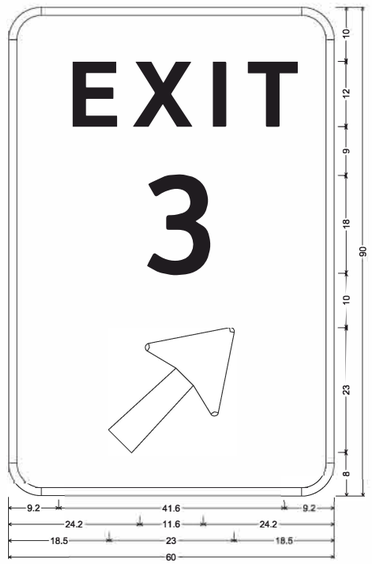
LARGE SIGN DETAILS

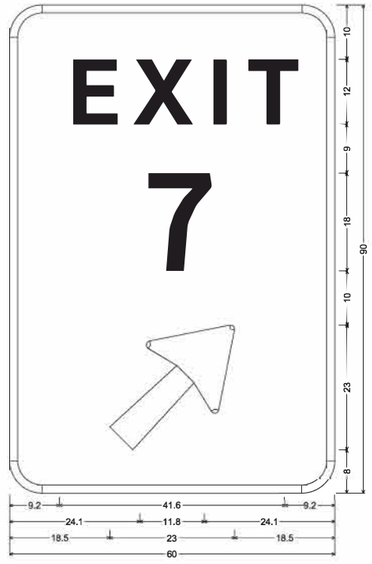
SHEET 1 OF 11

Texas Department of Transportation

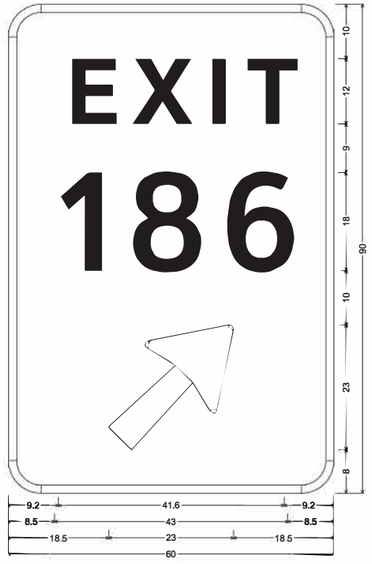
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			126
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



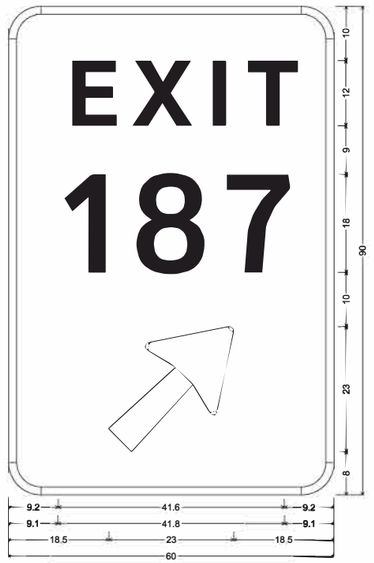
E5-1c_60x90;
6.0" Radius, 1.5" Border, White on, Green;
"EXIT", ClearviewHwy-6-W; "3", ClearviewHwy-4-W specified length;
Arrow A-2 - 29.3° 45°;



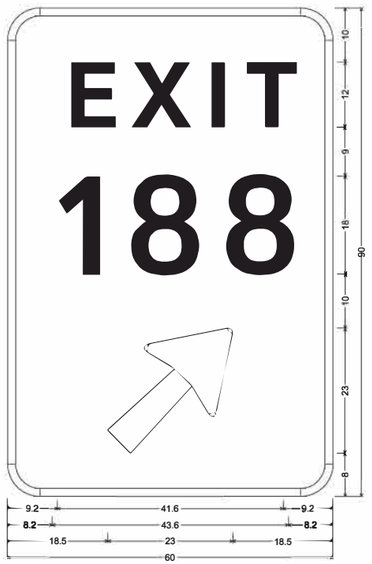
E5-1c_60x90;
6.0" Radius, 1.5" Border, White on, Green;
"EXIT", ClearviewHwy-6-W; "7", ClearviewHwy-4-W specified length;



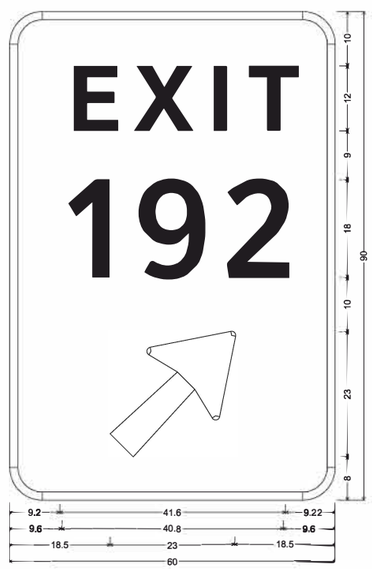
E5-1c_60x90;
6.0" Radius, 1.5" Border, White on, Green;
"EXIT", ClearviewHwy-6-W; "186", ClearviewHwy-4-W specified length;
Arrow A-2 - 29.3° 45°;



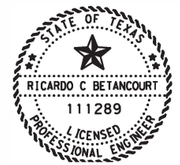
E5-1c_60x90;
6.0" Radius, 1.5" Border, White on, Green;
"EXIT", ClearviewHwy-6-W; "187", ClearviewHwy-4-W specified length;
Arrow A-2 - 29.3° 45°;



E5-1c_60x90;
6.0" Radius, 1.5" Border, White on, Green;
"EXIT", ClearviewHwy-6-W; "188", ClearviewHwy-4-W specified length;
Arrow A-2 - 29.3° 45°;



E5-1c_60x90;
6.0" Radius, 1.5" Border, White on, Green;
"EXIT", ClearviewHwy-6-W; "192", ClearviewHwy-4-W specified length;
Arrow A-2 - 29.3° 45°;



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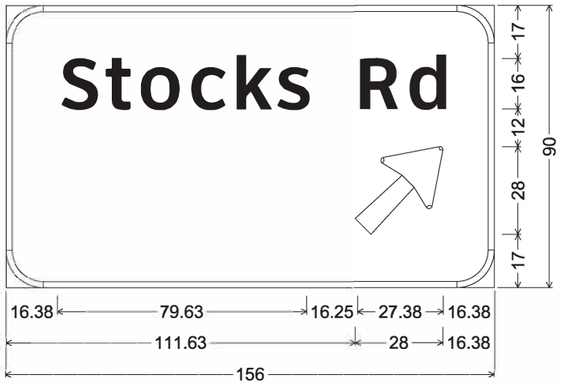
LARGE SIGN DETAILS

SHEET 2 OF 11

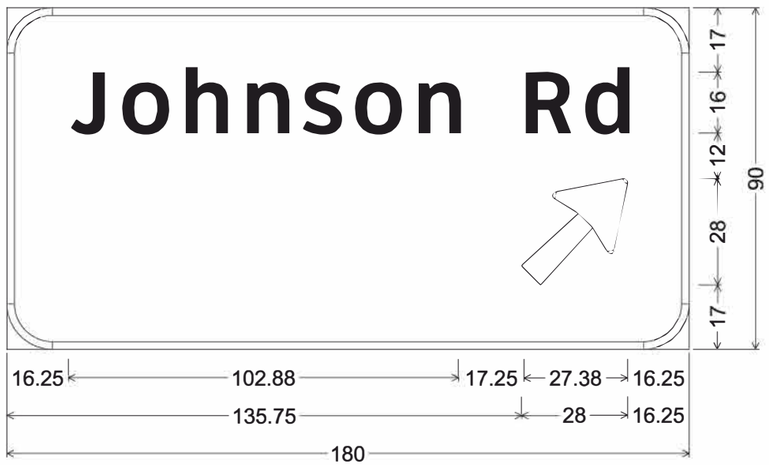
Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			127
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

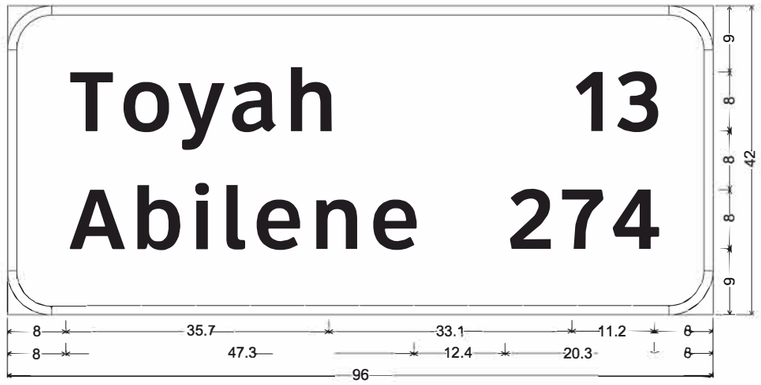
E7-3T_VARx54;
6.0" Radius, 1.3" Border, White on, Green;
"Pecos", ClearviewHwy-5-W-R; "38", ClearviewHwy-5-W-R; "Odessa", ClearviewHwy-5-W-R; "114", ClearviewHwy-5-W-R;
"Abilene", ClearviewHwy-5-W-R; "285", ClearviewHwy-5-W-R;



12.00" Radius, 2.00" Border, White on, Green;
"Stocks Rd", ClearviewHwy-5-W-R;
Arrow A-3 - 35.63" 45';



12.00" Radius, 2.00" Border, White on, Green;
"Johnson Rd", ClearviewHwy-5-W-R; Arrow A-3 - 35.63" 45';



E7-2T_VARx42;
6.0" Radius, 1.3" Border, White on, Green;
"Toyah", ClearviewHwy-5-W-R; "13", ClearviewHwy-5-W-R; "Abilene", ClearviewHwy-5-W-R;
"274", ClearviewHwy-5-W-R;

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Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			128
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

E11-1_V ARxV AR;

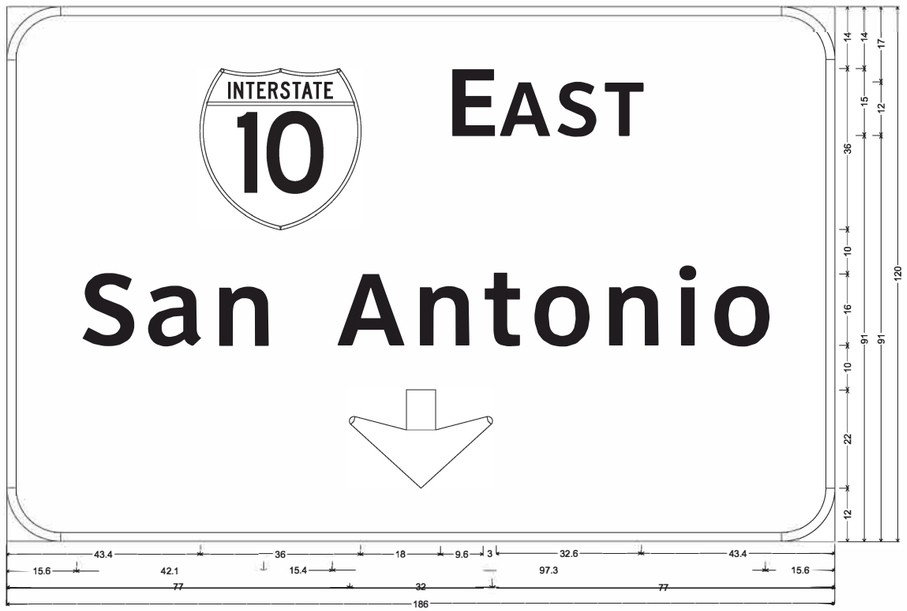
6.0" Radius, 2.0" Border, White on, Green;
Interstate 10 M1-1; "E AST", ClearviewHwy-5-W-R; "San Antonio", ClearviewHwy-5-W-R;

1.0" Inner border Green, 12.0" Radius, 2.0" Outer border, White on, Yellow;
"EXIT" Black, E; Down Arrow 22 - 22.0" 270' Black; "ONLY" Black, E;

IH 20 WB STA. 36+16

E6-2a_V ARx90;
12.0" Radius, 2.0" Border, White on, Green;
Interstate 10 M1-1; "W EST", ClearviewHwy-5-W-R; "El Paso", ClearviewHwy-5-W-R; Down Arrow 22 - 22.0" 270';
Down Arrow 22 - 22.0" 270';

IH 20 WB STA. 36+16



E6-2a_V ARx90;
12.0" Radius, 2.0" Border, White on, Green;
Interstate 10 M1-1; "E AST", ClearviewHwy-5-W-R; "San Antonio", ClearviewHwy-5-W-R; Down Arrow 22 - 22.0" 270';

IH 20 WB STA. 75+94

E6-2a_V ARx90;
12.0" Radius, 2.0" Border, White on, Green;
Interstate 10 M1-1; "W EST", ClearviewHwy-5-W-R; "El Paso", ClearviewHwy-5-W-R; Down Arrow 22 - 22.0" 270';

IH 20 WB STA. 75+94

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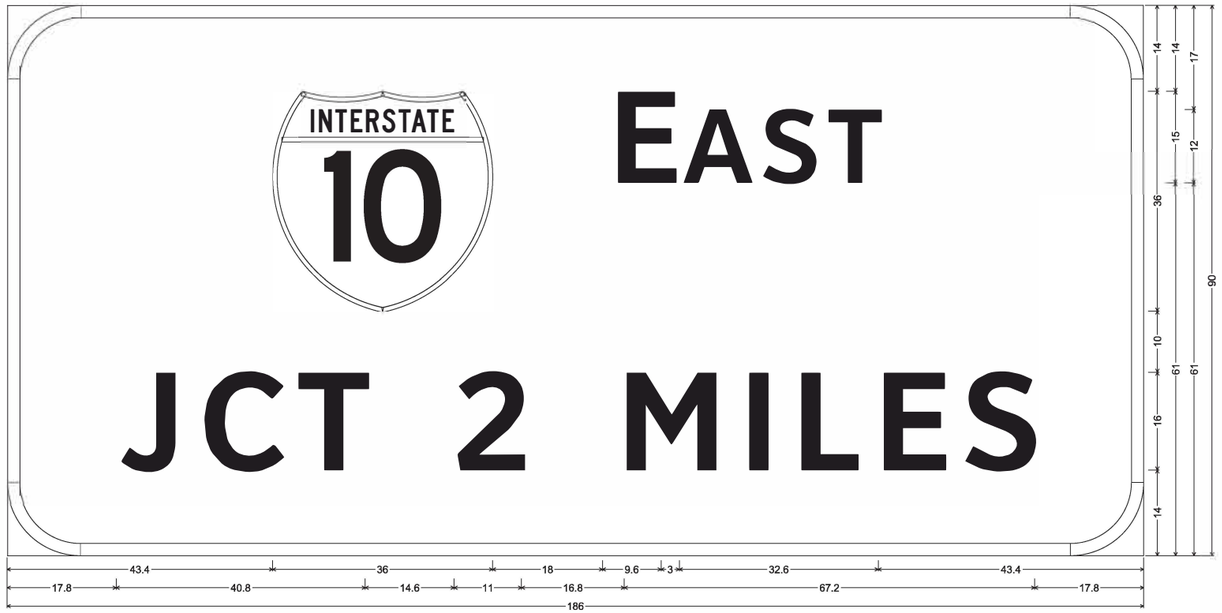
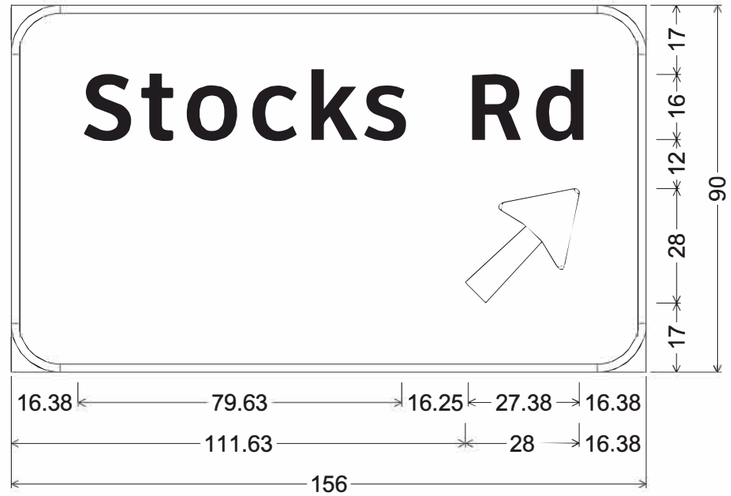
Texas Department of Transportation

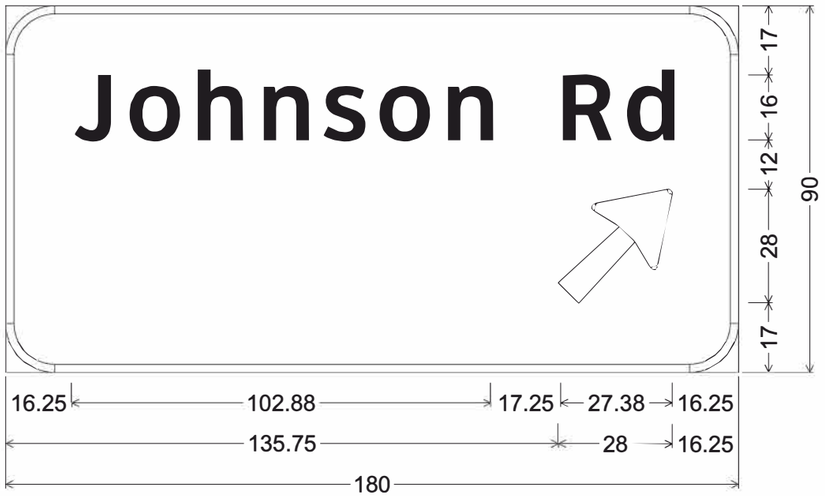
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			129
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



E6-2a_VARx90;
12.0" Radius, 2.0" Border, White on, Green;
Interstate 10 M1-1; "E AST", ClearviewHwy-5-W-R; "JCT 2 MILES", ClearviewHwy-5-W-R;



12.00" Radius, 2.00" Border, White on, Green;
"Stocks Rd", ClearviewHwy-5-W-R;
Arrow A-3 - 35.63" 45';



12.00" Radius, 2.00" Border, White on, Green;
"Johnson Rd", ClearviewHwy-5-W-R; Arrow A-3 - 35.63" 45';

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Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			130
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

E11-1_VARxVAR;

6.0" Radius, 2.0" Border, White on, Green;
Interstate 10 M1-1; "E AST", ClearviewHwy-5-W-R; "San Antonio", ClearviewHwy-5-W-R;

1.0" Inner border Green, 12.0" Radius, 2.0" Outer border, White on, Yellow;
"EXIT" Black, E; Arrow A-1 - 24.3" 135° Black; "ONLY" Black, E;

E6-2a_VARx90;
12.0" Radius, 2.0" Border, White on, Green;
Interstate 10 M1-1; "W EST", ClearviewHwy-5-W-R; "El Paso", ClearviewHwy-5-W-R; Down Arrow 22 - 22.0" 270°;
Down Arrow 22 - 22.0" 270°;

E6-2a_VARx90;
12.0" Radius, 2.0" Border, White on, Green;
Interstate 10 M1-1; "W EST", ClearviewHwy-5-W-R; "El Paso", ClearviewHwy-5-W-R; Down Arrow 22 - 22.0" 270°;
Down Arrow 22 - 22.0" 270°;

E6-2a_VARx90;
12.0" Radius, 2.0" Border, White on, Green;
Interstate 20 M1-1 18.0" C; "E AST", ClearviewHwy-5-W-R; "Dallas", ClearviewHwy-5-W-R; Arrow A-2 - 29.3" 45°;

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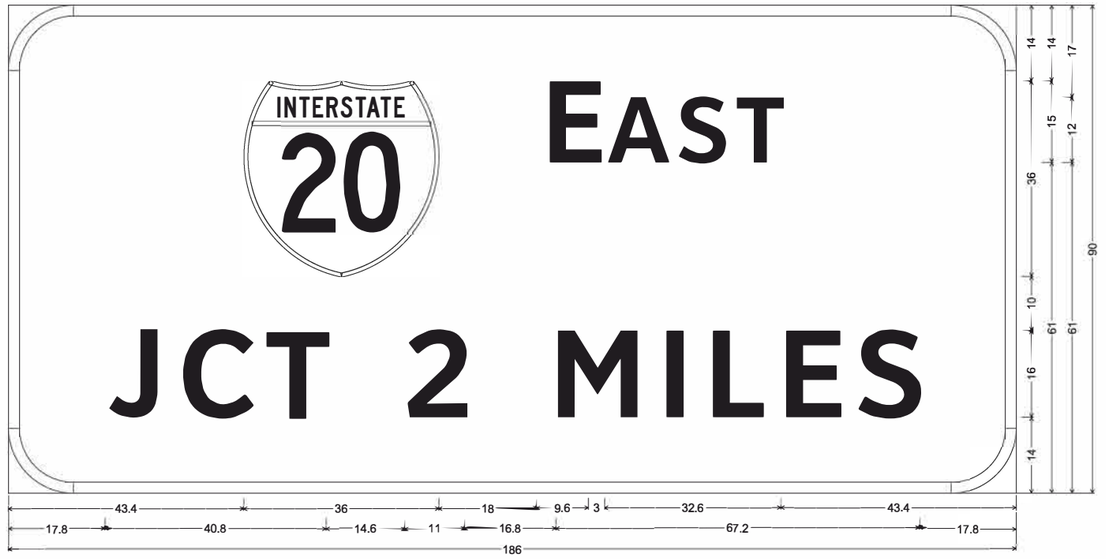
Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			131
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

E6-2a_VARx90;
12.0" Radius, 2.0" Border, White on, Green;
Interstate 20 M1-1 18.0" C; "E AST", ClearviewHwy-5-W-R; "Dallas", ClearviewHwy-5-W-R; "RIGHT LANE", ClearviewHwy-5-W-R;



E6-2a_VARx90;
12.0" Radius, 2.0" Border, White on, Green;
Interstate 20 M1-1 18.0" C; "E AST", ClearviewHwy-5-W-R; "JCT 2 MILES", ClearviewHwy-5-W-R;

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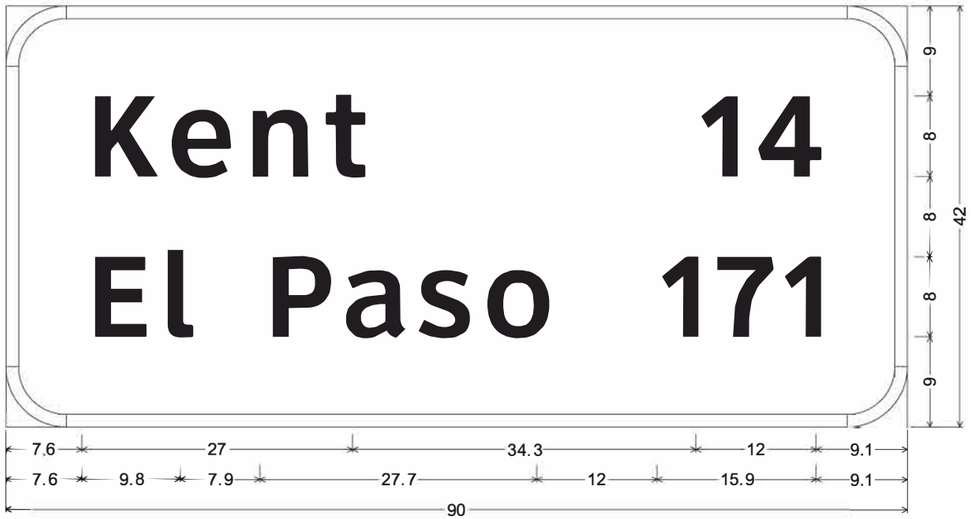
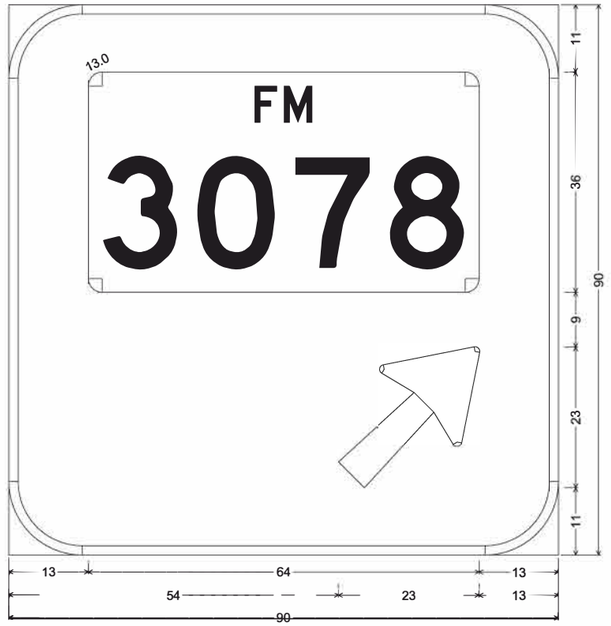
Texas Department of Transportation

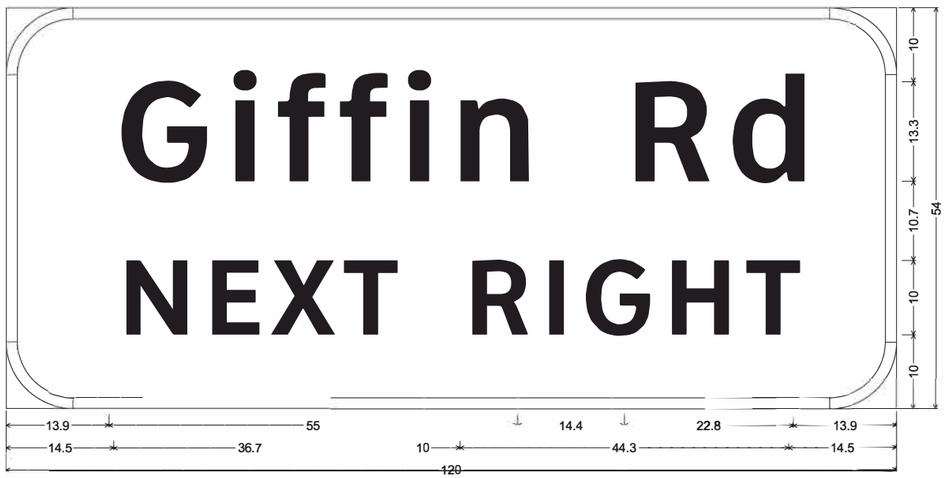
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			132
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



E7-2T_VARx42;
6.0" Radius, 1.3" Border, White on, Green;
"Kent", ClearviewHwy-5-W-R; "14", ClearviewHwy-5-W-R; "El Paso", ClearviewHwy-5-W-R;
"171", ClearviewHwy-5-W-R;



E6-2a_VARx90;
12.0" Radius, 1.5" Border, White on, Green;
State Highway 3078 M1-6F4; Arrow A-2 - 29.3" 45';



9.0" Radius, 1.5" Border, White on, Green;
"Giffin Rd", ClearviewHwy-5-W-R; "NEXT", ClearviewHwy-5-W-R; "RIGHT", ClearviewHwy-5-W-R;

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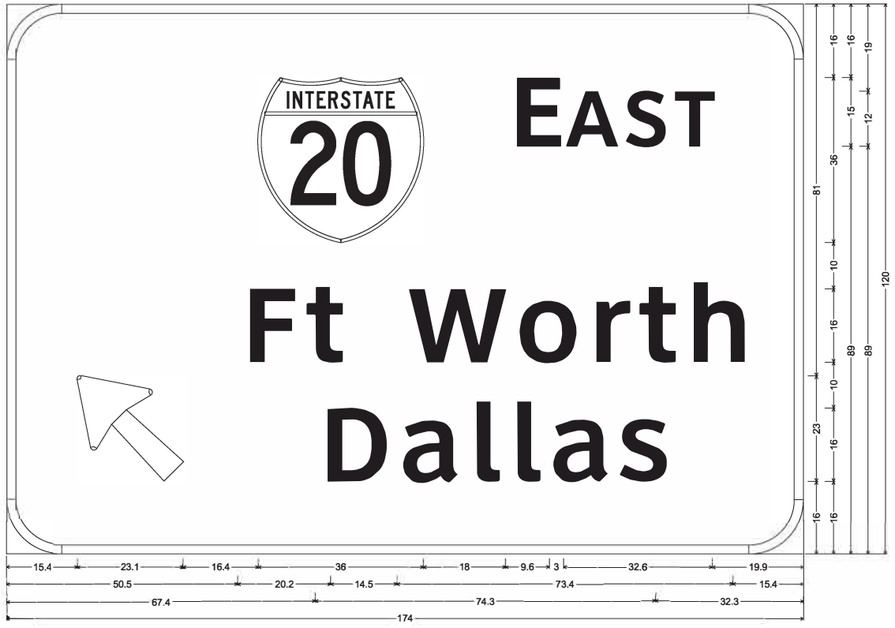
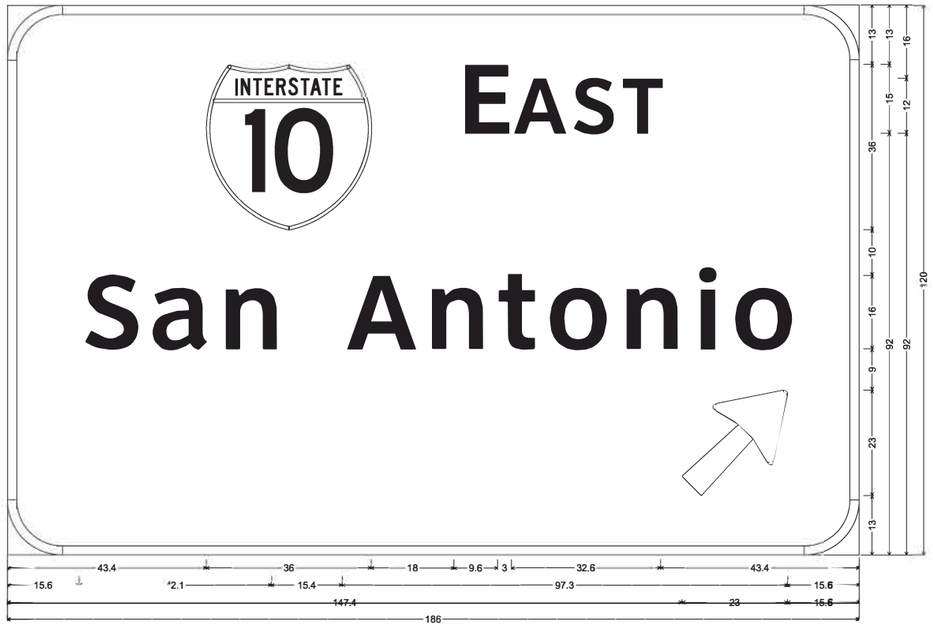
Texas Department of Transportation

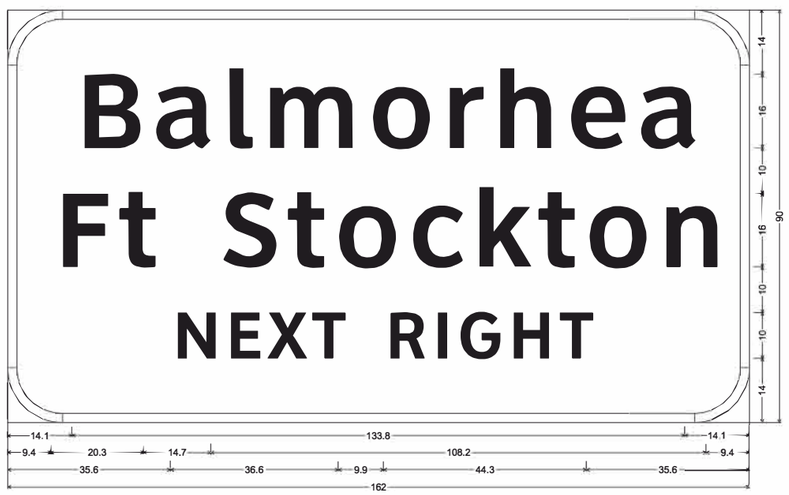
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			133
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



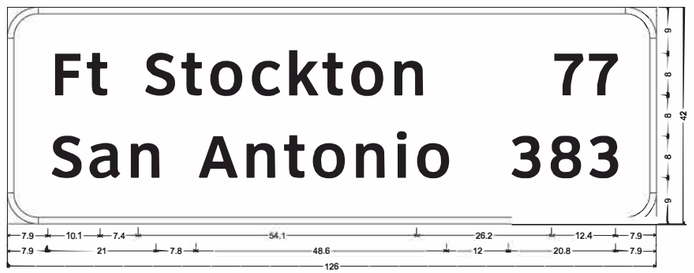
E6-2a_VARx90;
12.0" Radius, 2.0" Border, White on, Green;
Arrow A-2 - 29.3" 135'; Interstate 20 M1-1 18.0" C; "E AST", ClearviewHwy-5-W-R; "Ft Worth", ClearviewHwy-5-W-R; "Dallas", ClearviewHwy-5-W-R;



E6-2a_V ARx90;
12.0" Radius, 2.0" Border, White on, Green;
Interstate 10 M1-1; "E AST", ClearviewHwy-5-W-R; "San Antonio", ClearviewHwy-5-W-R; Arrow A-2 - 29.3" 45';



E1-2_V ARx120;
12.0" Radius, 2.0" Border, White on, Green;
"Balmorhea", ClearviewHwy-5-W-R; "Ft Stockton", ClearviewHwy-5-W-R; "NEXT RIGHT", ClearviewHwy-5-W-R;



E7-2T_VARx42;
6.0" Radius, 1.3" Border, White on, Green;
"Ft Stockton", ClearviewHwy-5-W-R; "77", ClearviewHwy-5-W-R; "San Antonio", ClearviewHwy-5-W-R; "383", ClearviewHwy-5-W-R;

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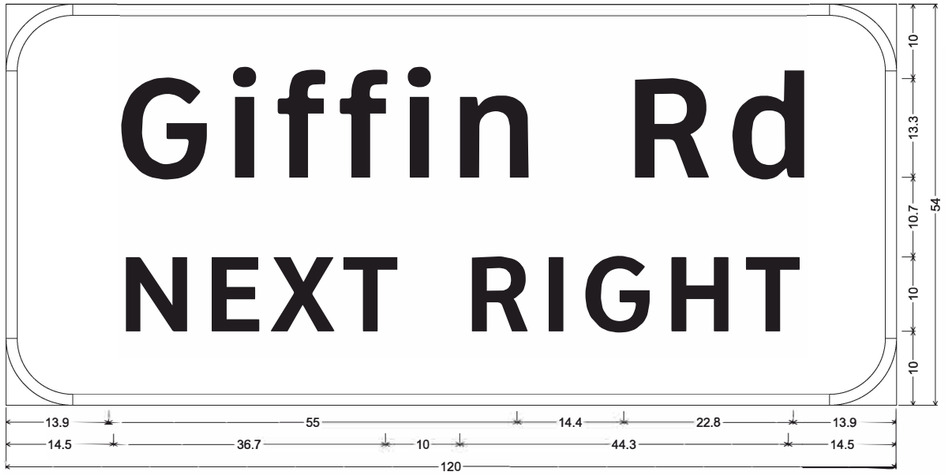
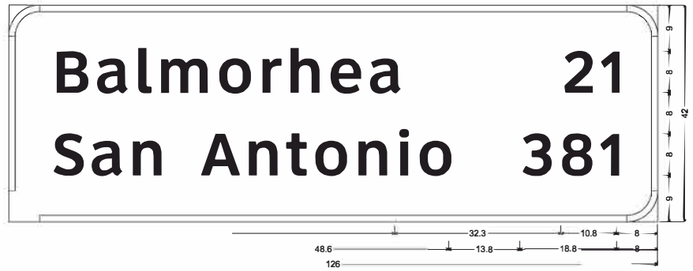
Texas Department of Transportation

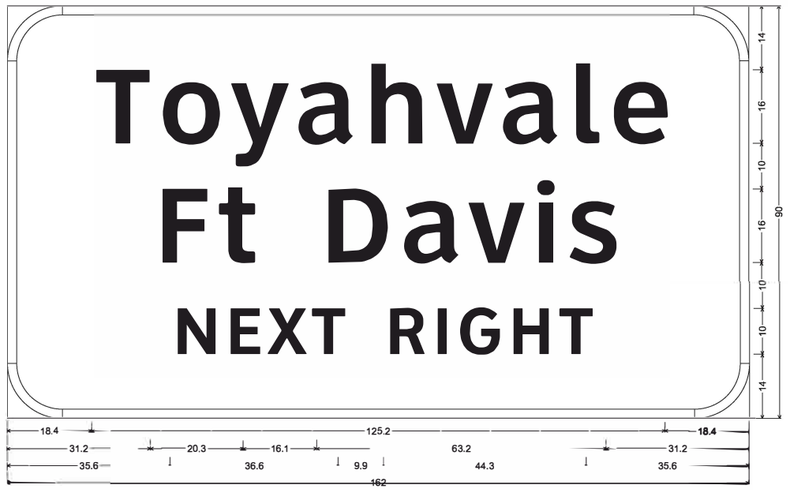
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			134
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



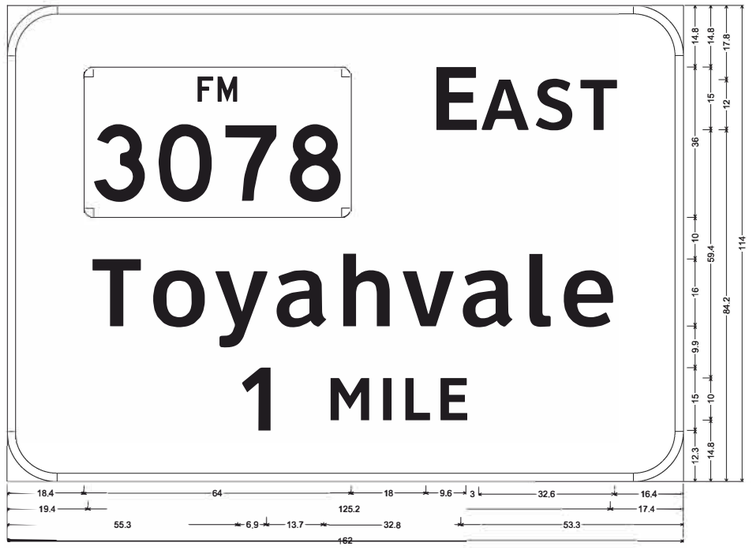
9.0" Radius, 1.5" Border, White on, Green;
"Giffin Rd", ClearviewHwy-5-W-R; "NEXT", ClearviewHwy-5-W-R; "RIGHT", ClearviewHwy-5-W-R;



"Balmorhea", ClearviewHwy-5-W-R; "21", ClearviewHwy-5-W-R; "San Antonio", ClearviewHwy-5-W-R; "381", ClearviewHwy-5-W-R;



E1-2_VARx120;
12.0" Radius, 2.0" Border, White on, Green;
"Toyahvale", ClearviewHwy-5-W-R; "Ft Davis", ClearviewHwy-5-W-R; "NEXT RIGHT", ClearviewHwy-5-W-R;



E6-2s_VARx90;
12.0" Radius, 2.0" Border, White on, Green;
State Highway 3078 M1-6F4; "E AST", ClearviewHwy-5-W-R; "Toyahvale", ClearviewHwy-5-W-R; "1 MILE", ClearviewHwy-5-W-R;

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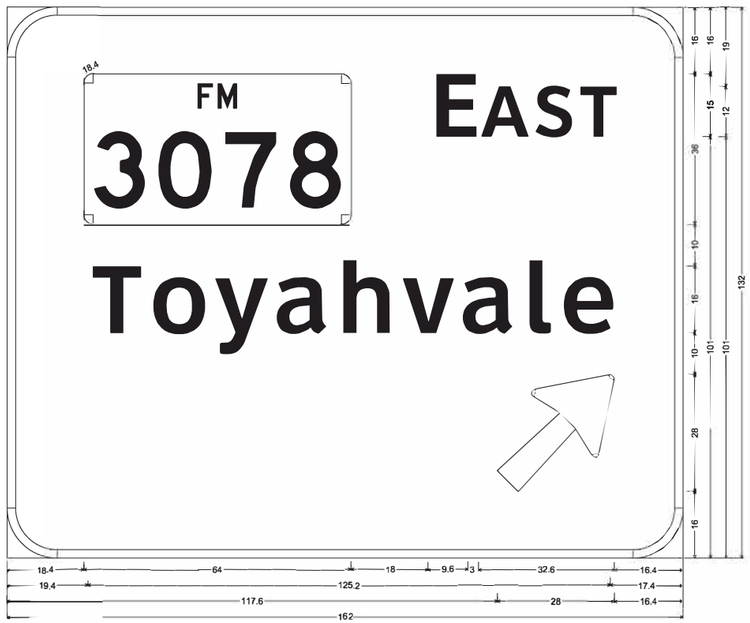
LARGE SIGN DETAILS

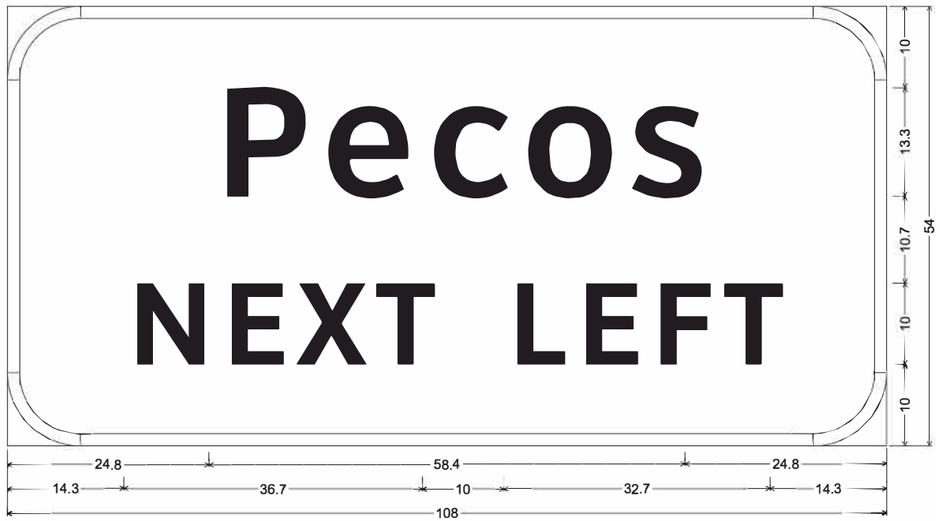
SHEET 10 OF 11

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			135
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



E6-2a_VARx90;
12.0" Radius, 2.0" Border, White on, Green;
State Highway 3078 M1-6F4; "E AST", ClearviewHwy-5-W-R; "Toyahvale", ClearviewHwy-5-W-R; Arrow A-3 - 35.6" 45';



9.0" Radius, 1.5" Border, White on, Green;
"Pecos", ClearviewHwy-5-W-R; "NEXT", ClearviewHwy-5-W-R; "LEFT", ClearviewHwy-5-W-R;

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LARGE SIGN DETAILS

SHEET 11 OF 11

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			136
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

SMALL SIGN REMOVAL SUMMARY
IH 20(0003-05-055)

SIGN NO.	HWY	DIRECTION	STATION	SIGN TEXT
1	IH 20	EB	7+47	LOW CLEARANCE 16(FT)-6(IN)
2	IH 20	EB	9+41	BRIDGE MAY ICE IN COLD WEATHER
3	IH 20	EB	15+61	LOW CLEARANCE 16(FT)-6(IN)
4	IH 20	EB	21+54	SYMBOL-MERGE RIGHT AHEAD
5	IH 20	EB	32+53	BRIDGE MAY ICE IN COLD WEATHER
6	IH 20	EB	44+23	EAST-INTERSTATE(TEXAS) 20
7	IH 20	EB	51+63	FOR OFFICIAL OR EMERGENCY VEH USE ONLY
8	IH 20	EB	52+08	MILE(1)
9	IH 20	EB	54+40	SPEED LIMIT 80
10	IH 20	EB	57+62	LEFT LANE FOR PASSING ONLY
11	IH 20	EB	100+52	MILE(2)
12	IH 20	EB	138+11	BRIDGE MAY ICE IN COLD WEATHER
13	IH 20	EB	144+46	EXIT/40 MPH
14	IH 20	EB	153+40	MILE(3)
15	IH 20	EB	168+05	SYMBOL-MERGE RIGHT AHEAD
16	IH 20	EB	178+30	EAST-INTERSTATE(TEXAS) 20
17	IH 20	EB	205+97	MILE(4)
18	IH 20	EB	258+82	MILE(5)
19	IH 20	EB	261+13	BRIDGE MAY ICE IN COLD WEATHER
20	IH 20	EB	286+28	FOR OFFICIAL OR EMERGENCY VEH USE ONLY
21	IH 20	EB	306+56	MILE(6)
22	IH 20	EB	360+35	MILE(7)
23	IH 20	EB	377+37	EXIT 30MPH
24	IH 20	EB	400+43	SYMBOL-MERGE RIGHT AHEAD
25	IH 20	EB	413+54	MILE(8)
26	IH 20	EB	423+39	EAST-INTERSTATE(TEXAS) 20
27	IH 20	EB	446+39	SPEED LIMIT 80
28	IH 20	EB	470+08	MILE(9)

SIGN NO.	HWY	DIRECTION	STATION	SIGN TEXT
29	IH 20	WB	470+08	MILE(9)
30	IH 20	WB	414+01	MILE(8)
31	IH 20	WB	413+62	EXIT/50 MPH
32	IH 20	WB	384+75	SYMBOL-MERGE RIGHT AHEAD
33	IH 20	WB	361+27	MILE(7)
34	IH 20	WB	343+29	SPEED LIMIT 80
35	IH 20	WB	307+65	MILE(6)
36	IH 20	WB	301+47	SYMBOL-ALERT FOR DEER
37	IH 20	WB	287+29	FOR OFFICIAL OR EMERGENCY VEH USE ONLY
38	IH 20	WB	286+98	BRIDGE MAY ICE IN COLD WEATHER
39	IH 20	WB	260+02	MILE(5)
40	IH 20	WB	207+17	MILE(4)
41	IH 20	WB	188+42	BRIDGE MAY ICE IN COLD WEATHER
42	IH 20	WB	175+14	EXIT/50 MPH
43	IH 20	WB	156+76	SYMBOL-MERGE RIGHT AHEAD
44	IH 20	WB	153+87	MILE(3)
45	IH 20	WB	136+98	EAST-INTERSTATE(TEXAS) 20
46	IH 20	WB	117+12	SPEED LIMIT 80
47	IH 20	WB	101+51	MILE(2)
48	IH 20	WB	52+91	MILE(1)
49	IH 20	WB	49+96	RIGHT LANE ENDS
50	IH 20	WB	49+96	RIGHT LANE ENDS
51	IH 20	WB	40+54	LANE ENDS MERGE LEFT
52	IH 20	WB	40+54	LANE ENDS MERGE LEFT
53	IH 20	WB	38+36	BRIDGE MAY ICE IN COLD WEATHER
54	IH 20	WB	31+24	SYMBOL-MERGE RIGHT AHEAD
55	IH 20	WB	31+24	SYMBOL-MERGE RIGHT AHEAD
56	IH 20	WB	10+51	SYMBOL-MERGELEFT AHEAD
57	IH 20	WB	0+00	MILE(0)

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SIGN REMOVAL SUMMARY

SHEET 1 OF 4

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			137
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

SMALL SIGN REMOVAL SUMMARY
IH 10(0441-09-049)

SIGN NO.	HWY	DIRECTION	STATION	SIGN TEXT
58	IH10	EB	8+28	SYMBOL-ALERT FOR DEER
59	IH10	EB	14+84	BRIDGE MAY ICE IN COLD WEATHER
60	IH10	EB	43+05	MILE(0)
61	IH10	EB	47+73	MILE(187)
62	IH10	EB	50+18	BRIDGE MAY ICE IN COLD WEATHER
63	IH10	EB	52+01	EAST-INTERSTATE(TEXAS) 10
64	IH10	EB	61+43	SPEED LIMIT 80
65	IH10	EB	80+33	LOW CLEARANCE17(FT)10(IN)
66	IH10	EB	91+46	EXIT/50 MPH
67	IH10	EB	94+96	MILE(188)
68	IH10	EB	104+70	LOW CLEARANCE17(FT)10(IN)
69	IH10	EB	113+76	SYMBOL-MERGE RIGHT AHEAD
70	IH10	EB	136+46	EAST-INTERSTATE(TEXAS) 10
71	IH10	EB	141+49	BRIDGE MAY ICE IN COLD WEATHER
72	IH10	EB	147+97	MILE(189)
73	IH10	EB	158+76	LEFT LANE FOR PASSING ONLY
74	IH10	EB	158+76	LEFT LANE FOR PASSING ONLY
75	IH10	EB	192+21	GUSTY WINDS AHEAD
76	IH10	EB	201+59	MILE(190)
77	IH10	EB	253+04	MILE(191)
78	IH10	EB	283+30	BRIDGE MAY ICE IN COLD WEATHER
79	IH10	EB	296+81	JONES DRAW
80	IH10	EB	305+76	MILE(192)
81	IH10	EB	333+97	LOW CLEARANCE16(FT)2(IN)
82	IH10	EB	341+14	EXIT/50 MPH
83	IH10	EB	351+34	LOW CLEARANCE16(FT)2(IN)

SIGN NO.	HWY	DIRECTION	STATION	SIGN TEXT
84	IH 10	WB	351+72	SYMBOL-MERGE RIGHT AHEAD
85	IH 10	WB	312+52	BRIDGE MAY ICE IN COLD WEATHER
86	IH 10	WB	311+22	MILE(192)
87	IH 10	WB	305+21	JONES DRAW
88	IH 10	WB	301+20	EAST-INTERSTATE(TEXAS) 10
89	IH 10	WB	298+16	SPEED LIMIT 80
90	IH 10	WB	258+18	MILE(191)
91	IH 10	WB	206+06	MILE(190)
92	IH 10	WB	163+35	BRIDGE MAY ICE IN COLD WEATHER
93	IH 10	WB	151+85	MILE(189)
94	IH 10	WB	134+43	LOW CLEARANCE15(FT)8(IN)
95	IH 10	WB	123+72	EXIT/50 MPH
96	IH 10	WB	109+97	LOW CLEARANCE15(FT)8(IN)
97	IH 10	WB	101+29	SYMBOL-MERGE RIGHT AHEAD
98	IH 10	WB	99+20	MILE(188)
99	IH 10	WB	75+58	BRIDGE MAY ICE IN COLD WEATHER
100	IH 10	WB	68+17	EXIT/35 MPH
101	IH 10	WB	45+69	SYMBOL-MERGE RIGHT AHEAD
102	IH 10	WB	27+90	RAMP/35 MPH
103	IH 10	WB	21+75	RAMP/35 MPH

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RICARDO C BETANCOURT, P.E. 12/19/22

SIGN REMOVAL SUMMARY

SHEET 2 OF 4

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			138
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

LARGE SIGN REMOVAL SUMMARY
IH 20(0003-05-055)

SIGN NO.	HWY	DIRECTION	STATION	SIGN TEXT
1	IH 20	EB		PECOS 38 ODESSA 114 ABILENE 285
2	IH 20	EB		EXIT 3 STOCKS RD
3	IH 20	EB		EXIT 3
4	IH 20	EB		EXIT 7 JOHNSON CITY
5	IH 20	EB		EXIT 7
6	IH 20	EB		TOYAH 13 ABILENE 274

SIGN NO.	HWY	DIRECTION	STATION	SIGN TEXT
7	IH 20	WB		EXIT 7 JOHNSON RD
8	IH 20	WB		EXIT 7
9	IH 20	WB		EXIT 3 STOCKS RD
10	IH 20	WB		EXIT 3
11	IH 20	WB		EAST SAN ANTONIO
12	IH 20	WB		WEST EL PASO
13	IH 20	WB		EXIT 186 EAST SAN ANTONIO EXIT ONLY
14	IH 20	WB		WEST EL PASO
15	IH 20	WB		EXIT 186 EAST SAN ANTONIO EXIT ONLY
16	IH 20	WB		WEST EL PASO
17	IH 20	WB		EXIT 186

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SIGN REMOVAL SUMMARY

SHEET 3 OF 4

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			139
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

LARGE SIGN REMOVAL SUMMARY
IH 10(0441-09-049)

SIGN NO.	HWY	DIRECTION	STATION	SIGN TEXT
18	IH 10	EB		PECOS NEXT LEFT
19	IH 10	EB		BALMORHEA FT STOCKTON NEXT RIGHT
20	IH 10	EB		EAST FT WORTH NEXT RIGHT
21	IH 10	EB		EAST SAN ANTONIO
22	IH 10	EB		FT STOCKTON 77 SAN ANTONIO 383
23	IH 10	EB		EXIT 188 GIFFIN RD NEXT RIGHT
24	IH 10	EB		EXIT 188
25	IH 10	EB		BALMORHEA 21 SAN ANGELO 381
26	IH 10	EB		EXIT 192 TOYAHVALE 1 MILE FM 3078
27	IH 10	EB		TOYAHVALE FT DAVIS NEXT RIGHT
28	IH 10	EB		EXIT 192 EAST FM 3078 TOYAHVALE
29	IH 10	EB		EXIT 192
30	IH 10	EB		BALMORHEA 16 SAN ANTONIO 378

SIGN NO.	HWY	DIRECTION	STATION	SIGN TEXT
31	IH 10	WB		KENT 14 EL PASO 171
32	IH 10	WB		JUNCTION EAST 2 MILES
33	IH 10	WB		EXIT 188 GIFFIN RD NEXT RIGHT
34	IH 10	WB		EXIT 188
35	IH 10	WB		EAST DALLAS NEXT RIGHT
36	IH 10	WB		WEST EL PASO
37	IH 10	WB		EXIT 187 EAST FT WORTH DALLAS
38	IH 10	WB		EXIT 187
39	IH 10	WB		EXIT 186 EAST SAN ANTONIO EXIT ONLY
40	IH 10	WB		WEST EL PASO

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SIGN REMOVAL SUMMARY

SHEET 4 OF 4

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			140
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

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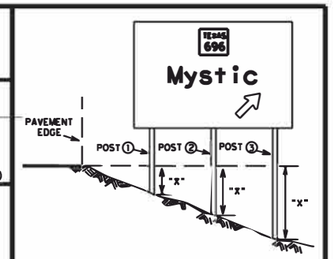
SUMMARY OF LARGE SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN BACK-GROUND COLOR	SIGN TEXT	SIGN DIMENSIONS	PLAQUES, & OTHER ATTACHMENTS		BACKGROUND SUBSTRATE (SQ FT)		TYPE OF MOUNT	"X" DIMENSION ◒			GALVANIZED STRUCTURAL STEEL					DRILLED SHAFT			
					DIRECT APPLY	✱ ALUMINUM (TYPE A)	GROUND MOUNT (TYPE G)	OVERHEAD (TYPE O)		post ①	post ②	post ③	SIZE	LINEAR FEET post ①	post ②	post ③	TOTAL WEIGHT LBS.	NON-REINF 12"ϕ	LINEAR FEET REINFORCED 24"ϕ	30"ϕ	36"ϕ
EB IH 20 64+59	1	GREEN	PECOS 38 ODESSA 114 ABILENE 285	8.5X4.5			38.25		2,2,0	3.1	3.9		S4X7.7	10	10		301.40	8			
EB IH 20 138+11	2	GREEN	EXIT 3 STOCKS RD 45 DEG ARROW	6X2.5 13X7.5			97.5		2,2,0	3	0		W6X12	15	15		500.60		12		
EB IH 20 148+07	3	GREEN	EXIT 3 45 DEG ARROW	5X3.5			17.5		2,2,0	0	0		S4X7.7	9	9		293.70	8			
EB IH 20 371+08	4	GREEN	EXIT 7 JOHNSON RD 45 DEG ARROW	6X2.5 15X7.5			112.50		2,2,0	22	27		W6X12	12	12		1007.60		12		
EB IH 20 381+30	5	GREEN	EXIT 7 45 DEG ARROW	5x7.5			37.50		2,2,0	2	2.3		S4X7.7	13.3	13.3		326.80	8			
EB IH 20 444+00	6	GREEN	TOYAH 13 ABILENE 274	8x3.5			28.00		2,2,0	2.1	2.7		S3x5.7	5.8	5.8		204.90	8			
			PAGE TOTALS				331.25							**PAGE TOTALS**			2635.00	32	24		



◒ The "X" dimension is the elevation difference at the post between the ground and the edge of pavement or top of curb.

Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.

The post lengths listed here are approximations, The corrected post lengths will be furnished by the Contractor after the stud posts are placed.

Tower heights shall be verified with the Engineer before fabrication.

✱ This column is for aluminum Type A and not direct apply. Direct apply is subsidiary to the sign.

STATE OF TEXAS
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SIGN TYPE

SIGN TYPE 1 3 0

- 1 — Wind Design Zone
- 3 — No. of Posts
- 0 — Series No.: 0 Aluminum/Fiberglass, 1 Aluminum, 2 Fiberglass

See sheet SMD(8W1)

SUMMARY OF LARGE SIGNS

SOLS

DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS			
11-93	8-95	5-01	1-04 9-08

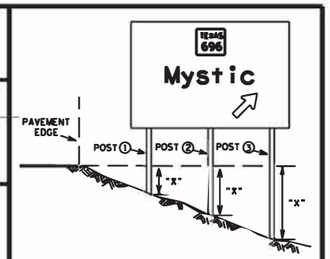
CONT	SECT	JOB	HIGHWAY
0003	05	055	IH 20, ETC
DIST	COUNTY		SHEET NO.
ODA	REEVES		141

DATE:
FILE:

SUMMARY OF LARGE SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN BACK-GROUND COLOR	SIGN TEXT	SIGN DIMENSIONS	PLAQUES, & OTHER ATTACHMENTS		BACKGROUND SUBSTRATE (SQ FT)		TYPE OF MOUNT	"X" DIMENSION ◒			GALVANIZED STRUCTURAL STEEL					DRILLED SHAFT			
					DIRECT APPLY	✱ ALUMINUM (TYPE A)	GROUND MOUNT (TYPE G)	OVERHEAD (TYPE O)		post ①	post ②	post ③	SIZE	LINEAR FEET post ①	post ②	post ③	TOTAL WEIGHT LBS.	NON-REINF 12"ϕ	LINEAR FEET REINFORCED 24"ϕ	30"ϕ	36"ϕ
WB IH 20 36+16	7	GREEN	INTERSTATE 10 EXIT 186 EAST SAN ANTONIO EXIT ONLY ARROW	8X2.5 15.5X10	9.00			155.00													
WB IH 20 36+16	8	GREEN	INTERSTATE 10 WEST EL PASO DOUBLE ARROW	12X10	9.00			120.00													
WB IH 20 75+94	9	GREEN	INTERSTATE 10 EAST SAN ANTONIO ARROW	15.5X10	9.00			155.00													
WB IH 20 75+94	10	GREEN	INTERSTATE 10 WEST EL PASO ARROW	12X10	9.00			155.00													
WB IH 20 142+42	11	GREEN	INTERSTATE 10 EAST JCT 2 MILES	15.5X7.5	9.00		116.25		2,2,0	3.5	9.0		W6X15	15	15		913.10		12		
WB IH 20 208+54	12	GREEN	EXIT 3 45 DEG ARROW	5X3.5			17.5		2,2,0	0	0		S4X7.7	9	9		293.70	8			
WB IH 20 218+55	13	GREEN	EXIT 3 STOCKS RD 45 DEG ARROW	6X2.5 13X7.5			97.5		2,2,0	3	0		W6X12	15	15		500.60		12		
WB IH 20 446+24	14	GREEN	EXIT 7 45 DEG ARROW	5X7.5			37.50		2,2,0	24	28		S4X7.7	7.7	7.7		694.1	8			
WB IH 20 457+04	15	GREEN	EXIT 7 JOHNSON RD 45 DEG ARROW	6X2.5 15X7.5			112.50		2,2,0	22	27		W6X12	12	12		1007.60		12		
			PAGE TOTALS				381.25	585.00						PAGE TOTALS			3409.0	16	36		

DATE:
FILE:



◒ The "X" dimension is the elevation difference at the post between the ground and the edge of pavement or top of curb.

Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.

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Tower heights shall be verified with the Engineer before fabrication.

✱ This column is for aluminum Type A and not direct apply. Direct apply is subsidiary to the sign.

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

SIGN TYPE

SIGN TYPE 1 3 0
- 1 — Wind Design Zone
- 3 — Series No.
- 0 — No. of Posts

Series No.: 0 Aluminum/Fiberglass, 1 Aluminum, 2 Fiberglass

See sheet SMD(8W1)

SUMMARY OF LARGE SIGNS

SOLS

		REVISIONS	
DN.: TxDOT			
CK.: TxDOT	11-93	1-04	
DW.: TxDOT	8-95	9-08	
CK.: TxDOT	5-01		

CONT	SECT	JOB	HIGHWAY
0003	05	055	IH 20, ETC
DIST	COUNTY		SHEET NO.
ODA	REEVES		142

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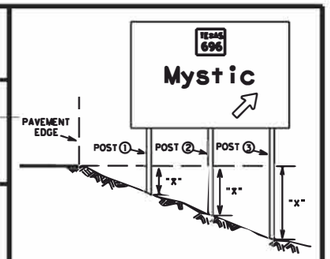
DATE:
FILE:

SUMMARY OF LARGE SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN BACK-GROUND COLOR	SIGN TEXT	SIGN DIMENSIONS	PLAQUES, & OTHER ATTACHMENTS		BACKGROUND SUBSTRATE (SQ FT)		TYPE OF MOUNT	"X" DIMENSION ◒			GALVANIZED STRUCTURAL STEEL					DRILLED SHAFT				
					DIRECT APPLY	✳ ALUMINUM (TYPE A)	GROUND MOUNT (TYPE G)	OVERHEAD (TYPE O)		post ①	post ②	post ③	SIZE	LINEAR FEET post ①	post ②	post ③	TOTAL WEIGHT LBS.	NON-REINF 12"ϕ	LINEAR FEET REINFORCED 24"ϕ	30"ϕ	36"ϕ
EB IH 10 30+34	16	GREEN	PECOS NEXT LEFT	9X4.5			40.50		2,2,0	1.75	2.58			7.33	7.33		280.80	8			
EB IH 10 39+53	17	GREEN	BALMORHEA FT STOCKTON NEXT RIGHT	13.5X7.5			101.25		2,2,0	2.3	0			11.3	11.3		456.20		12		
EB IH 10 47+49	18	GREEN	EAST FT WORTH DALLAS 45 DEG ARROW	13.5X7.5				101.25	2,0,0												
EB IH 10 47+49	19	GREEN	EAST SAN ANTONIO 45 DEG ARROW	15.5X10				155.00	2,0,0												
EB IH 10 71+66	20	GREEN	FT STOCKTON 77 SAN ANTONIO 383	10.5X3.5			36.75		2,2,0	2.8	0			7.7	7.7		253.70	8			
EB IH 10 82+52	21	GREEN	EXIT 188 GIFFIN RD NEXT RIGHT	8x2.5 9X5.5			49.50		2,2,0												
EB IH 10 92+71	22	GREEN	EXIT 188	5x7.5			37.50		2,2,0	0	0		S4X7.7	7.7	7.7		293.70	8			
EB IH 10 155+48	23	GREEN	BALMORHEA 21 SAN ANTONIO 381	10.5X3.5			36.75		2,2,0	28	27		S4X7.7	7.7	7.7		647.90	8			
EB IH 10 279+86	24	GREEN	EXIT 192 FM 3078 EAST TOYAHVALE 1 MILE	13.5x9.5			128.25		2,2,0	7	13.5		W6X15	33.5	33.5		838.10		12		
EB IH 10 315+30	25	GREEN	TOYAHVALE FT DAVIS NEXT RIGHT	15X11			101.25		2,2,0	2.5	2.5		W6X12	14	14		488.60		12		
			PAGE TOTALS				531.75	256.25						PAGE TOTALS			3259.00	32	36		



◒ The "X" dimension is the elevation difference at the post between the ground and the edge of pavement or top of curb.

Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.

The post lengths listed here are approximations, The corrected post lengths will be furnished by the Contractor after the stud posts are placed.

Tower heights shall be verified with the Engineer before fabrication.

✳ This column is for aluminum Type A and not direct apply. Direct apply is subsidiary to the sign.

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED PROFESSIONAL ENGINEER

RICARDO C BETANCOURT, P.E. 12/19/22

SIGN TYPE

SIGN TYPE 1 3 0

- 1 — Wind Design Zone
- 3 — Series No.
- 0 — No. of Posts

Series No.: 0 Aluminum/Fiberglass; 1 Aluminum; 2 Fiberglass

See sheet SMD(8W1)

SUMMARY OF LARGE SIGNS

SOLS

		REVISIONS	
DN.: TxDOT	CK.: TxDOT	11-93	1-04
DW.: TxDOT	CK.: TxDOT	8-95	9-08
		5-01	

CONT	SECT	JOB	HIGHWAY
0003	05	055	IH 20, ETC
DIST	COUNTY		SHEET NO.
ODA	REEVES		143

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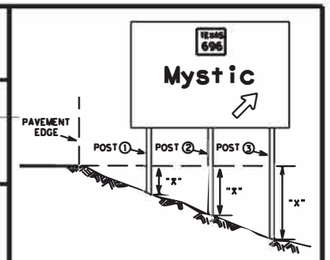
SUMMARY OF LARGE SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN BACK-GROUND COLOR	SIGN TEXT	SIGN DIMENSIONS	PLAQUES, & OTHER ATTACHMENTS		BACKGROUND SUBSTRATE (SQ FT)		TYPE OF MOUNT	"X" DIMENSION ⊖			GALVANIZED STRUCTURAL STEEL					DRILLED SHAFT			
					DIRECT APPLY	✳ ALUMINUM (TYPE A)	GROUND MOUNT (TYPE G)	OVERHEAD (TYPE O)		post ①	post ②	post ③	SIZE	LINEAR FEET post ①	post ②	post ③	TOTAL WEIGHT LBS.	LINEAR FEET NON-REINF 12"ϕ	REINFORCED 24"ϕ	30"ϕ	36"ϕ
EB IH 10 336+54	26	GREEN	EXIT 192 FM 3078 EAST TOYAHVALE	8X2.5 13.5X11			148.50		2,2,0	2.6	2.9		W8X18	21.5	21.5		790.60		12		
EB IH 10 341.74	27	GREEN	EXIT 192 45 DEG ARROW	5X7.5			37.50		2,2,0	0	0		S4X7.7	7.7	7.7		293.70	8			
PAGE TOTALS							186.00										1084.30	8	12		



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Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.

The post lengths listed here are approximations, The corrected post lengths will be furnished by the Contractor after the stud posts are placed.

Tower heights shall be verified with the Engineer before fabrication.

✳ This column is for aluminum Type A and not direct apply. Direct apply is subsidiary to the sign.

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

SIGN TYPE

SIGN TYPE 1 3 0
- 1 — Wind Design Zone
- 3 — No. of Posts
- 0 — Series No.: 0 Aluminum/Fiberglass, 1 Aluminum, 2 Fiberglass

See sheet SMD(BW1)

SUMMARY OF LARGE SIGNS

SOLS

DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	REVISIONS
	11-93	8-95	5-01	1-04 9-08

CONT	SECT	JOB	HIGHWAY
0003	05	055	IH 20, ETC
DIST	COUNTY		SHEET NO.
ODA	REEVES		144

DATE:
FILE:

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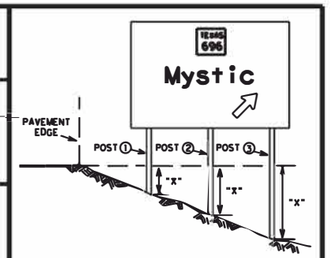
DATE:
FILE:

SUMMARY OF LARGE SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN BACK-GROUND COLOR	SIGN TEXT	SIGN DIMENSIONS	PLAQUES, & OTHER ATTACHMENTS		BACKGROUND SUBSTRATE (SQ FT)		TYPE OF MOUNT	"X" DIMENSION ◒			GALVANIZED STRUCTURAL STEEL					DRILLED SHAFT			
					DIRECT APPLY	✱ ALUMINUM (TYPE A)	GROUND MOUNT (TYPE G)	OVERHEAD (TYPE O)		post ①	post ②	post ③	SIZE	LINEAR FEET post ①	post ②	post ③	TOTAL WEIGHT LBS.	NON-REINF 12"ϕ	LINEAR FEET REINFORCED 24"ϕ	30"ϕ	36"ϕ
WB IH 20 14+87	28	GREEN	EXIT 186 45 DEG ARROW	5x7.5			37.50		2,2,0	0	0		S4X7.7	7.7	7.7		293.70	8			
WB IH 20 24+09	29	GREEN	INTERSTATE 10 EXIT 186 EAST SAN ANTONIO EXIT ONLY ARROW	8X2.5 15.5X10	9.00			155.00													
WB IH 20 24+09	30	GREEN	INTERSTATE 10 WEST EL PASO DOUBLE ARROW	12X10	9.00			120.00													
WB IH 10 61+05	31	GREEN	EXIT 187 45 DEG ARROW	5x7.5			37.50		2,2,0				S4X7.7	7.7	7.7		305.30	8			
WB IH 10 65+60	32	GREEN	EXIT 187 INTERSTATE 10 EAST DALLAS RIGHT LANE	8X2.5 11X7.5	9.00		82.50		2,2,0				W6X9	9	9		390.40		12		
WB IH 10 65+60	33	GREEN	INTERSTATE 10 WEST EL PASO DOUBLE ARROW	12X10	9.00			120.00	2,0,0												
WB IH 10 79+37	34	GREEN	EXIT 187 INTERSTATE 10 EAST DALLAS RIGHT LANE	8X2.5 11X10	9.00			110.00	2,0,0												
WB IH 10 118+10	35	GREEN	EXIT 188 5X7.5				37.50		2,2,0				S4X7.7	9	9		293.70	8			
WB IH 10 26+57	36	GREEN	EXIT 188 GIFFIN RD NEXT RIGHT	8X2.5 10X4.5			45.00		2,2,0				S4X7.7	8.5	8.5		289.90	8			
WB IH 10 170+79	37	GREEN	INTERSTATE 10 EAST JCT 2 MILES	15.5X7.5	9.00		116.25		2,2,0				W6X12	17.1	17.1		525.80		12		
			PAGE TOTALS				318.75	505.00					PAGE TOTALS				2098.80	32	24		



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Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.

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✱ This column is for aluminum Type A and not direct apply. Direct apply is subsidiary to the sign.

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

SIGN TYPE

SIGN TYPE 1 3 0
- 1 — Wind Design Zone
- 3 — Series No.
- 0 — Aluminum/Fiberglass
  - 1 Aluminum
  - 2 Fiberglass
- 0 — No. of Posts

See sheet SMD(8W1)

SUMMARY OF LARGE SIGNS

SOLS

DN.: TxDOT	11-93	REVISIONS	1-04
CK.: TxDOT	8-95		9-08
DW.: TxDOT	5-01		
CK.: TxDOT			

CONT	SECT	JOB	HIGHWAY
0003	05	055	IH 20, ETC
DIST	COUNTY		SHEET NO.
ODA	REEVES		145

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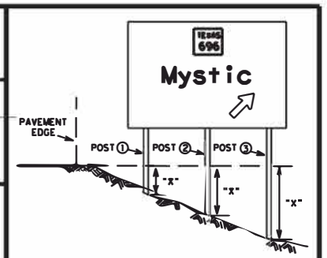
SUMMARY OF LARGE SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN BACK-GROUND COLOR	SIGN TEXT	SIGN DIMENSIONS	PLAQUES, & OTHER ATTACHMENTS		BACKGROUND SUBSTRATE (SQ FT)		TYPE OF MOUNT	"X" DIMENSION ◒			GALVANIZED STRUCTURAL STEEL					DRILLED SHAFT			
					DIRECT APPLY	✳ ALUMINUM (TYPE A)	GROUND MOUNT (TYPE G)	OVERHEAD (TYPE O)		post ①	post ②	post ③	SIZE	LINEAR FEET post ①	post ②	post ③	TOTAL WEIGHT LBS.	NON-REINF 12"ϕ	LINEAR FEET REINFORCED 24"ϕ	30"ϕ	36"ϕ
WB IH 10 303+89	38	GREEN	KENT 14 EL PASO 171	8X3.5			26.25		2,2,0				S3X5.7	5.8	5.8		204.90	8			
WB IH 20 370+10	39	GREEN	EXIT 192 FM 3078 45 DEG ARROW	8X2.5 7.5X7.5	16		56.25		2,2,0	2.2	2.3		S4X7.7	7.7	7.7		328.40	8			
WB IH 10 363+02	40	GREEN	EXIT 192	5X7.5			37.50		2,2,0				S4X7.7	7.7	7.7		293.70	8			
PAGE TOTALS							120.00						PAGE TOTALS				827.00	24			



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STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

SIGN TYPE

SIGN TYPE 1 3 0
- 1 — Wind Design Zone
- 3 — Series No.
- 0 — Aluminum/Fiberglass
  - 1 Aluminum
  - 2 Fiberglass
- 0 — No. of Posts

See sheet SMD(8W1)

SUMMARY OF LARGE SIGNS

SOLS

DW.: TxDOT	REVISIONS	
CK.: TxDOT	11-93	1-04
DW.: TxDOT	8-95	9-08
CK.: TxDOT	5-01	

CONT	SECT	JOB	HIGHWAY
0003	05	055	IH 20, ETC
DIST	COUNTY		SHEET NO.
ODA	REEVES		146

DATE:
FILE:

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SUMMARY OF SMALL SIGNS

APPROXIMATE STATION	SIGN NO.	SIGN NOMENCLATURE	DIRECTION	HIGHWAY	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
									FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
7+47	1	W12-2	EB	IH 20	LOW CLEARANCE 16(FT)-3(IN)	48X48			10 BWG	1	SA	T		
9+41	2	W8-13aT	EB	IH 20	BRIDGE MAY ICE IN COLD WEATHER	48X48			10 BWG	1	SA	T		
15+61	3	W12-2	EB	IH 20	LOW CLEARANCE 16(FT)-3-(IN)	48X48			10 BWG	1	SA	T		
21+54	4	W4-1R	EB	IH 20	SYMBOL-MERGE RIGHT AHEAD	48X48			10 BWG	2	SA	T		
32+53	5	W8-13aT	EB	IH 20	BRIDGE MAY ICE IN COLD WEATHER	48X48			10 BWG	1	SA	P		
44+23	6	M1-1(2 DGT)	EB	IH 20	EAST-INTERSTATE(TEXAS)20	36X36			10 BWG	1	SA	P		
51+63	7	R5-11T	EB	IH 20	FOR OFFICAL OR EMERGENCY VEH USE ONLY	48X48			10 BWG	1	SA	P		
52+08	8	D10-1	EB	IH 20	MILE(1)	12X48			10 BWG	1	SA	P		
54+40	9	R2-1	EB	IH 20	SPEED LIMIT 80	48X60			10 BWG	1	SA	T		
57+62	10	R4-2aT	EB	IH 20	LEFT LANE FOR PASSING ONLY	36X54			10 BWG	1	SA	T		
100+52	11	D10-1	EB	IH 20	MILE(2)	12X48			10 BWG	1	SA	P		
138+11	12	W8-13aT	EB	IH 20	BRIDGE MAY ICE IN COLD WEATHER	48X48			10 BWG	1	SA	T		
144+46	13	W13-2	EB	IH 20	EXIT/40 MPH	24X30			10 BWG	1	SA	T		
153+40	14	D10-1	EB	IH 20	MILE(3)	12X48			10 BWG	1	SA	P		
168+05	15	W4-1R	EB	IH 20	SYMBOL-MERGE RIGHT AHEAD	48X48			10 BWG	2	SA	T		
178+39	16	M1-1(2 dgt)	EB	IH 20	EAST-INTERSTATE(TEXAS)20	36X36			10 BWG	1	SA	P		
205+97	17	D10-1	EB	IH 20	MILE(4)	12X48			10 BWG	1	SA	P		
258+82	18	D10-1	EB	IH 20	MILE(5)	12X48			10 BWG	1	SA	P		
261+13	19	W8-13aT	EB	IH 20	BRIDGE MAY ICE IN COLD WEATHER	48X48			10 BWG	1	SA	T		
286+28	20	R5-11T	EB	IH 20	FOR OFFICAL OR EMERGENCY VEH USE ONLY	48X48			10 BWG	1	SA	P		
306+56	21	D10-1	EB	IH 20	MILE(6)	12X48			10 BWG	1	SA	P		
360+35	22	D10-1	EB	IH 20	MILE(7)	12X48			10 BWG	1	SA	P		
377+37	23	W13-2	EB	IH 20	EXIT 30MPH	48X60			10 BWG	1	SA	P		
400+43	24	W4-1R	EB	IH 20	SYMBOL-MERGE RIGHT AHEAD	48X48			10 BWG	1	SA	T		
413+57	25	D10-1	EB	IH 20	MILE(8)	12X48			10 BWG	1	SA	P		
423+97	26	M1-1(2DGT)	EB	IH 20	EAST-INTERSTATE(TEXAS)20	36X36			10 BWG	1	SA	P		
446+39	27	R2-1	EB	IH 20	SPEED LIMIT (80)	48X60			10 BWG	1	SA	T		
470+08	28	D10-1	EB	IH 20	MILE(9)	12X48			10 BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS	
SQUARE FEET	Minimum Thickness
LESS THAN 7.5	0.080"
7.5 TO 15	0.100"
GREATER THAN 15	0.125"

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

NOTE:

1. Sign supports shal l be located as shown an the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location orto ovoid conflict with utillities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.

2. For installation of bridgemount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.

3. For Sign Support Descriptive Codes, see Sign Mounting Detai Is Smal l Roadside Signs General Notes & Details SMD(GEN).

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

FILE: © TxDOT SOSS

sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
May 1987	CONT	SECT	JOB	HIGHWAY	
REVISIONS 4-16 8-16	0003	05	055	IH0020	
	DIST	COUNTY		SHEET NO.	
	ODA	REEVES		147	

18

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SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

APPOXIMATE STATION	SIGN NO.	SIGN NOMENCLATURE	DIRECTION	HIGHWAY	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
0+00	29	D10-1	WB	IH 20	MILE(0)	12X48			10 BWG	1	SA	P		
10+95	30	W4-1L	WB	IH 20	SYMBOL-MERGE AHEAD LEFT	48X48			10 BWG	2	SA	T		
31+48	31	W4-2L	WB	IH 20	SYMBOL-LANE ENDS MERGE LEFT	48X48			10 BWG	1	SA	T		
31+48	32	W4-2L	WB	IH 20	SYMBOL-LANE ENDS MERGE LEFT	48X48			10 BWG	1	SA	T		
38+50	33	W8-13aT	WB	IH 20	BRIDGE MAY ICE IN COLD WEATHER	48X48			10 BWG	1	SA	T		
40+66	34	W9-2L	WB	IH 20	LANE ENDS MERGE LEFT	48X48			10 BWG	1	SA	T		
40+66	35	W9-2L	WB	IH 20	LANE ENDS MERGE LEFT	48X48			10 BWG	1	SA	T		
50+03	36	W9-1R	WB	IH 20	RIGHT LANE ENDS	48X48			10 BWG	1	SA	T		
50+03	37	W9-1R	WB	IH 20	RIGHT LANE ENDS	48X48			10 BWG	1	SA	T		
51+63	38	R5-11T	WB	IH 20	FOR OFFICAL OR EMERGENCY USE ONLY	48X48			10 BWG	1	SA	P		
53+11	39	D10-1	WB	IH 20	MILE(1)	12X48			10 BWG	1	SA	P		
101+37	40	D10-1	WB	IH 20	MILE(2)	12X48			10 BWG	1	SA	P		
116+96	41	R2-1	WB	IH 20	SPEED LIMIT (80)	48X60			10 BWG	1	SA	T		
136+71	42	M1-1(2DGT)	WB	IH 20	EAST-INTERSTSTE(TEXAS)20	36X36			10 BWG	1	SA	P		
154+15	43	D10-1	WB	IH 20	MILE(3)	12X48			10 BWG	1	SA	P		
156+71	44	W4-1R	WB	IH 20	SYMBOL-MERGE RIGHT AHEAD	48X48			10 BWG	1	SA	T		
175+23	45	W13-2	WB	IH 20	EXIT/50 MPH	48X60			10 BWG	1	SA	T		
187+52	46	W8-13aT	WB	IH 20	BRIDGE MAY ICE IN COLD WEATHER	48X48			10 BWG	1	SA	T		
207+24	47	D10-1	WB	IH 20	MILE(4)	12X48			10 BWG	1	SA	P		
260+07	48	D10-1	WB	IH 20	MILE(5)	12X48			10 BWG	1	SA	P		
287+34	49	W8-13aT	WB	IH 20	BRIDGE MAY ICE IN COLD WEATHER	48X48			10 BWG	1	SA	T		
287+34	50	R5-11T	WB	IH 20	FOR OFFICAL OR EMERGENCY USE ONLY	48X48			10 BWG	1	SA	P		
301+26	51	W11-3 (DEER)	WB	IH 20	SYMBOL-ALERT FOR DEER	36X36			10 BWG	1	SA	T		
307+72	52	D10-1	WB	IH 20	MILE(6)	12X48			10 BWG	1	SA	P		
343+09	53	R2-1	WB	IH 20	SPEED LIMIT (80)	48X60			10 BWG	1	SA	T		
361+32	54	D10-1	WB	IH 20	MILE(7)	12X48			10 BWG	1	SA	P		
384+84	55	W4-1R	WB	IH 20	SYMBOL-MERGE RIGHT AHEAD	48X48			10 BWG	1	SA	T		
413+86	56	W13-2	WB	IH 20	EXIT/50 MPH	48X60			10 BWG	1	SA	T		
414+48	57	D10-1	WB	IH 20	MILE(8)	12X48			10 BWG	1	SA	P		
470+06	58	D10-1	WB	IH 20	MILE(9)	12X48			10 BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS	
SQUARE FEET	Minimum Thickness
LESS THAN 7.5	0.080"
7.5 TO 15	0.100"
GREATER THAN 15	0.125"

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http://www.txdot.gov/

NOTE:
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2. For installation of bridgemount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.

3. For Sign Support Descriptive Codes, see Sign Mounting Detai Is Smal l Roadside Signs General Notes & Details SMD(GEN).

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

RICARDO C BETANCOURT, P.E. 12/19/22

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH0020
4-16	DIST	COUNTY		SHEET NO.
8-16	ODA	REEVES		148

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SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

APPROXIMATE STATION	SIGN NO.	SIGN NOMENCLATURE	DIRECTION	HIGHWAY	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE: FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80	POSTS: 1 or 2	ANCHOR TYPE: UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED P = "Plain", T = "T", U = "U"	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam, WC = 1.12 #/ft Wing Channel, EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE: TY N, TY S
9+23	59	W11-3 (DEER)	EB	IH 10	SYMBOL-ALERT FOR DEER	36X36			10 BWG	1	SA	T		
15+65	60	W8-13aT	EB	IH 10	BRIDGE MIGHT ICE IN COLD WEATHER	48X48			10 BWG	1	SA	T		
43+42	61	D10-3	EB	IH 10	MILE (0)	12X48			10 BWG	1	SA	P		
47+76	62	D10-3	EB	IH 10	MILE (187)	12X48			10 BWG	1	SA	P		
49+95	63	W8-13aT	EB	IH 10	BRIDGE MIGHT ICE IN COLD WEATHER	48X48			10 BWG	1	SA	T		
51+71	64	M1-1T	EB	IH 10	EAST-INTERSTATE (TEXAS) 10	36X36			10 BWG	1	SA	P		
61+58	65	R2-1	EB	IH 10	SPEED LIMIT 80	48X60			10 BWG	2	SA	P		
80+03	66	W12-2	EB	IH 10	LOW CLEARANCE 17(FT)-10(IN)	48X48			S80	1	SA	T		
91+20	67	W13-2,3	EB	IH 10	EXIT 50 MPH	48X60			10 BWG	1	SA	P		
94+68	68	D10-3	EB	IH 10	MILE (188)	12X48			10 BWG	1	UA	P		
105+05	69	W12-2	EB	IH 10	LOW CLEARANCE 17(FT)-10(IN)	48X48			S80	1	SA	T		
113+40	70	W4-1R	EB	IH 10	SYMBOL-MERGE RIGHT AHEAD	48X48			10 BWG	1	SA	P		
135+83	71	M1-1T	EB	IH 10	EAST-INTERSTATE (TEXAS) 10	36X36			10 BWG	1	SA	P		
140+91	72	W8-13aT	EB	IH 10	BRIDGE MIGHT ICE IN COLD WEATHER	48X48			10 BWG	1	SA	T		
147+17	73	D10-3	EB	IH 10	MILE (189)	12X48			10 BWG	1	SA	P		
158+20	74	R4-2aT	EB	IH 10	LEFT LANE FOR PASSING ONLY	36X54			10 BWG	1	SA	T		
158+20	75	R4-2aT	EB	IH 10	LEFT LANE FOR PASSING ONLY	36X54			10 BWG	1	SA	T		
191+69	76	W8-21	EB	IH 10	GUST WINDS AREA	48X48			10 BWG	1	SA	T		
200+89	77	D10-3	EB	IH 10	MILE (190)	12X48			10 BWG	1	SA	P		
252+59	78	D10-3	EB	IH 10	MILE (191)	12X48			10 BWG	1	SA	P		
282+66	79	W8-13aT	EB	IH 10	BRIDGE MIGHT ICE IN COLD WEATHER	48X48			10 BWG	1	SA	T		
295+90	80	I-3	EB	IH 10	JONES DRAW	18x36			10 BWG	1	SA	T		
305+18	81	D10-3	EB	IH 10	MILE (192)	12X48			10 BWG	1	SA	P		
333+32	82	W12-2	EB	IH 10	LOW CLEARANCE 16(FT)-2(IN)	48X48			S80	1	SA	T		
340+64	83	W13-2,3	EB	IH 10	EXIT 50 MPH	48X60			10 BWG	1	SA	P		
350+64	84	W12-2	EB	IH 10	LOW CLEARANCE 16(FT)-2(IN)	48X48			S80	1	SA	T		
358+01	85	D10-3	EB	IH 10	MILE (193)	12X48			10 BWG	1	SA	P		
360+11	86	W4-1R	EB	IH 10	SYMBOL-MERGE RIGHT AHEAD	48X48			10 BWG	1	SA	P		

ALUMINUM SIGN BLANKS THICKNESS	
SQUARE FEET	Minimum Thickness
LESS THAN 7.5	0.080"
7.5 TO 15	0.100"
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STATE OF TEXAS
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SOSS

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©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
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SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

APPOXIMATE STATION	SIGN NO.	SIGN NOMENCLATURE	DIRECTION	HIGHWAY	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE: FRP = Fiberglass, TWT = Thin-Wall, 10BWG = 10 BWG, S80 = Sch 80	POSTS: 1 or 2	ANCHOR TYPE: UA=Universal Conc, UB=Universal Bolt, SA=Slipbase-Conc, SB=Slipbase-Bolt, WS=Wedge Steel, WP=Wedge Plastic	MOUNTING DESIGNATION: PREFABRICATED P = "Plain", T = "T", U = "U"	MOUNTING DESIGNATION: 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam, WC = 1.12 #/ft Wing Channel, EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE: TY N, TY S
22+43	87	W13-3	WB	IH 10	RAMP/35 MPH	24X30			10 BWG	1	SA	P		
27+86	88	W13-3	WB	IH 10	RAMP/35 MPH	24X30			10 BWG	1	SA	P		
45+69	89	W4-1R	WB	IH 10	SYMBOL-MERGE RIGHT AHEAD	48X48			10 BWG	1	SA	P		
68+17	90	W13-2,3	WB	IH 10	EXIT 35 MPH	48X60			10 BWG	1	SA	P		
75+58	91	W8-13aT	WB	IH 10	BRIDGE MIGHT ICE IN COLD WEATHER	48X48			10 BWG	1	SA	T		
99+20	92	D10-3	WB	IH 10	MILE (188)	12X48			10 BWG	1	SA	P		
101+29	93	W4-1R	WB	IH 10	SYMBOL-MERGE RIGHT AHEAD	48X48			10 BWG	1	SA	P		
109+97	94	W12-2	WB	IH 10	LOW CLEARANCE 15(FT)8(IN)	48X48			S80	1	SA	T		
123+72	95	W13-2,3	WB	IH 10	EXIT 50 MPH	48X60			10 BWG	1	SA	P		
134+43	96	W12-2	WB	IH 10	15(FT) 8(IN)	48X48			S80	1	SA	T		
151+85	97	D10-3	WB	IH 10	MILE (189)	12X48			10 BWG	1	SA	P		
163+35	98	W8-13aT	WB	IH 10	BRIDGE MIGHT ICE IN COLD WEATHER	48X48			10 BWG	1	SA	T		
206+06	99	D10-3	WB	IH 10	MILE (190)	12X48			10 BWG	1	SA	P		
258+18	100	D10-3	WB	IH 10	MILE (191)	12X48			10 BWG	1	SA	P		
298+16	101	R2-1	WB	IH 10	SPEED LIMIT 80	48X60			10 BWG	2	SA	P		
301+20	102	M1-1T	WB	IH 10	WEST-INTERSTATE (TEXAS) 10	36X36			10 BWG	1	SA	P		
305+21	103	I-3	WB	IH 10	JONES DRAW	18x36			10 BWG	1	SA	T		
311+22	104	D10-3	WB	IH 10	MILE (192)	12X48			10 BWG	1	SA	P		
312+52	105	W8-13aT	WB	IH 10	BRIDGE MIGHT ICE IN COLD WEATHER	48X48			10 BWG	1	SA	T		
351+72	106	W4-1R	WB	IH 10	SYMBOL-MERGE RIGHT AHEAD	48X48			10 BWG	1	SA	P		
134+43	107	W12-2	WB	IH 10	16(FT) 2(IN)	48X48			S80	1	SA	T		
311+22	108	D10-3	WB	IH 10	MILE (193)	12X48			10 BWG	1	SA	P		
123+72	109	W13-2,3	WB	IH 10	EXIT 50 MPH	48X60			10 BWG	1	SA	P		
134+43	110	W12-2	WB	IH 10	16(FT) 2(IN)	48X48			S80	1	SA	T		

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ALUMINUM SIGN BLANKS THICKNESS	
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Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
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4-16	DIST	COUNTY		SHEET NO.
8-16	ODA	REEVES		150

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DATE: 12/22/2022 3:44:00 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/06 - ODA/Design Projects/0003050554 - Design/Plan Set/1. General/SIGN STANDARDS/smdgen.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

SM RD SGN ASSM TY XXXXX(X)XX(X-XXXX)

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

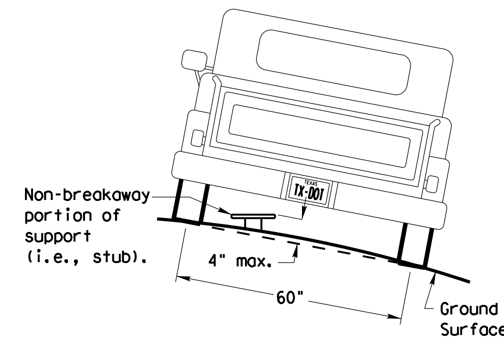
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

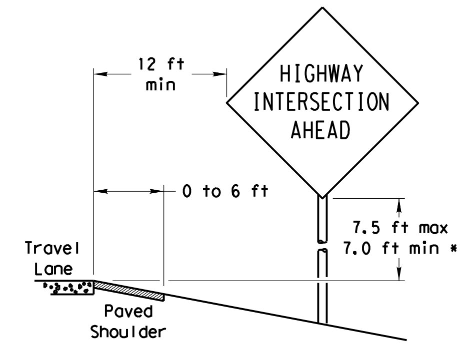
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

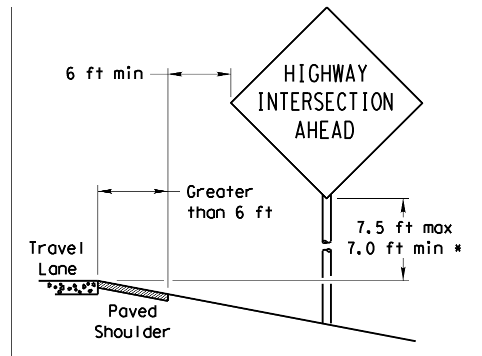
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

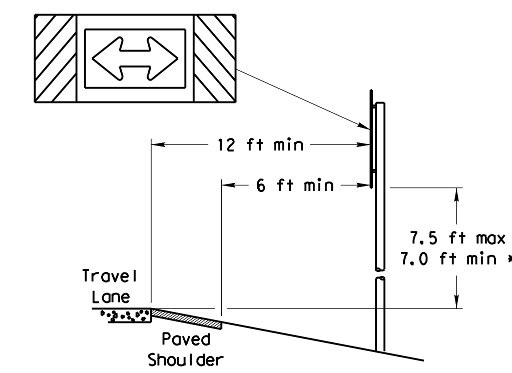
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



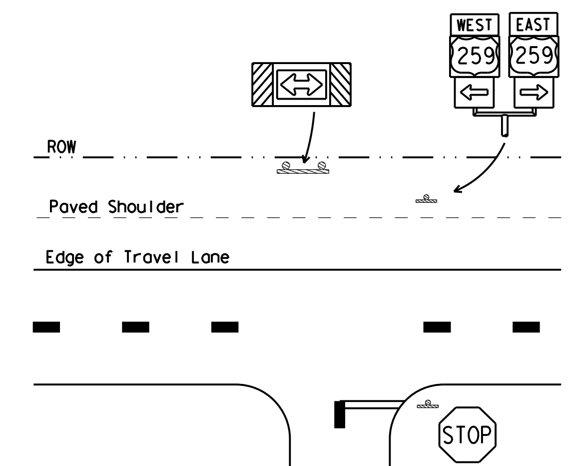
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

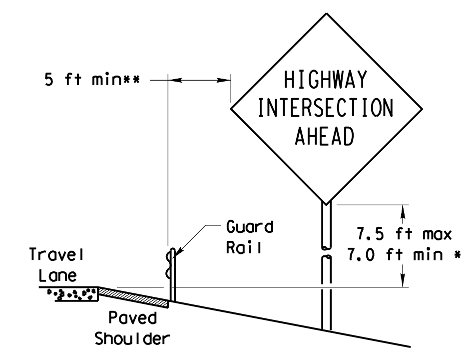
T-INTERSECTION



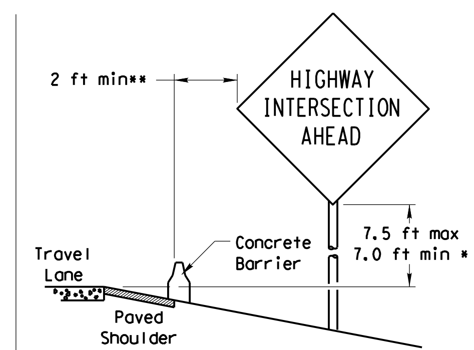
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



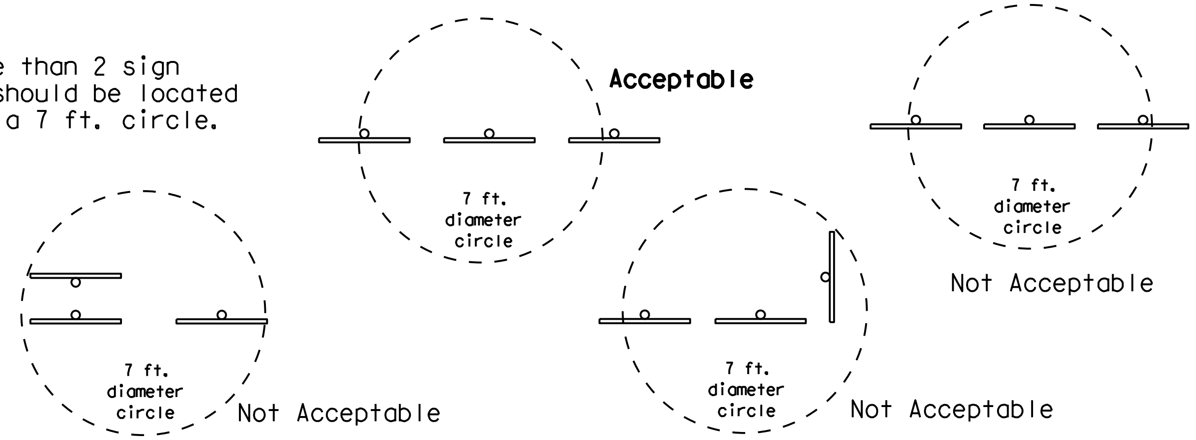
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

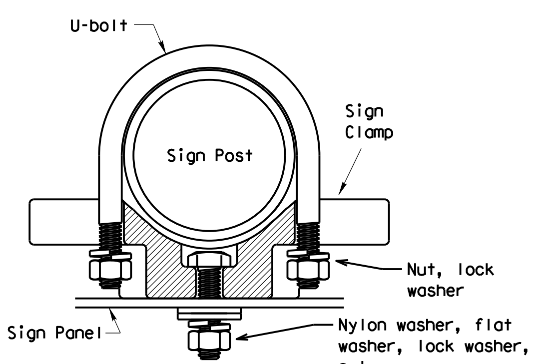
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

No more than 2 sign posts should be located within a 7 ft. circle.

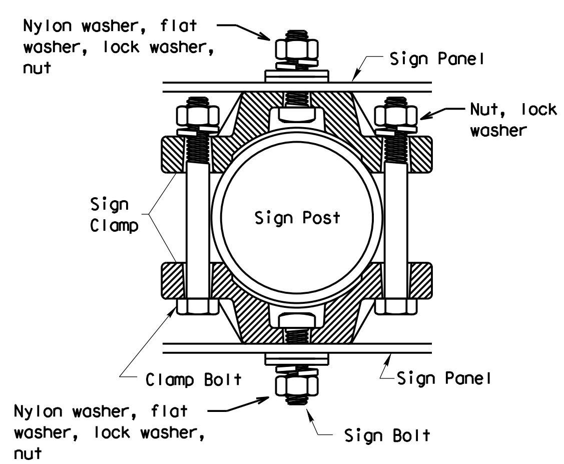


TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



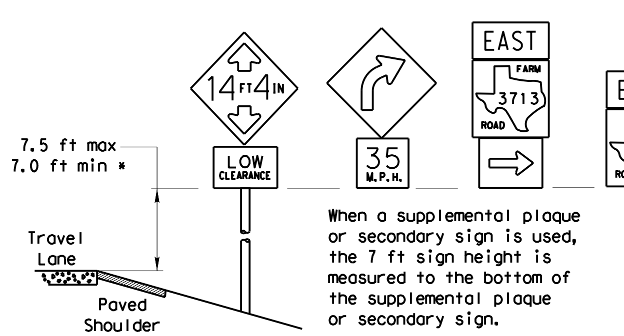
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp or the universal clamp.

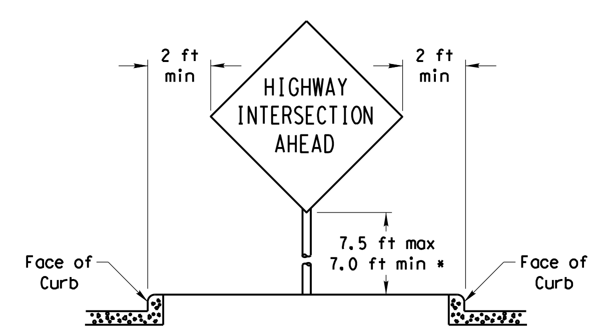
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



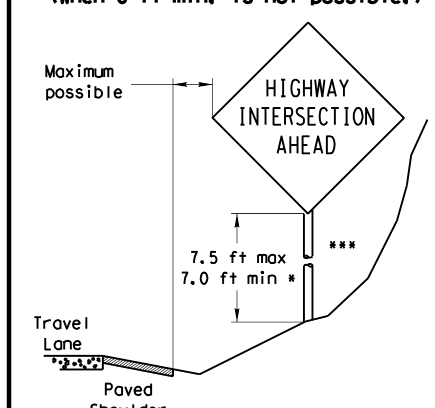
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

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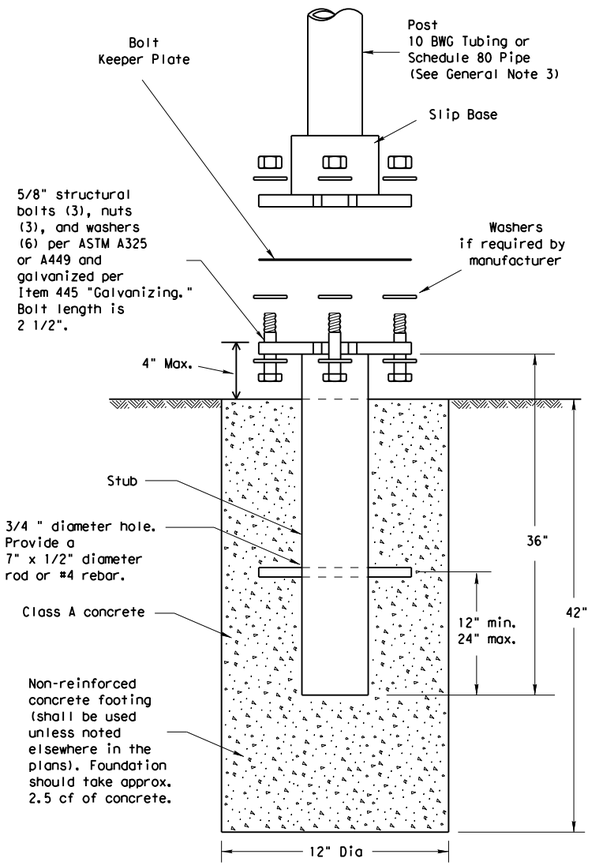
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0003	05	055	IH 20, ETC
	DIST		COUNTY	SHEET NO.
	ODA		REEVES	151

26A

DATE: 12/22/2022 3:44:05 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/06 - ODA/Design Projects/00030505/4 - Design/Plan Set/1. General/SIGN STANDARDS/smdsl.dgn

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



SM RD SGN ASSM TY XXXXX(X)SA(X-XXXX)

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

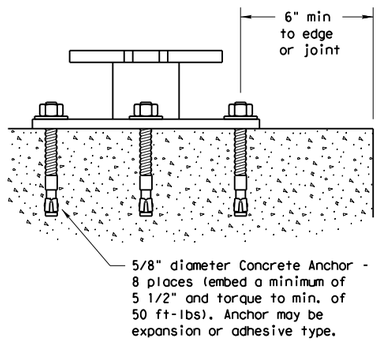
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



SM RD SGN ASSM TY XXXXX(X)SB(X-XXXX)

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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

CONT	SECT	JOB	HIGHWAY
0003	05	055	IH 20, ETC
DIST	COUNTY		SHEET NO.
ODA	REEVES		152

DATE: 12/22/2022 3:44:13 PM
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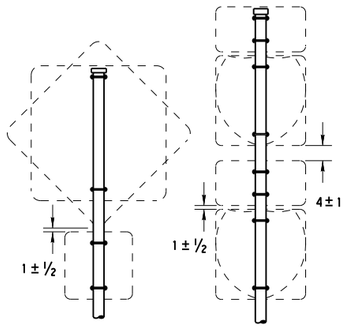
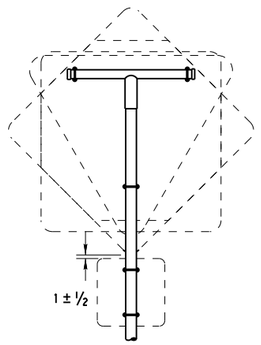


SM RD SGN ASSM TY XXXXX(1)XX(P)



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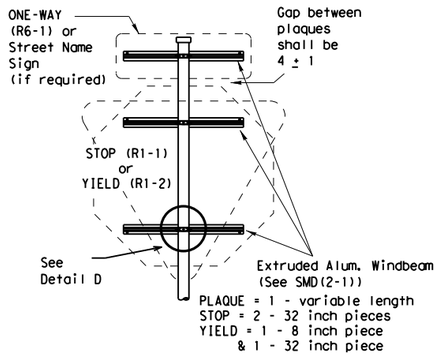

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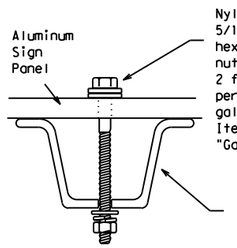
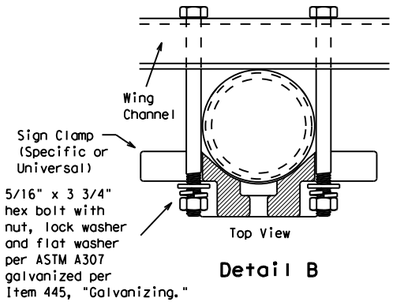
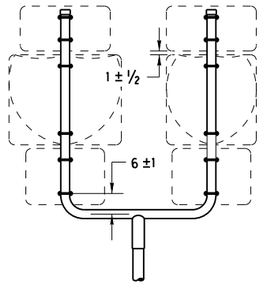


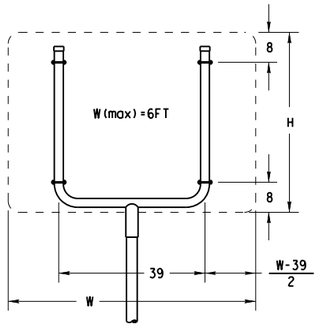
Detail A



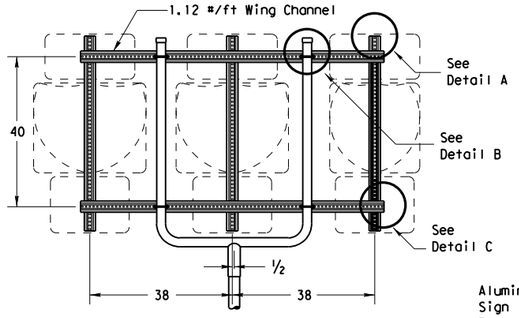
Detail B



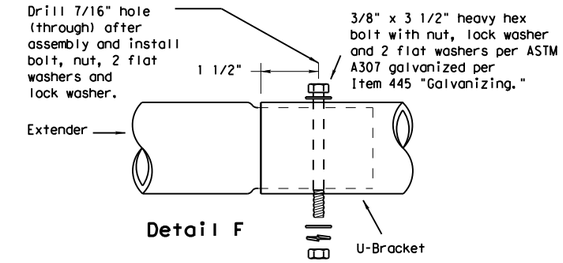
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

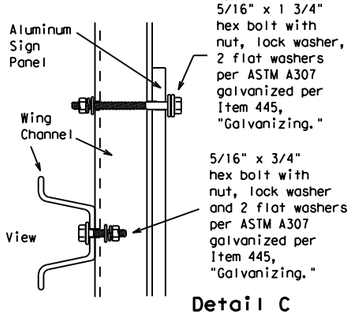


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

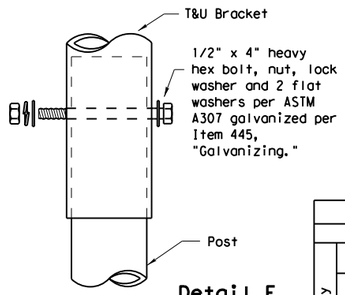


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



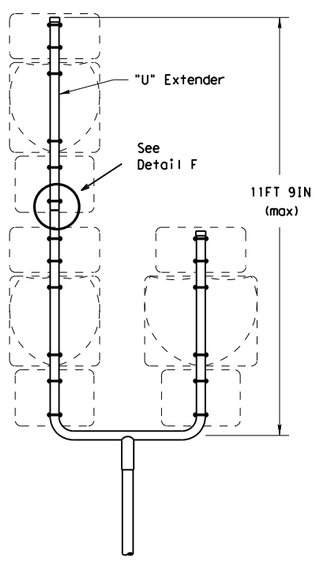
Detail E

GENERAL NOTES:

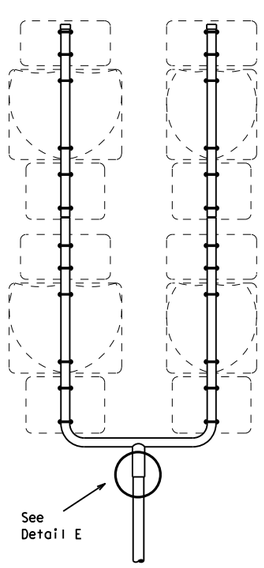
1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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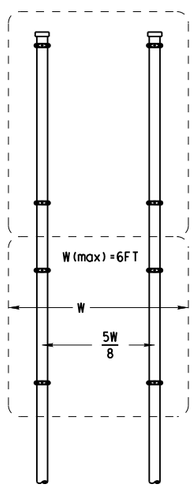
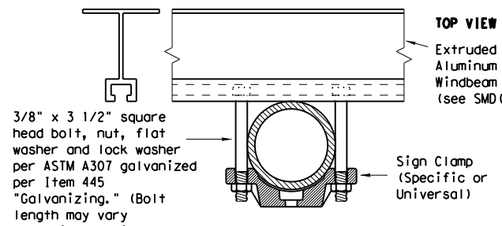
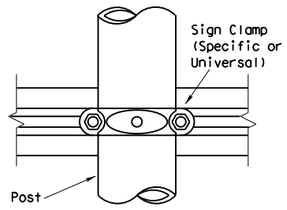


SM RD SGN ASSYM TY XXXXX(2)XX(P)

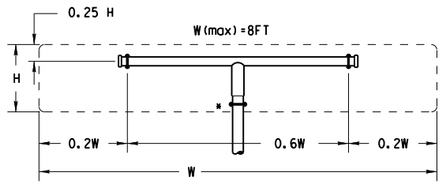
SIDE VIEW



Detail D



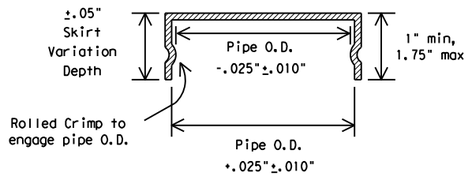
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)



SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
0003	05	055	IH 20, ETC
DIST	COUNTY		SHEET NO.
ODA	REEVES		153

9-08 REVISIONS

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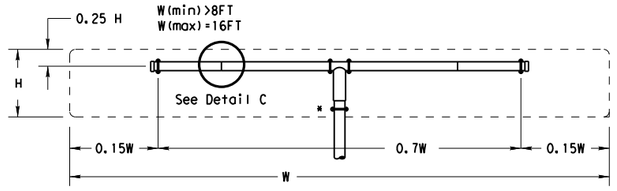
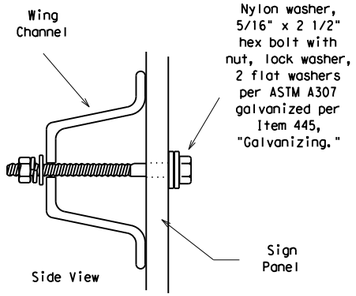
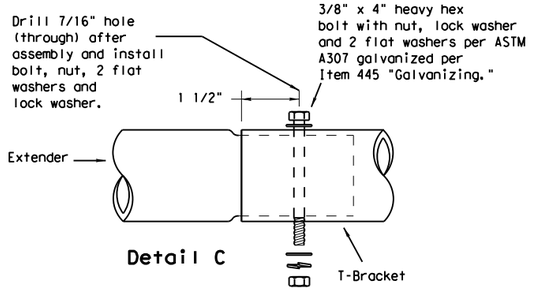


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



Detail B



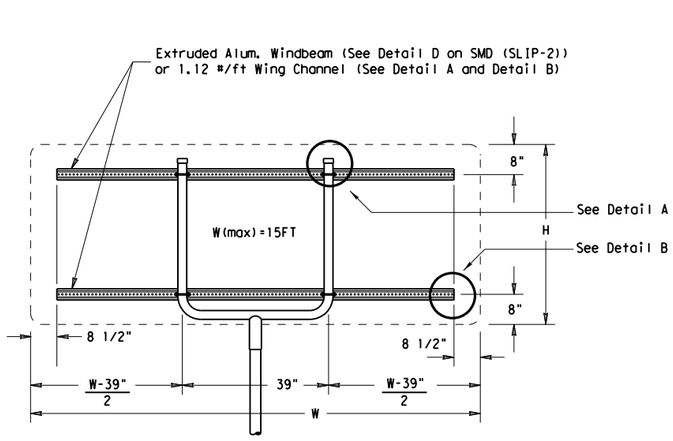
Detail C

Splices shall only be allowed behind the sign substrate.

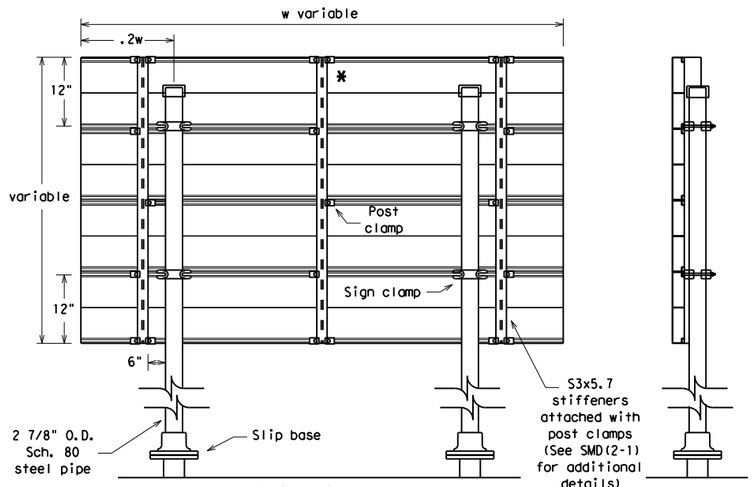
GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

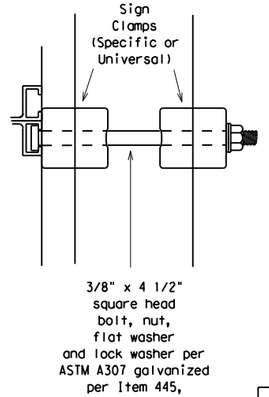


Typical Sign Mount

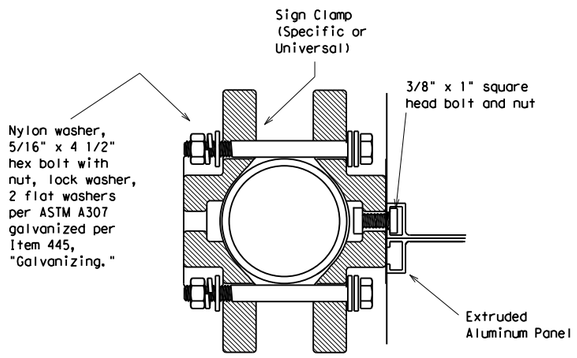
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

See Detail E
for clamp installation

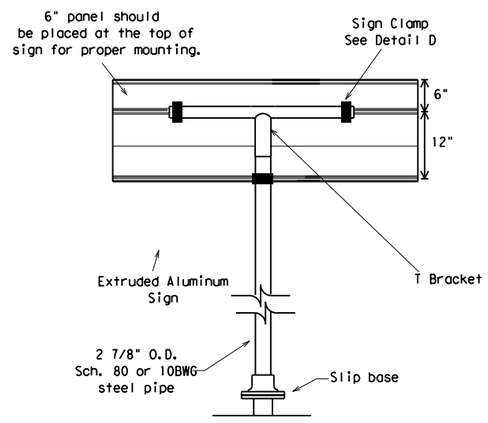


Detail E

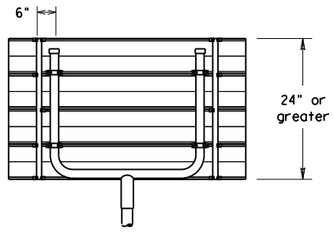


Detail A

Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

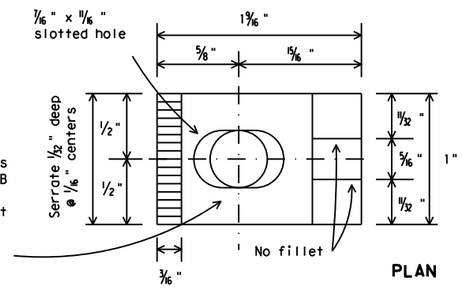
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

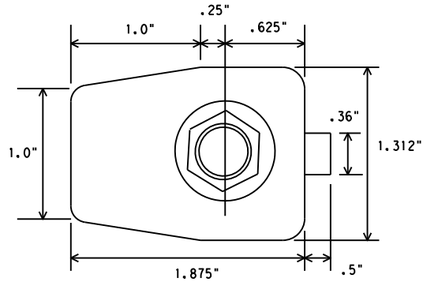
REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0003	05	055	IH 20, ETC
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		154

DATE: 12/22/2022 3:43:33 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/06 - ODA/Design Projects/0003050554 - Design/Plan Set/1. General/SIGN STANDARDS/smd21-08.dgn

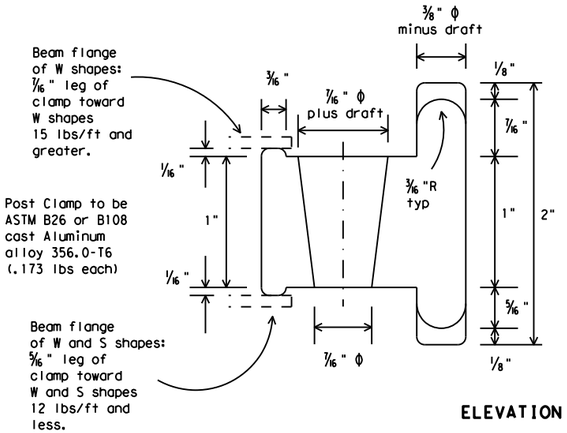
NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.



PLAN

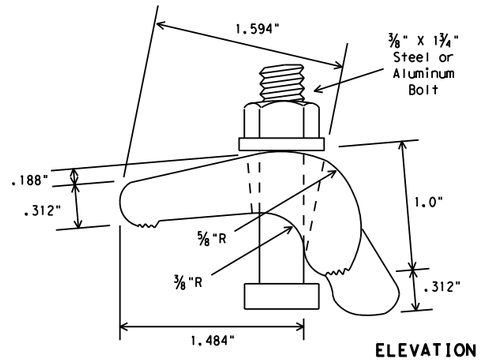


PLAN



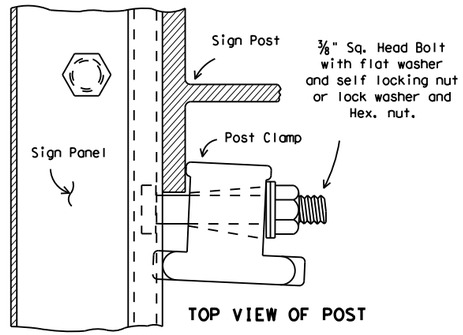
ELEVATION

POST CLAMP DETAIL

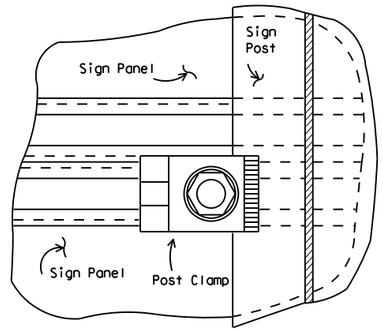


ELEVATION

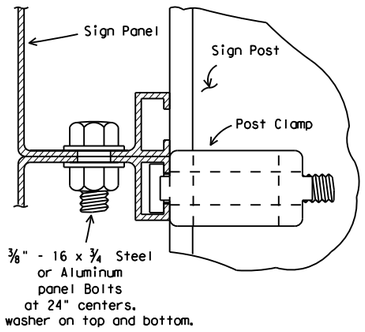
ALTERNATE POST CLAMP DETAIL



TOP VIEW OF POST



TOP VIEW OF CLAMP



SIDE VIEW OF PANELS

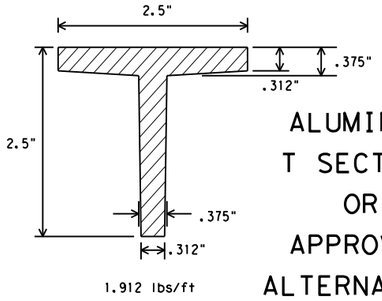
CONNECTION DETAILS

DEPARTMENTAL MATERIAL SPECIFICATIONS

SIGN HARDWARE — DMS-7120

GENERAL NOTES:

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

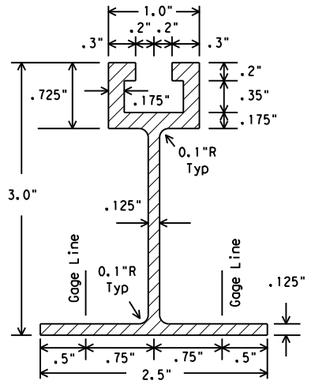


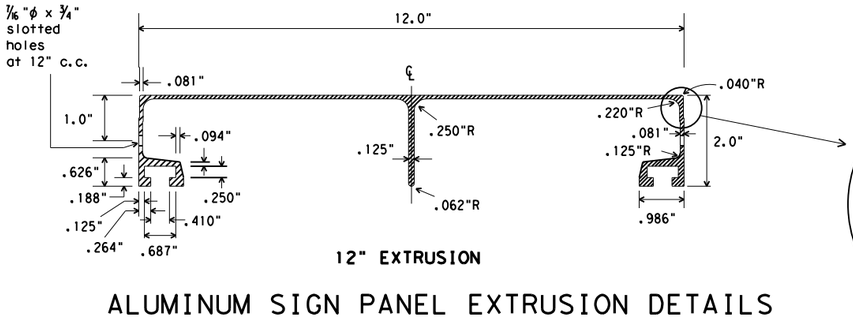
1.912 lbs/ft

ALUMINUM T SECTION OR APPROVED ALTERNATIVE

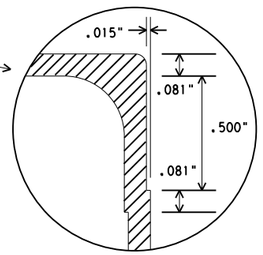
WINDBEAM CROSS SECTION

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

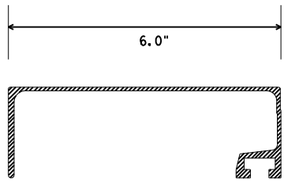




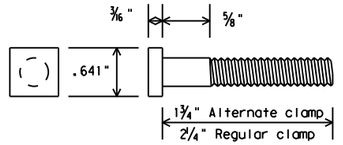
12" EXTRUSION



ALUMINUM SIGN PANEL EXTRUSION DETAILS



6" EXTRUSION



POST CLAMP BOLT DETAIL

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- EXTRUDED ALUMINUM SIGN PANELS & HARDWARE

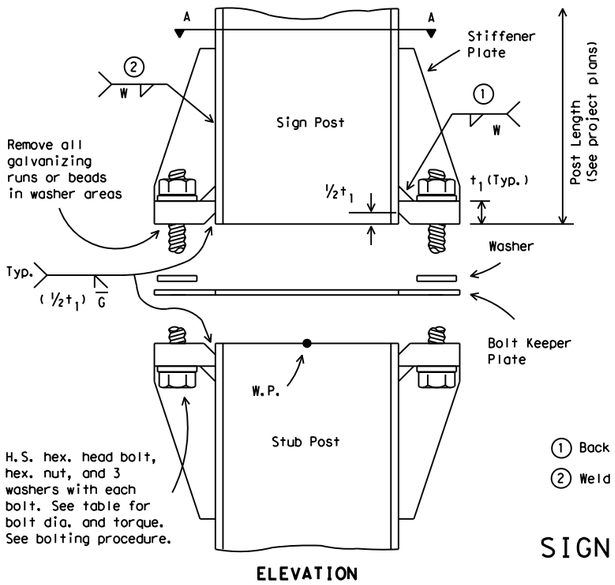
SMD(2-1)-08

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

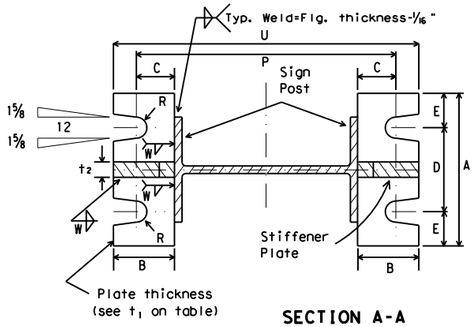
REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0003	05	055	IH 20, ETC
DIST	COUNTY		SHEET NO.
ODA	REEVES		155

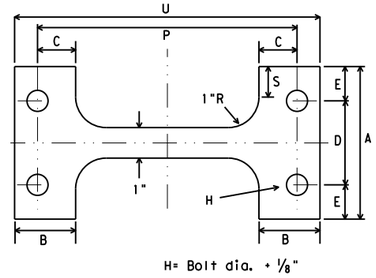
DATE: 12/22/2022 3:43:40 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/06 - ODA/Design Projects/0003050574 - Design/Plan Set/1. General/SIGN STANDARDS/smd22-08.dgn



ELEVATION

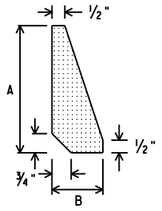


SECTION A-A



H= Bolt dia. + ⅛"

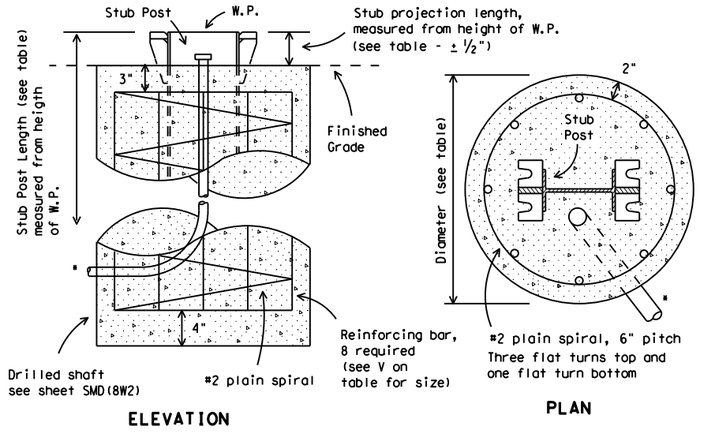
BOLT KEEPER PLATE
30 Ga galv. sheet steel



STIFFENER PLATE DETAIL

Steel Plate (thickness = t_2)

(See table for dimensions)

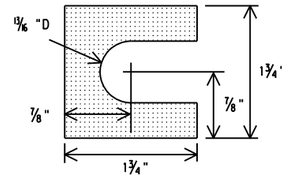


ELEVATION

PLAN

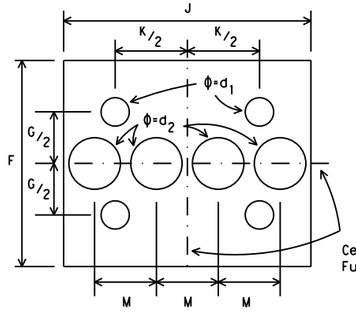
FOUNDATION DETAIL

*Note: For signs with electrical apparatus, see ED(10) for conduit required in founation.



SHIM DETAIL

Furnish two .012"± thick and two .032"± thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.



PERFORATED FUSE PLATE DETAIL

Use H.S. hex head bolts, hex head nut and bevel or flat washer (where req'd) under nut. All holes shall be drilled, sub-punched and reamed. All plate cuts shall preferably be saw cuts. However, flame cutting will be permitted provided all edges are ground. Metal projecting beyond the plane of the plate face will not be permitted. Steel fuse plates shall conform to the requirements of ASTM A36. ASTM A572 Grade 50 or ASTM A588 may be substituted for A36 at the option of the fabricator. Mill test reports shall be submitted for Fuse Plates. Steel used shall have an ultimate tensile strength not to exceed 80 KSI. For alternative Fuse Plate contact Traffic Operations Division.

SIGN POST AND STUB POST

(For W Shapes)

① Back up weld to be made before installing stiffener plate

② Weld W may be continued across clips to seal joint

BOLTING PROCEDURE FOR ASSEMBLY OF BASE CONNECTION:

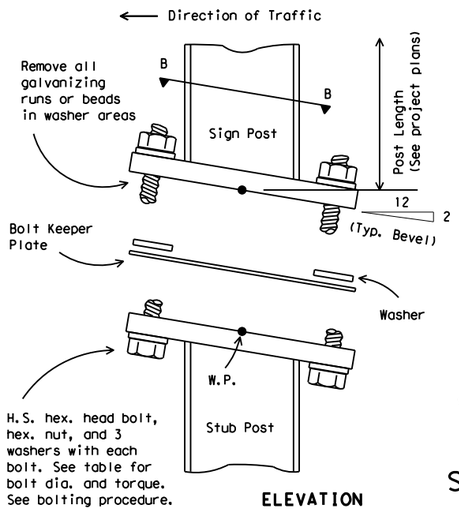
1. Assemble sign post, BOLT KEEPER PLATE and stub post with bolts and three flat washers per bolt as shown.
2. Shim as required to plumb post.
3. Tighten all bolts the maximum possible with a 12 to 15 inch wrench to clean bolt threads and to bed washers and shims.
4. Loosen each bolt in sequence and retighten bolts in a systematic order to the prescribed torque. Do not overtighten.
5. To prevent nut loosening, burr threads of bolt at junction with nut using a center punch.

Dimensions / Post Size	Base Connection Data Table: Bolt Size & Torque	A	B	C	D	E	t_1	t_2	W	R
W6x9	⅝"ϕ x 2¾" 440-450 inch pounds 36-38 foot pounds	5"	2"	1¼"	2¾"	1⅛"	¾"	½"	¼"	11/32"
W6x12										
W6x15										
W8x18										
W8x21	¾"ϕ x 3½" 740-750 inch pounds 62-63 foot pounds	6"	2¼"	1⅜"	3½"	1¼"	1"	¾"	5/16"	13/32"
W10x22										
W10x26										
W12x26										
S3x5.7	½"ϕ x 2½" 440-450 inch pounds 36-38 foot pounds	See Detail Below								
S4x7.7										

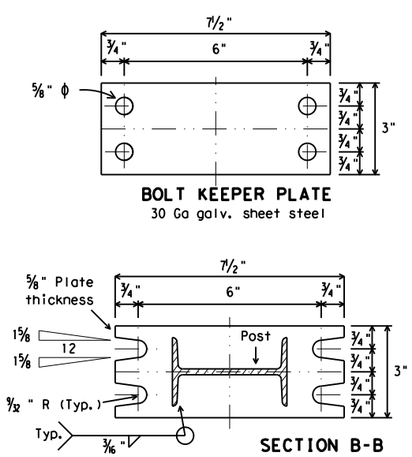
Perforated Fuse Plate Data Table											
F	G	J	K	M	d_1	d_2	t_3	Bolt Dia.	Wt. (ea.) (lbs.)	Bolt length
4¼"	2"	4"	2¼"	1"	9/16"	¾"	¼"	½"	1.01	1½"
5"	2½"	6"	3½"	1½"	11/16"	1¼"	⅜"	⅝"	2.51	2¼"
5"	2½"	5¼"	2¾"	1¼"	11/16"	1 1/16"	⅜"	⅝"	2.26	2¼"
5½"	2½"	5¼"	2¾"	1¼"	13/16"	1"	½"	¾"	3.35	2¼"
6"	3"	5¾"	2¾"	1⅜"	13/16"	1⅛"	½"	¾"	4.03	2¼"
6"	3"	6½"	3½"	1⅝"	13/16"	1 5/16"	½"	¾"	4.47	2¼"
3¾"	1½"	2⅝"	1½"	⅝"	9/16"	⅜"	¼"	½"	0.60	1½"

Bolt Keeper Data			Foundation Data			
P	S	U	Stub length	Stub projection	Dr. Shaft diameter	Bar V Size
8⅜"	1"	9⅞"	2'-0"	3"	24"	#5
8½"		10"	2'-0"	3"		#5
8½"		10"	2'-6"	3"		#6
10⅝"		12⅛"	2'-6"	3"		#7
11"	1½"	12¾"	3'-0"	2½"		#8
12⅞"		14⅝"	3'-0"	2½"		#9
13⅛"		14⅞"	3'-0"	2½"		#10
15"		16¾"	3'-0"	2½"		#11
See Detail Below			3'-3½"	3½"	12"	Non-reinforced ③

③ Foundation design shall be Type G Mount, see SMD (TY G).

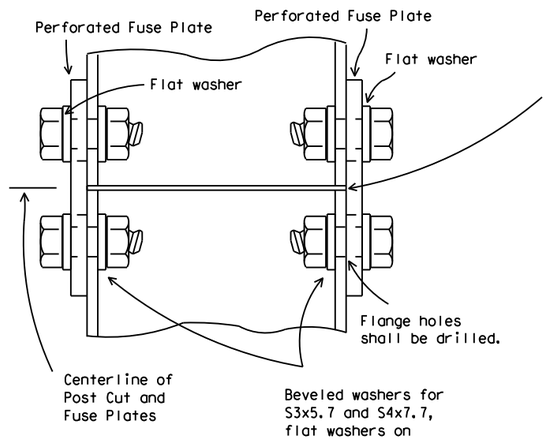


ELEVATION



SIGN POST AND STUB POST

(For S4x7.7 and S3x5.7)



DETAIL "A"

Parts shall be saw cut either before galvanizing and the galvanized cut cleaned of zinc build-up, or saw cut after galvanizing and the cut surface repaired per Item 445, "Galvanizing."

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- LARGE ROADSIDE SIGNS FOUNDATION & STUB

SMD(2-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
4-98	CONT	SECT	JOB	HIGHWAY
9-08	0003	05	055	IH 20, ETC
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		156

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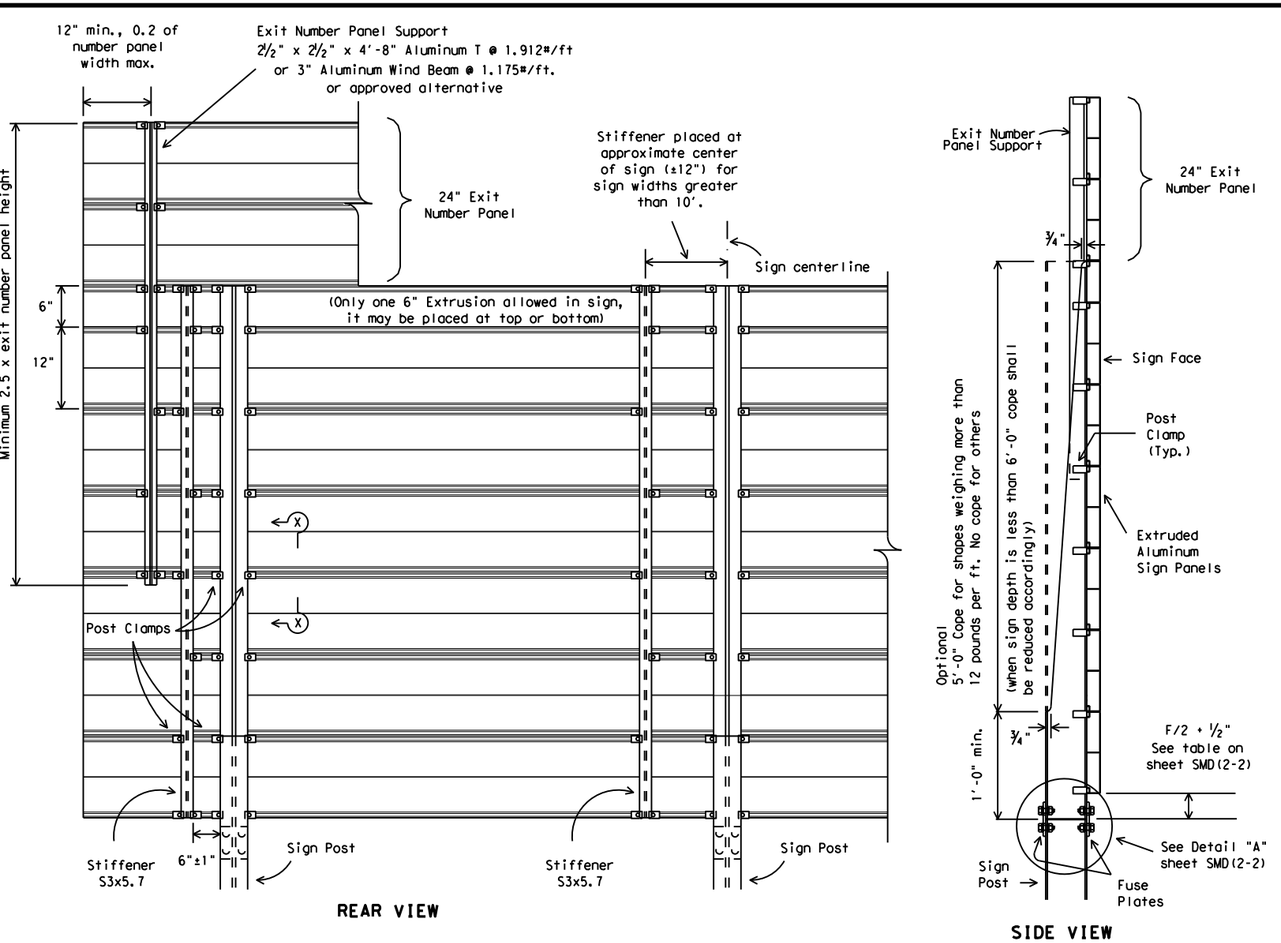
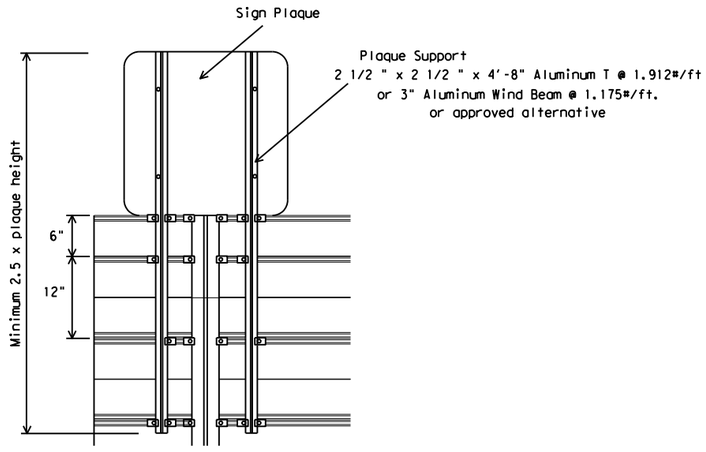
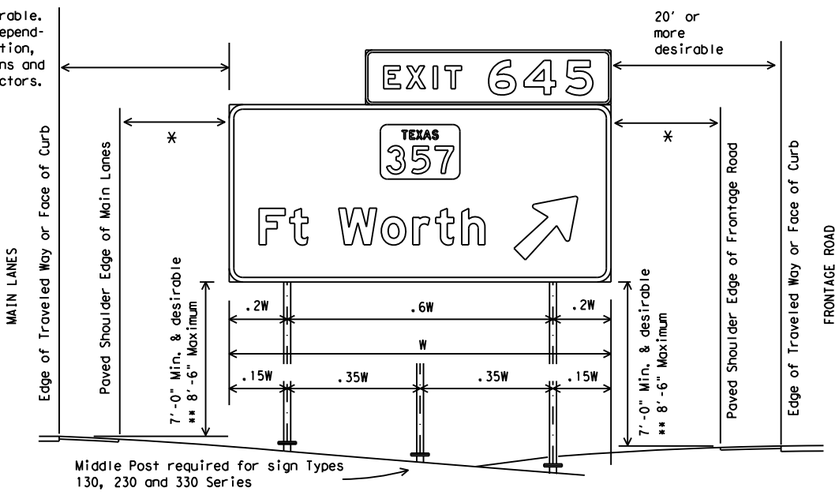


ALUMINUM PARENT SIGN & EXIT NUMBER PANEL MOUNTING DETAILS



SIGN PLAQUE MOUNTING DETAIL TO ALUMINUM PARENT SIGN

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



TYPICAL SIGN INSTALLATION AND LOCATION

LATERAL CLEARANCE NOTES:

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

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

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

POST SPACING NOTES:

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

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

SIGN HEIGHT NOTES:

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

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

GENERAL NOTES:

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS-LARGE ROADSIDE SIGNS

SMD(2-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0003	05	055	IH 20, ETC
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		157

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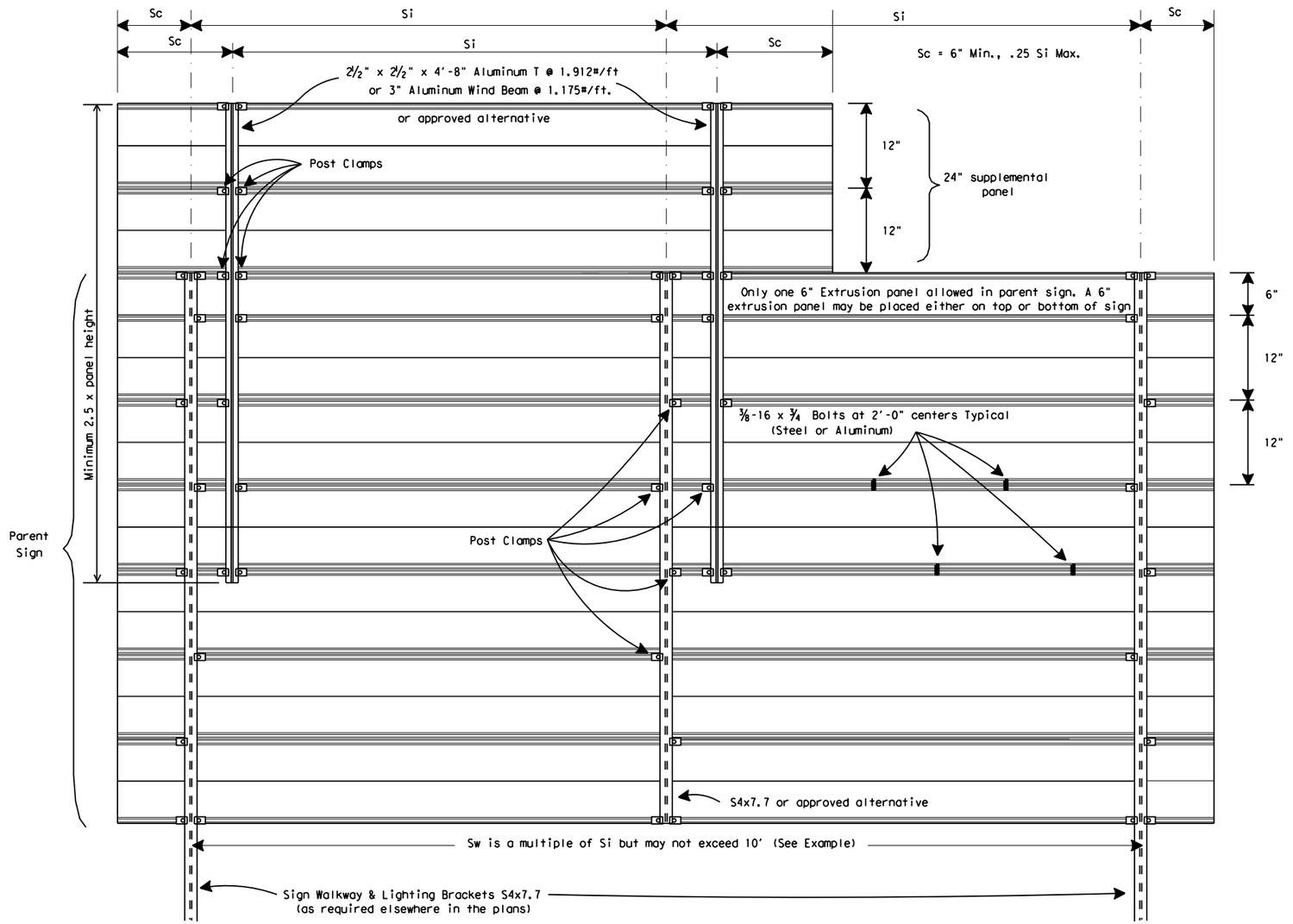
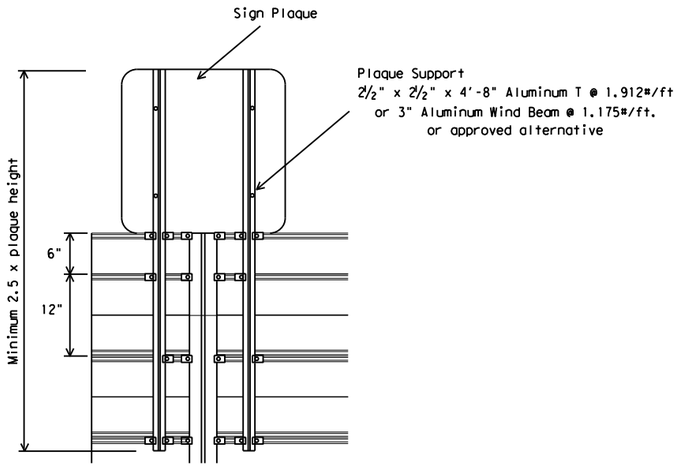


REAR VIEW

EXAMPLES (FOR DETERMINING Si and Sw)

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

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



SIGN PLAQUE MOUNTING DETAIL

MAXIMUM SIGN SUPPORT SPACING "Si" (FEET)

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

For fiberglass sign installations, see manufacturer's recommendations.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- OVERHEAD SIGNS EXTRUDED ALUMINUM

SMD(2-4)-08

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

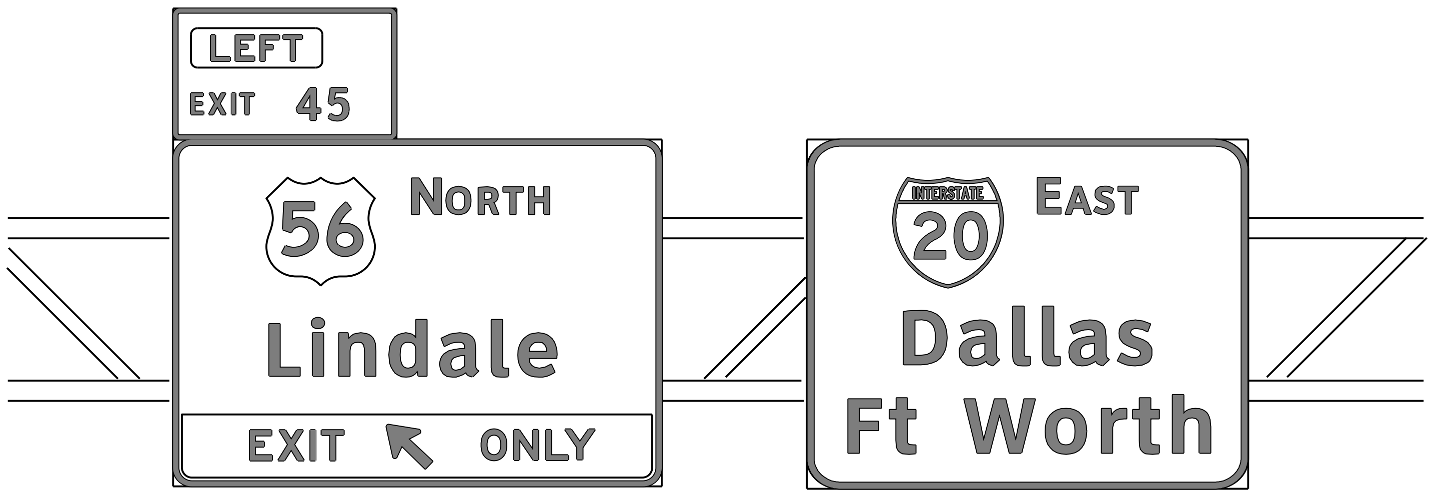
REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0003	05	055	IH 20, ETC

DIST	COUNTY	SHEET NO.
ODA	REEVES	158

REQUIREMENTS FOR OVERHEAD AND LARGE GROUND-MOUNTED SIGNS

TYPICAL EXAMPLES



GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign summary sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Black legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod, or F). White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white FHWA lettering, when not specified in the SHSD or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be cut-out white sheeting applied to colored background sheeting.
6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius need not be trimmed or rounded if fabricated from an extruded material.
7. Sign substrate for ground-mounted signs shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative. Sign substrate for overhead signs shall be any material that meets DMS-7110. Exit Number Panels attached above the parent sign shall be made with the same substrate and sheeting as the parent sign.
8. Mounting details of attachments to parent sign face are shown on Standard Plan Sheet TSR(5). Mounting details of exit number panels above parent sign are shown in the "SMD series" Standard Plan Sheets.
9. Background sheeting shall be applied to the substrate per sheeting manufacturer's recommendations. Sheeting will not be allowed to bridge the horizontal gap between panels.
10. Cut all legend, symbols, borders, and direct applied sign attachments at panel joints.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE B OR C SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(1)-13

FILE: tsr1-13.dgn		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003		CONT	SECT	JOB	HIGHWAY
REVISIONS		0003	05	055	IH 20, ETC
12-03 7-13		DIST		COUNTY	SHEET NO.
9-08		ODA		REEVES	159

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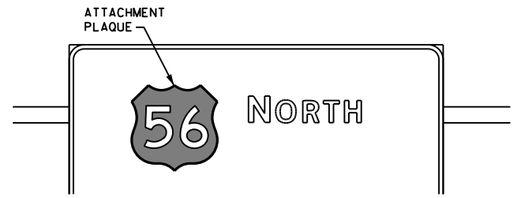
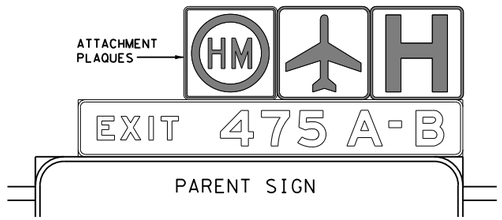
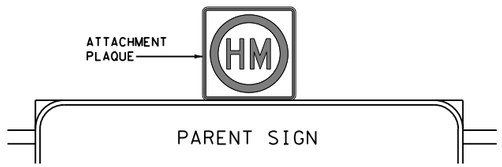
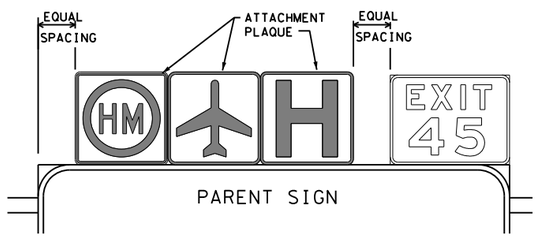
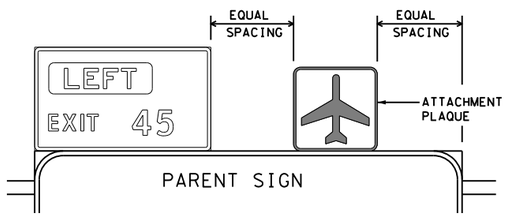
REQUIREMENTS FOR ATTACHMENTS TO OVERHEAD AND LARGE GROUND MOUNTED SIGNS











DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B OR C SHEETING

GENERAL NOTES

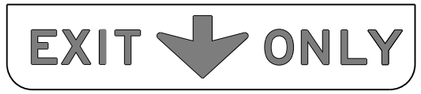
1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Route Marker legends (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod, or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to white background sheeting, or combination thereof.
7. Route markers and other attachments within the parent sign face shall be direct applied unless otherwise specified in the plans. Attachments not direct applied shall use 0.063 inch thick one piece sheet aluminum signs (Type A).
8. General Service Plaques shall be 0.080 inch thick and Routing Plaques shall be 0.100 inch thick.
9. The priority for Routing Plaques shall be (left to right) Hazardous Material, Airport then Hospital. See examples for mounting location.
10. Mounting details of attachments to parent signs face are shown on Standard Plan Sheet TSR(5). Mounting details of sign plaque attachments above and below parent sign are shown in the "SMD series" Standard Plan Sheets.
11. Plaques shall be horizontally centered at the top of the parent sign. If an exit number panel exists, the plaque shall be centered between the edge of the parent sign and the edge of the exit number panel. The plaque may be placed above the exit number panel when there is insufficient space.

TYPICAL EXAMPLES

REQUIREMENTS FOR EXIT ONLY AND LEFT EXIT PANELS

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

SHEETING REQUIREMENTS FOR OVERHEAD EXIT PANELS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLUORESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND	BLACK	ACRYLIC NON-REFLECTIVE FILM



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD). Individual panel sizes shown in the plans may be adjusted to fit actual parent sign sizes if necessary.
2. Exit Panel legend shall use the Federal Highway Administration (FHWA)Standard Highway Alphabets E Series.
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend shall be applied by screening process or cut-out acrylic non-reflective black film to yellow background sheeting, or combination thereof.
5. Exit Only and Left Exit panels within the parent sign face shall be direct applied unless otherwise specified in the plans. Panels not direct applied shall use 0.063 inch thick one piece sheet aluminum signs (Type A).
6. Mounting details of Exit Only and Left Exit panel attachments to parent signs face are shown on Standard Plan Sheet TSR(5).

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(2)-13

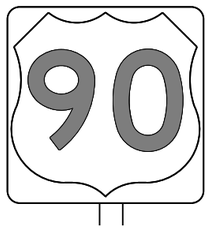
FILE: tsr2-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH 20, ETC
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	ODA	REEVES		160

2

DATE: 12/22/2022 3:51:48 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/06 - ODA/Design Projects/STANDARDS/tsr3-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

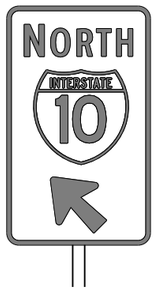
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

http://www.txdot.gov/

Texas Department of Transportation

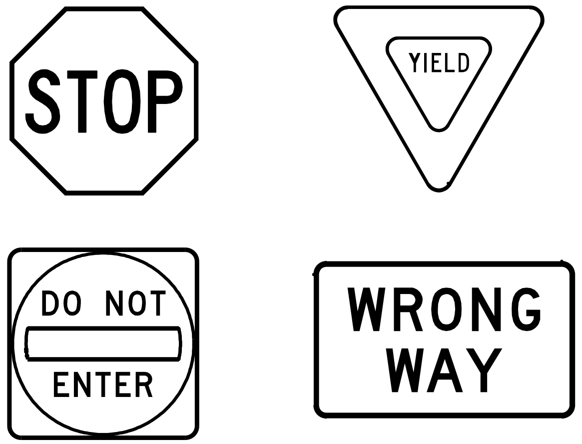
Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH 20, ETC
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	ODA	REEVES		161

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS
(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

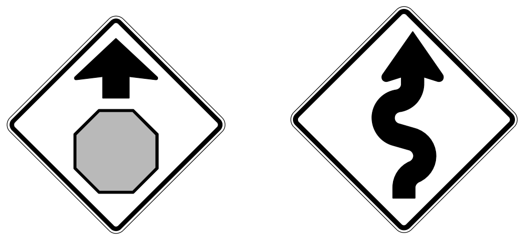
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
http://www.txdot.gov/

Texas Department of Transportation — Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT 0003	SECT 05	JOB 055	HIGHWAY IH 20, ETC
REVISIONS 12-03 7-13 9-08	DIST ODA		COUNTY REEVES	SHEET NO. 162

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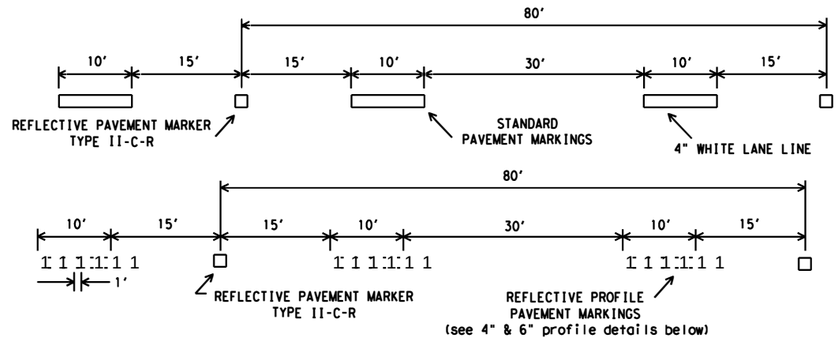
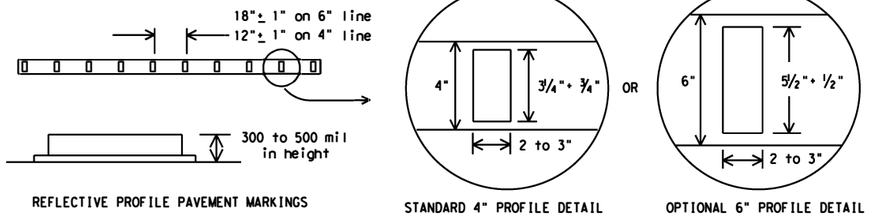


PAVEMENT MARKERS (REFL) TYPE II-C-R SHALL BE SPACED ON 80' CENTERS WITH THE CLEAR FACE TOWARD NORMAL TRAFFIC AND THE RED FACE TOWARD WRONG WAY TRAFFIC.

TRAFFIC LANE LINES PAVEMENT MARKING DETAILS

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

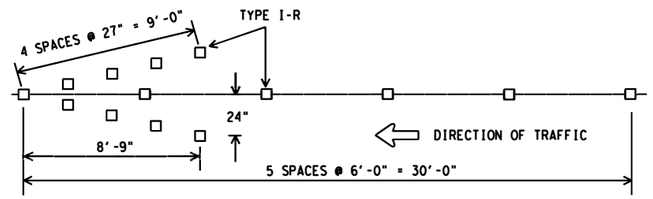


REFLECTIVE PROFILE PAVEMENT MARKINGS

STANDARD 4" PROFILE DETAIL

OPTIONAL 6" PROFILE DETAIL

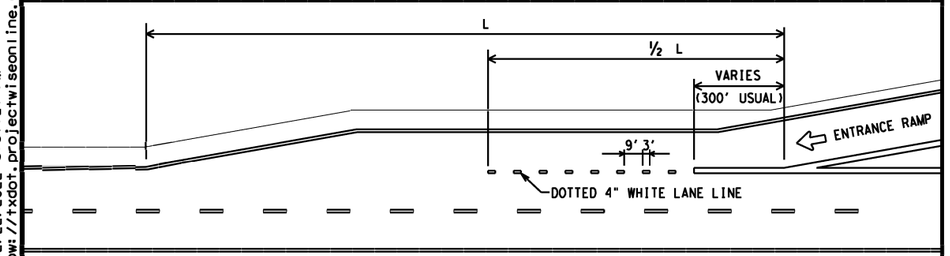
EDGELINE PAVEMENT MARKINGS



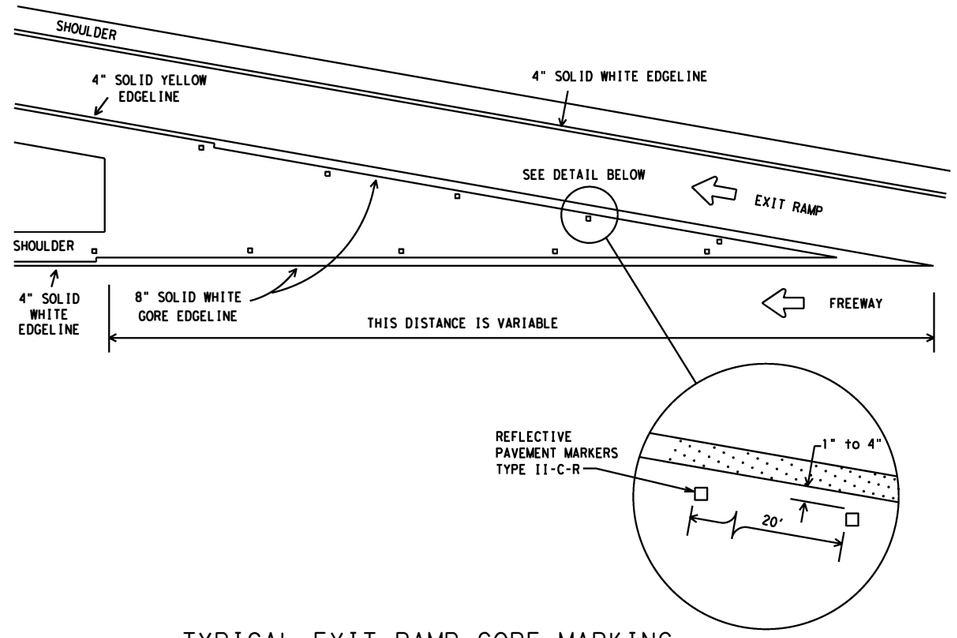
ALL RAISED MARKERS IN THE WRONG WAY ARROW SHALL BE TYPE I-R REFLECTORIZED PAVEMENT MARKERS WITH THE REFLECTORIZED SURFACE FACING THE WRONG WAY TRAFFIC. TYPE II-C-R SHALL NOT BE USED.

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.

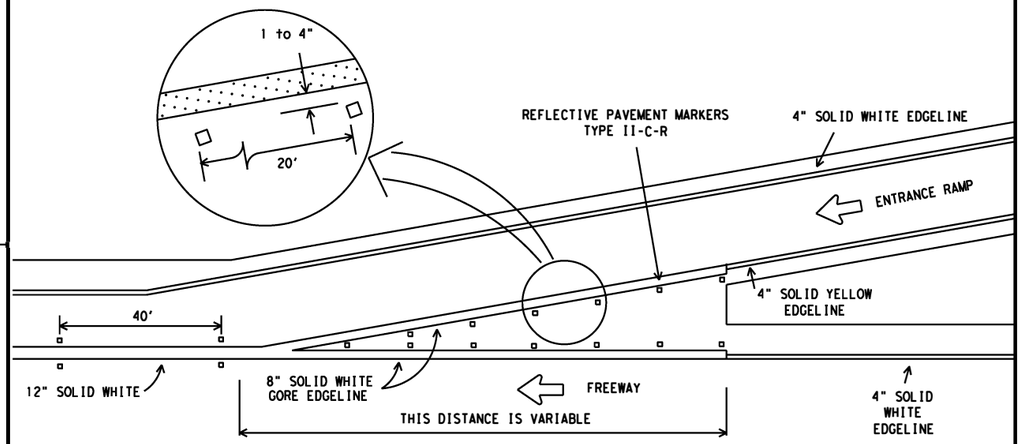
WRONG WAY ARROW DETAIL



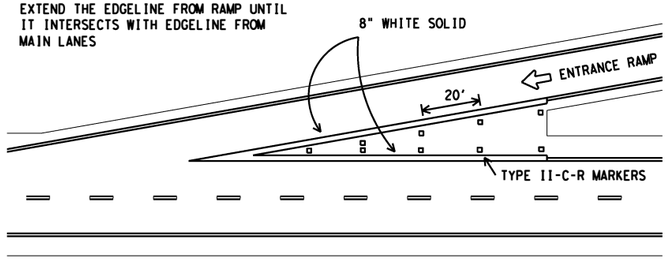
PARALLEL ACCELERATION LANE



TYPICAL EXIT RAMP GORE MARKING



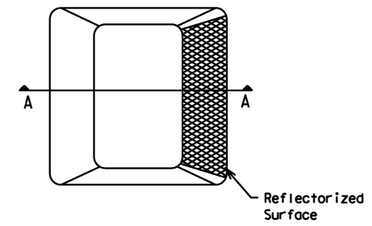
TYPICAL ENTRANCE RAMP GORE MARKING



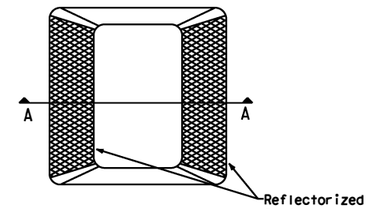
TAPERED ACCELERATION LANE

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

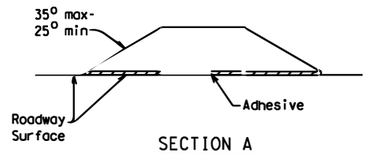
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS

FPM(1)-12

REVISIONS
4-92 2-10
5-00 2-12
8-00
2-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
CONT	SECT	JOB	HIGHWAY
0003	05	055	IH 20, ETC
DIST	COUNTY		SHEET NO.
ODA	REEVES		163

23A

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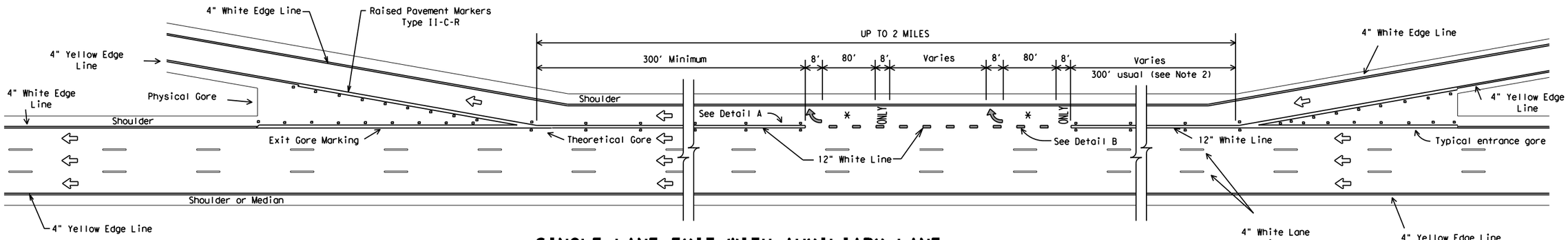
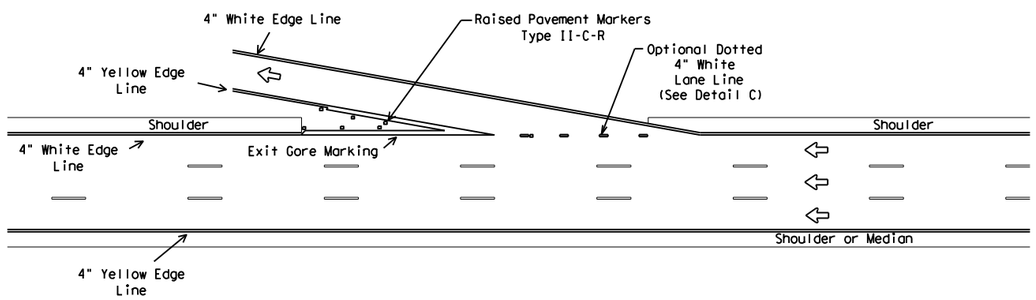
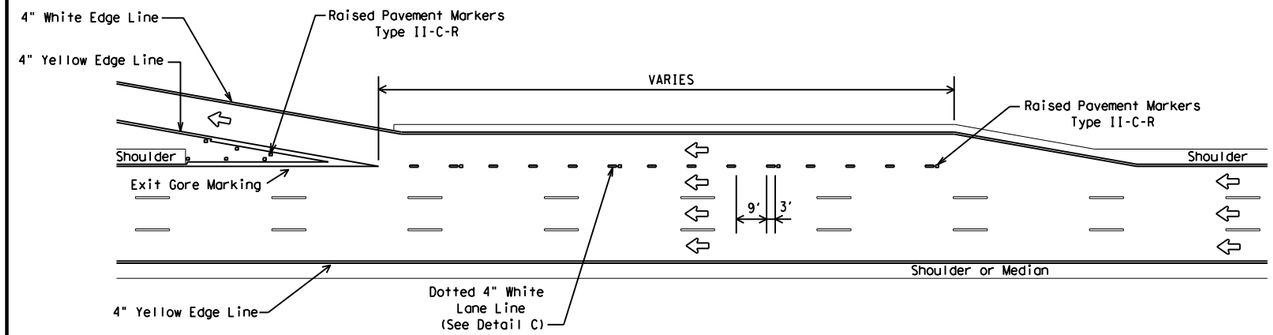


SINGLE LANE EXIT WITH AUXILIARY LANE

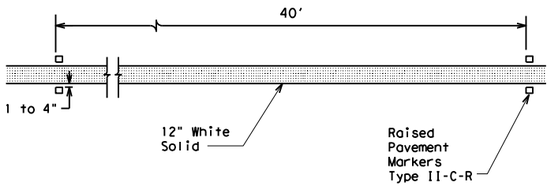
(See Note 2)



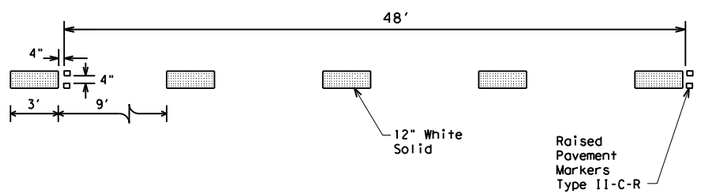
TAPERED DECELERATION LANE



PARALLEL DECELERATION LANE

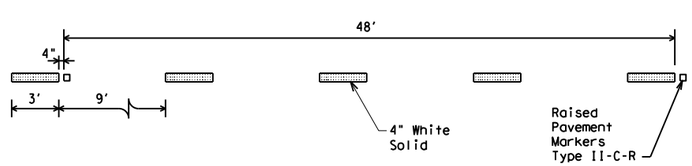


DETAIL A



DETAIL B

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



DETAIL C

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMPS

FPM(2)-12

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

REVISIONS		CONT	SECT	JOB	HIGHWAY
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8-95	2-12	DIST	COUNTY		SHEET NO.
5-00		ODA	REEVES		164
8-00					

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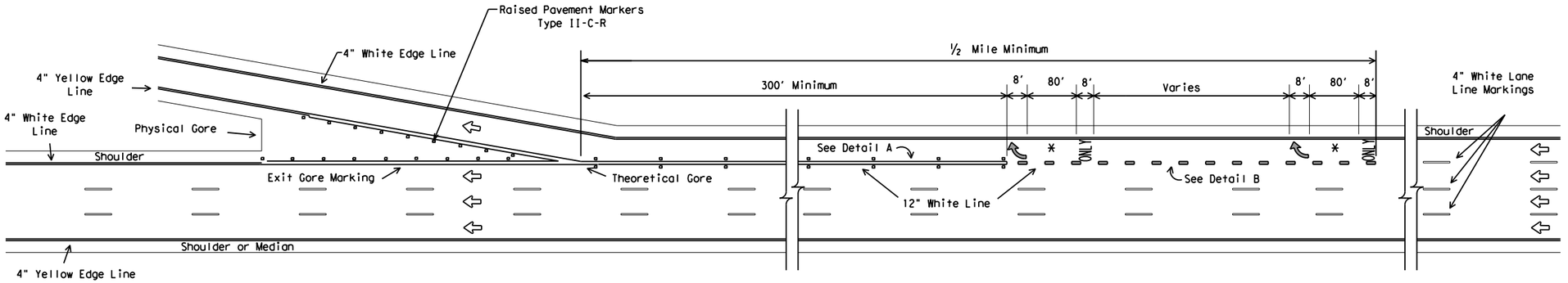
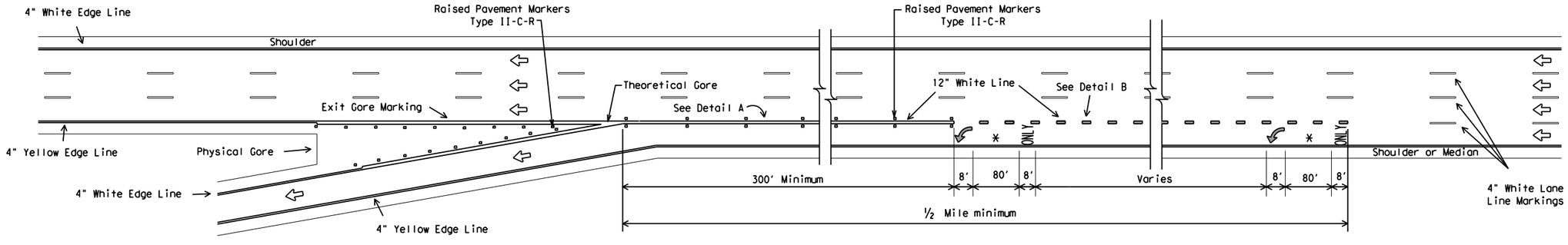


SINGLE LANE EXIT - LANE DROP OR EXIT ONLY

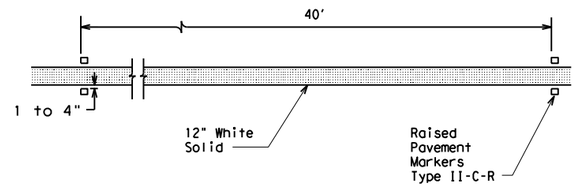


SINGLE LANE EXIT - LANE DROP OR EXIT ONLY (LEFTHAND)

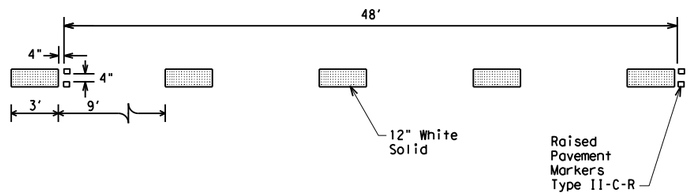
LEGEND	
⇦	Denotes direction of traffic.
↱	Pavement marking arrows (white)
✳	Arrow markings are optional, however "ONLY" is required if arrow is used

GENERAL NOTES

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



DETAIL A



DETAIL B

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

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

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

Texas Department of Transportation
Traffic Operations Division

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

FPM(3)-12

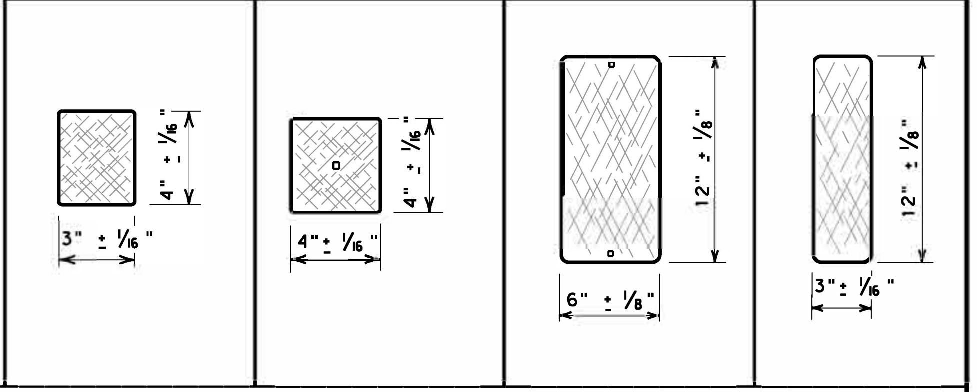
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

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

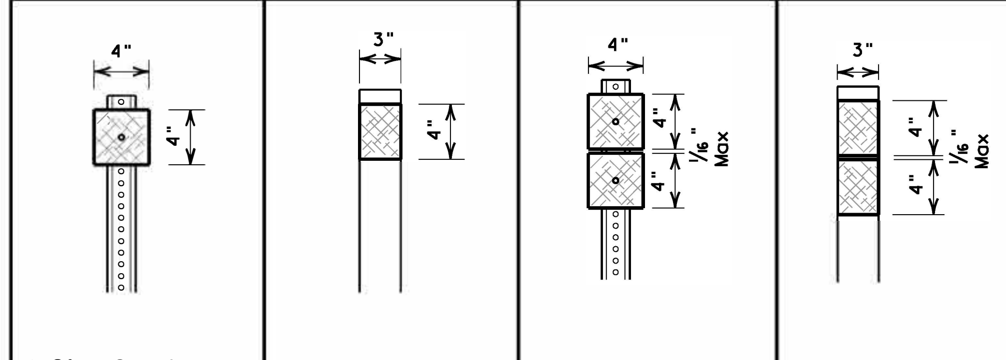
CONT	SECT	JOB	HIGHWAY
0003	05	055	IH 20, ETC
DIST	COUNTY		SHEET NO.
ODA	REEVES		165

23C

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
- S = Single
- D = Double

COLOR OF REFLECTORS
- W = White
- Y = Yellow
- R = Red

REFLECTOR UNIT SIZE
- 1 or 2

TYPE OF POST OR DELINEATOR
- WC = Wing Channel Post
- YFLX = Yellow Flexible Post
- WFLX = White Flexible Post
- BRF = Barrier Reflector

TYPE OF MOUNT
- GND = Embedded (drivable or set in concrete)
- CTB = Concrete Barrier Mount
- GF1 or GF2 = Guard Fence Attachment
- SRF = Surface Mount

DIRECTION
- If Required
- BI = Bi-Directional
- BR = Bi-Directional with red on back

INSTL OM ASSM (OM XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
- 1, 2, 3, or 4

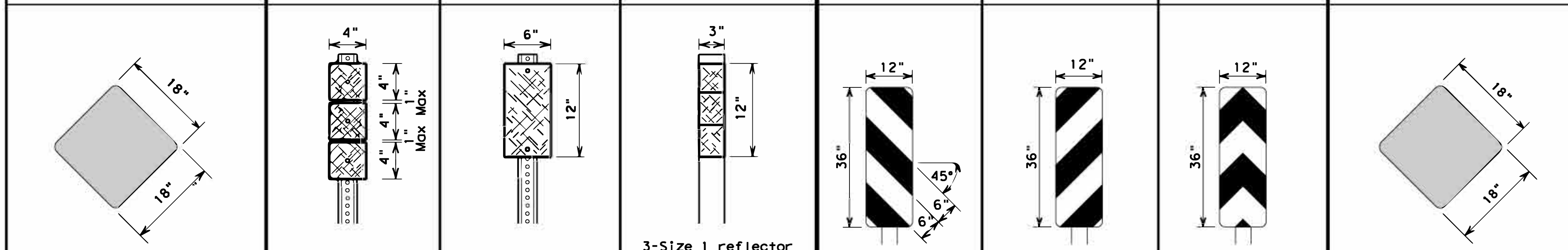
NUMBER OF REFLECTORS OR DIRECTION
- X = 3-Size 2 reflector units (Type 2 only)
- Y = 1-Size 3 reflector unit (Type 2 only)
- Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only)
- L = Left Side (Type 3 Object Marker only)
- R = Right Side (Type 3 Object Marker only)
- C = Center (Type 3 Object Marker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

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

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

DIRECTION
- If Required
- BI = Bi-Directional

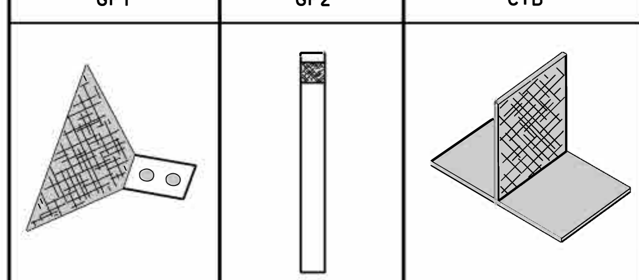
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

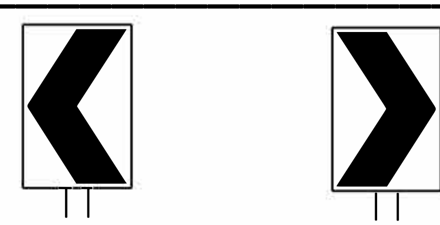
DEPARTMENTAL MATERIAL SPECIFICATIONS

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

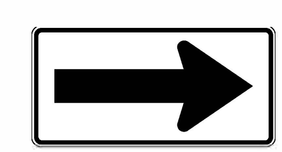
BARRIER REFLECTORS (BRF)

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

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE

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).

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

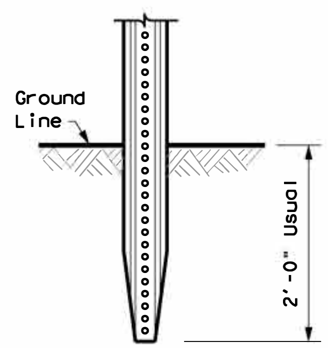
FILE: doml-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH 20, ETC
10-09 3-15	DIST		COUNTY	SHEET NO.
4-10 7-20	ODA		REEVES	166

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

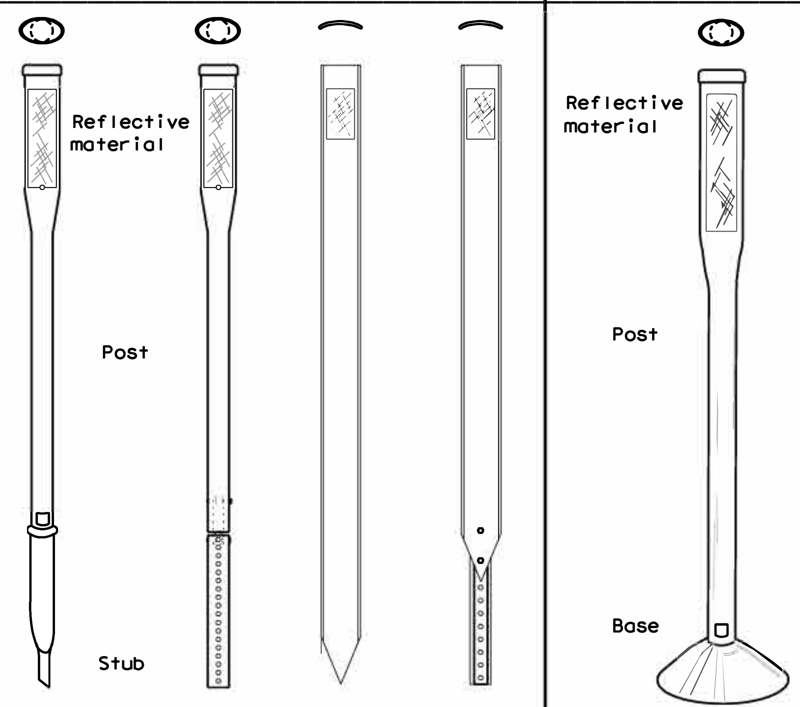


NOTES

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 / SRF



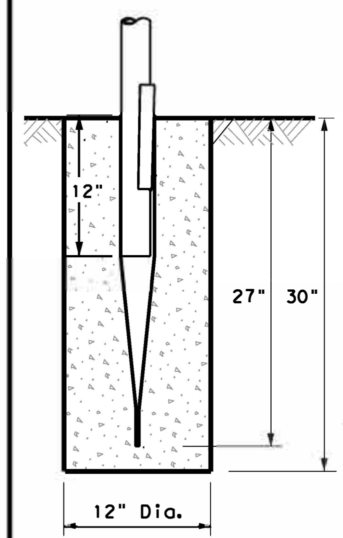
EMBEDDED | SURFACE MOUNT

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.

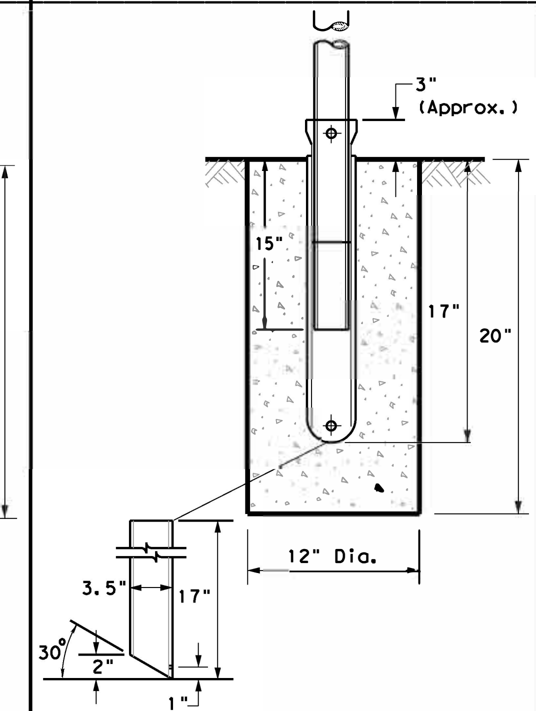
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

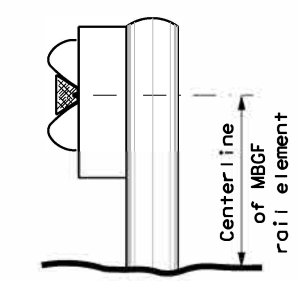
NOTE

1. Install per manufacturer's recommendations.

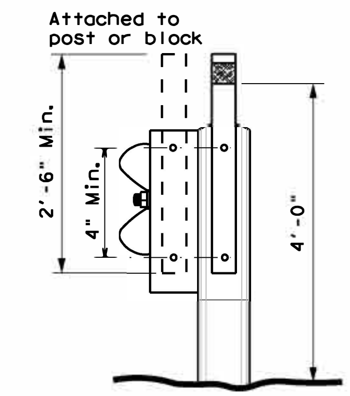
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

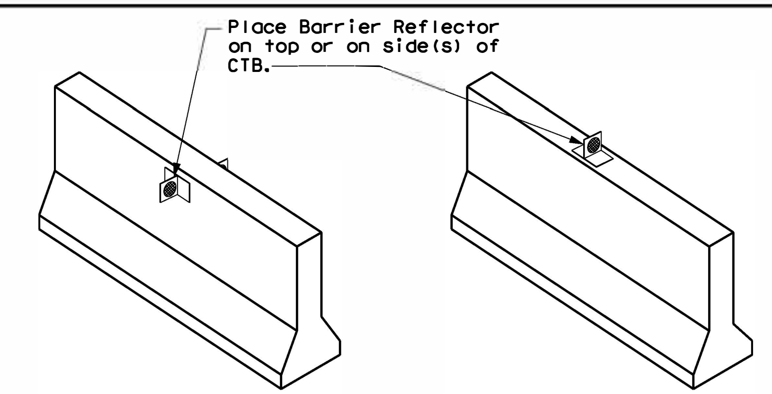
GF1



GF2



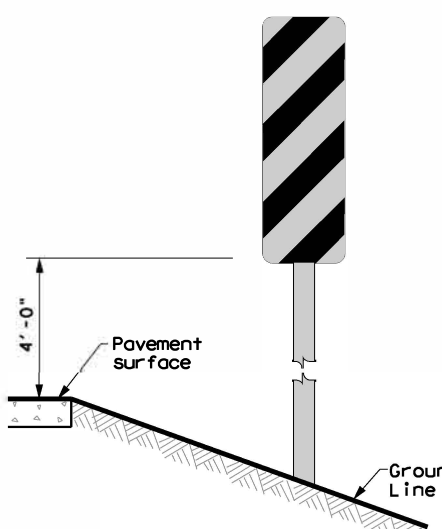
CONCRETE TRAFFIC BARRIER (CTB)



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.

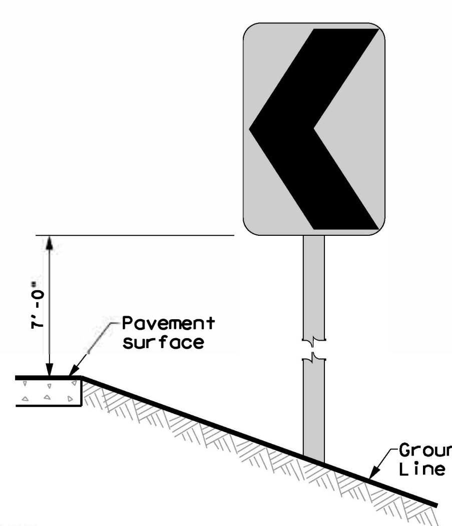
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

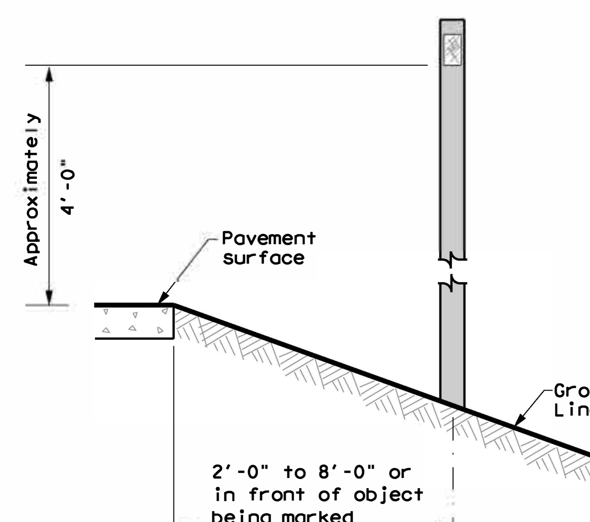
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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 0003	SECT 05	JOB 055	HIGHWAY IH 20, ETC
REVISIONS 10-09 3-15 4-10 7-20	DIST ODA		COUNTY REEVES	SHEET NO. 167

208

DATE: 12/22/2022 4:05:19 PM
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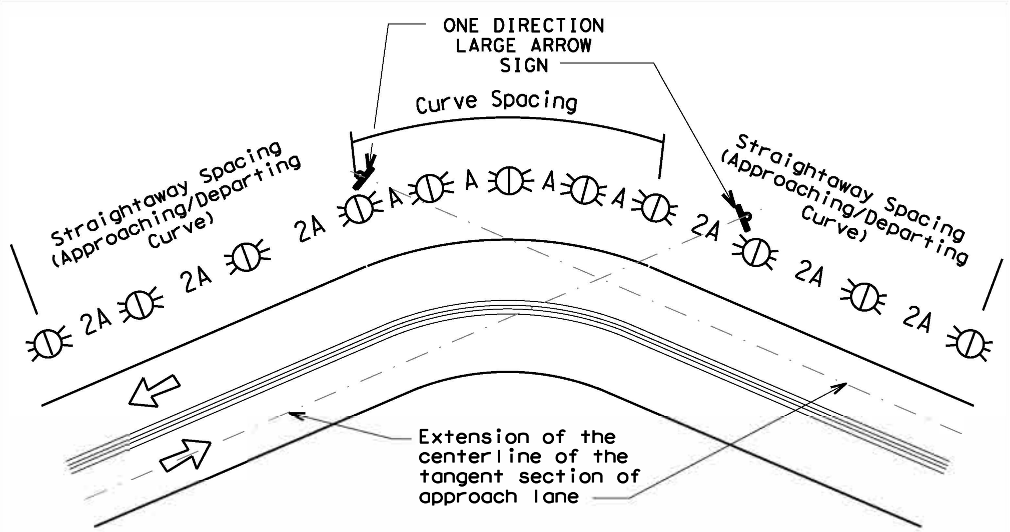
DATE: 12/22/2022 4:06:55 PM
FILE: pw://txdot.projectwiseonline.com:TXDOT2/Documents/06 - ODA/Design Pro...

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

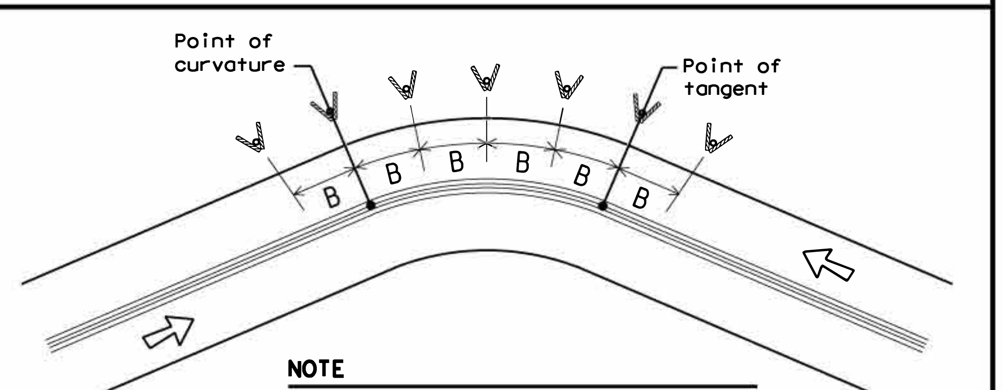
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

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

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

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

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

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

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

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

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

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

NOTES

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

LEGEND

Symbol	Description
(symbol)	Bi-directional Delineator
(symbol)	Delineator
(symbol)	Sign

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

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©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	05	055	IH 20, ETC
3-15 8-15 8-15 7-20	DIST		COUNTY	SHEET NO.
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20C

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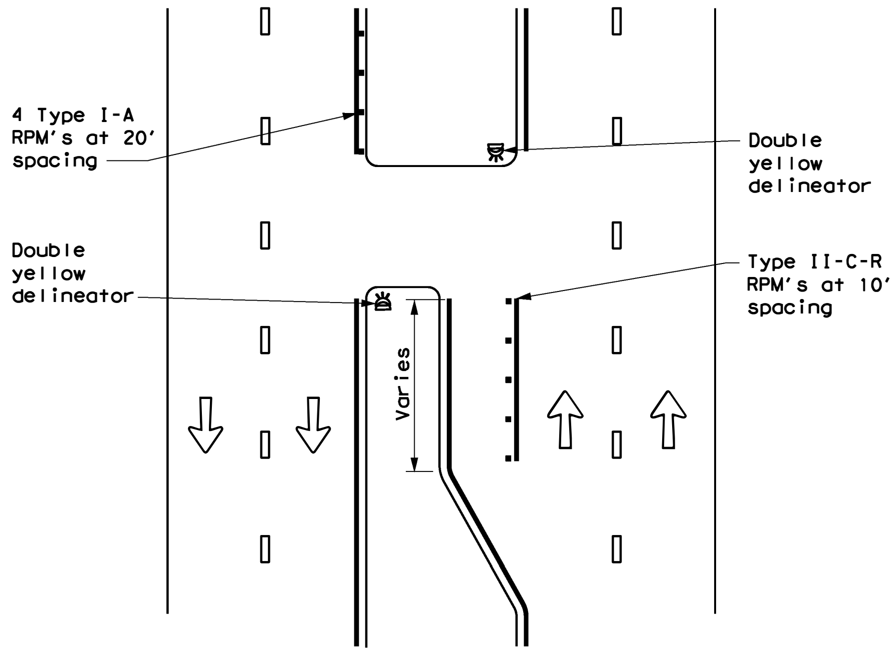
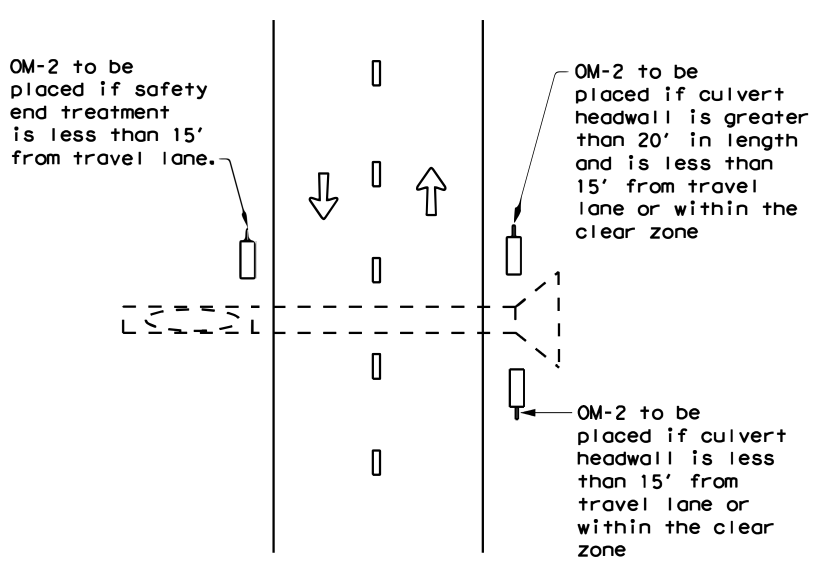
CROSSOVERS



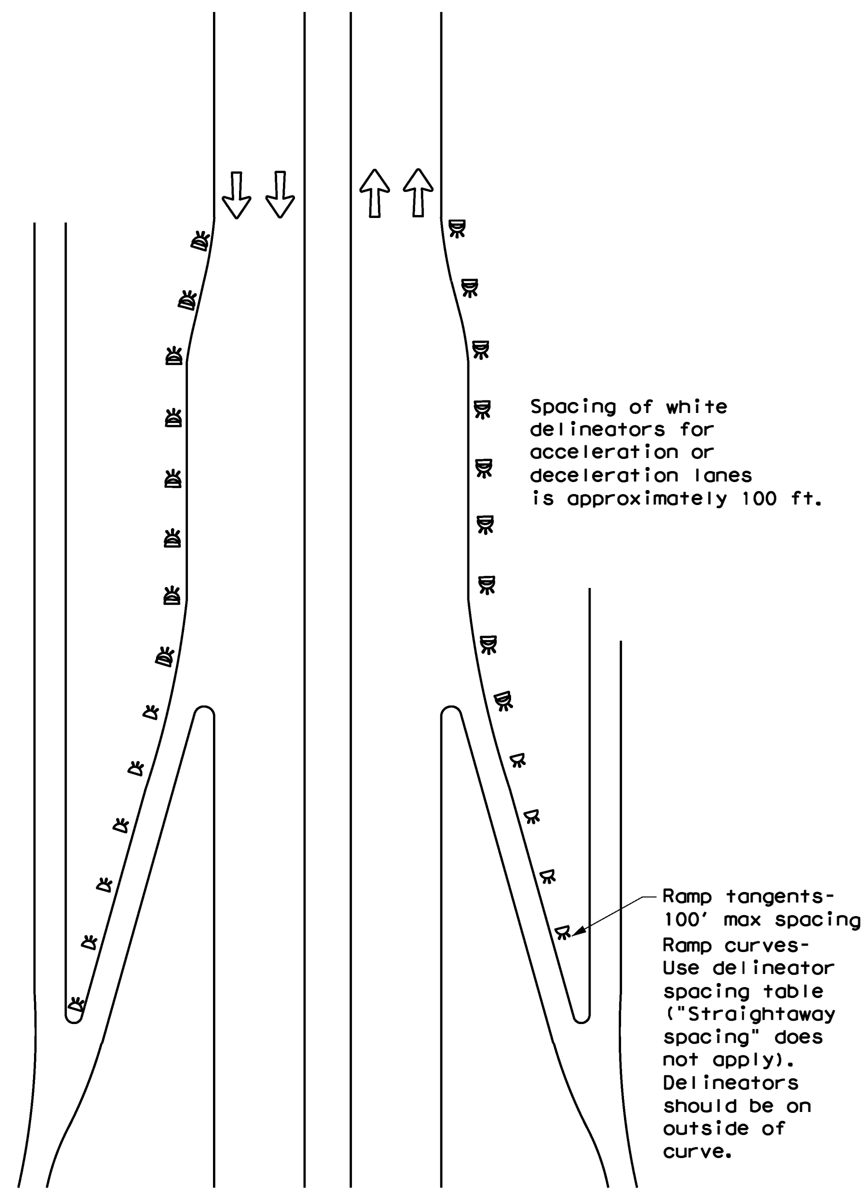
DETAIL 1

FOR CULVERTS WITHOUT MBGF



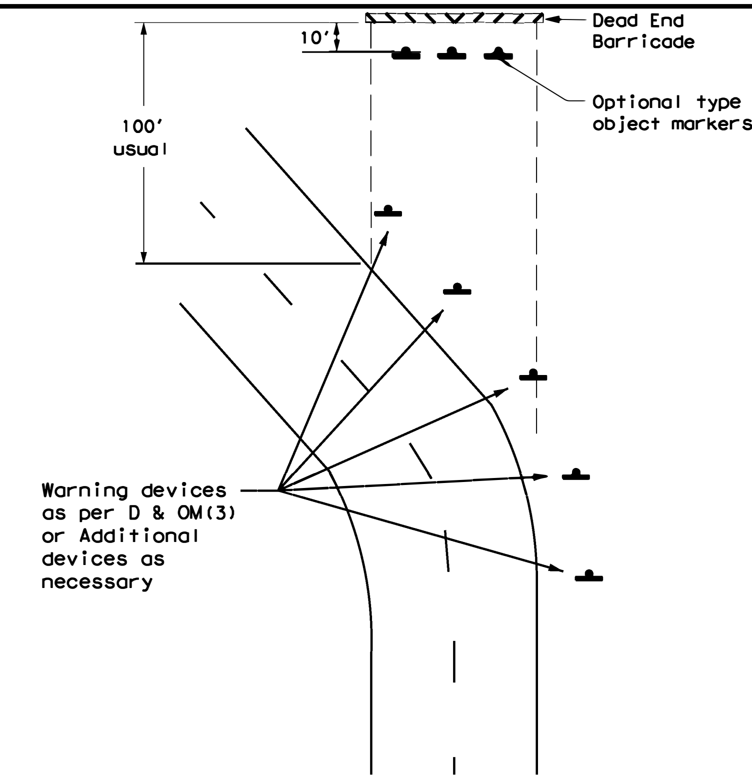
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



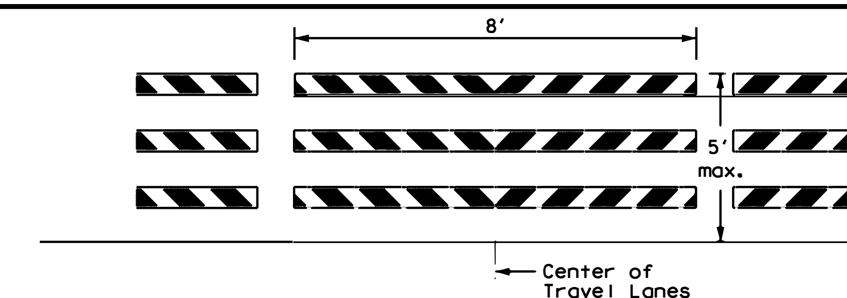
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND

Symbol	Description
	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	0003	05	055	IH 20, ETC
	DIST		COUNTY	SHEET NO.
	ODA		REEVES	169

20D

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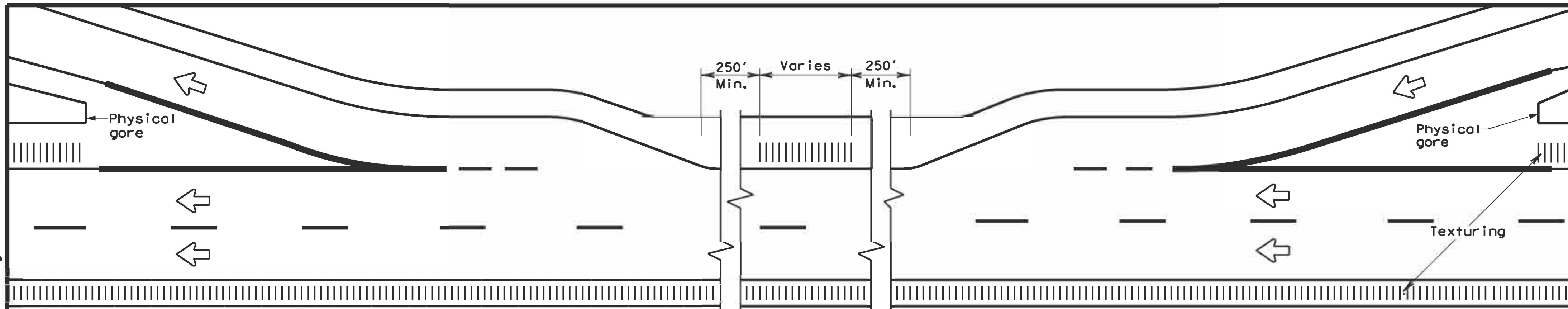
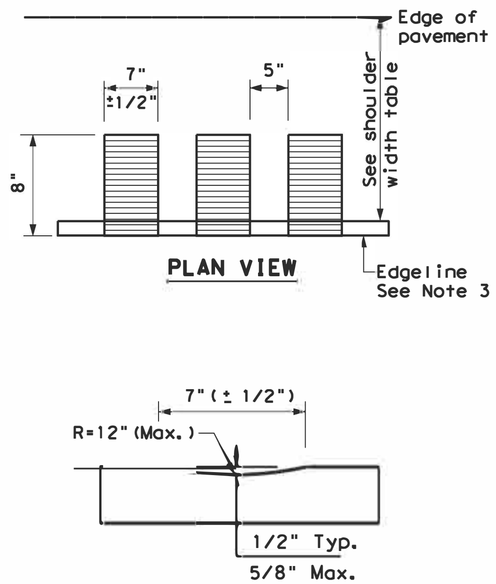
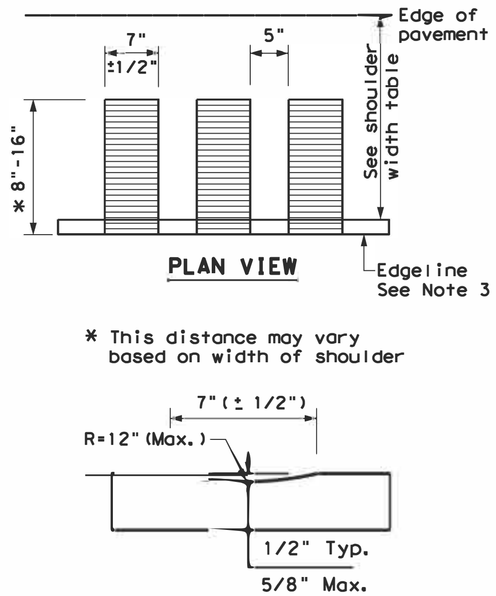


TYPICAL RUMBLE STRIP PLACEMENT AT EXIT AND ENTRANCE RAMPS



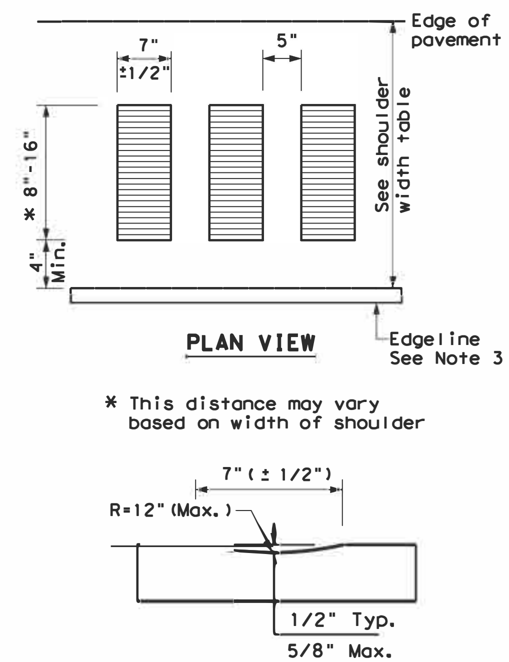
PROFILE VIEW
OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



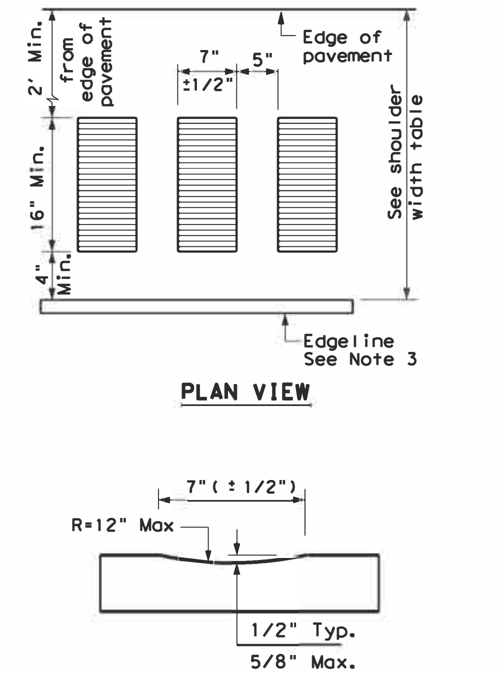
PROFILE VIEW
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



PROFILE VIEW
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PROFILE VIEW
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

GENERAL NOTES

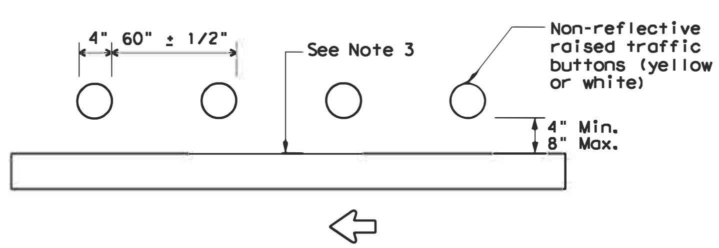
1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard 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.

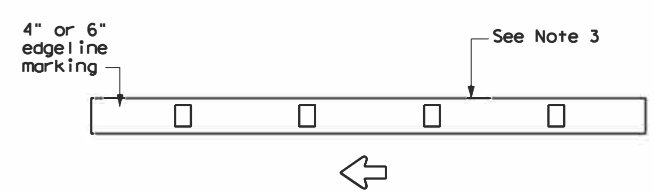
WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:

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.



PLAN VIEW
OPTION 5

RAISED EDGELINE RUMBLE STRIPS



PLAN VIEW
OPTION 6

PROFILE EDGELINE MARKINGS

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	0003	05	055	IH 20, ETC
2-10	DIST		COUNTY	SHEET NO.
10-13	ODA		REEVES	170

90

STORM WATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TPDES General Permit TXR150000. The operator, The Texas Department of Transportation ensures that: Project specifications provide that adequate BMPs have been developed for this project. The contractor shall be the party responsible for implementing the BMPs described herein. The contractor shall implement changes approved by the Project Engineer to the SWP3 within the times specified in the SWP3 or the TPDES General Permit. Operators affected by modifications to specifications will be notified in a timely manner.

1. SITE OR PROJECT DESCRIPTION:

NATURE OF THE CONSTRUCTION ACTIVITY: SEE TITLE SHEET

POTENTIAL POLLUTANTS AND	SOURCES:
Sediment laden storm water	*Storm water conveyance over disturbed areas*
Fuels, oils, and lubricants	*Construction vehicles and storage areas*
Transported soil	*Off site vehicle tracking*
Construction debris and waste	*Various construction activities*
Sanitary waste	*Restroom facilities*
Trash	*Construction site and Receptacles*

SEQUENCE OF ACTIVITIES THAT WILL DISTURB SOILS:

1. *Blade existing topsoil into windrows.*
2. *Grading operations, excavation, and embankment*
3. *Rework slopes, grade ditches*
4. *Blade windrowed material back across slopes*
5.
6.
7.
8.

AREAS:

TOTAL AREA OF PROJECT: 150.60 ACRES

TOTAL AREA OF SOIL DISTURBANCE: 00.00 ACRES

TOTAL AREA OFF-SITE: Acreage and Description to be Attached

DATA DESCRIBING THE SOIL: *Delnorte Association: Loamy, nearly level to undulating soils on uplands. Pale-brown, moderately alkaline gravelly loam surface layer about 8 inches thick.*

GENERAL LOCATION MAP: SEE TITLE SHEET

DETAILED SITE MAP: SEE SWP3 SITE MAP/S SHEET/S

THE LOCATION AND DESCRIPTION OF CONCRETE AND ASPHALT PLANTS:

Supporting Concrete Plant Facilities shall be located off site. See note DEDICATED CONCRETE PLANTS.

Supporting Asphalt Plant Facilities shall be located off site. See note DEDICATED ASPHALT PLANTS.

NAME OF RECEIVING WATERS: *Storm Water from this project will flow to several draws, ultimately flowing into the Upper Pecos River which is segment number 2311 of the Rio Grande River Basin.*

A COPY OF TPDES CGP TXR150000 IS INCLUDED IN THE SWP3 FILE.

REMARKS:

401 WATER QUALITY CERTIFICATION: YES____ NO__X__

2. BEST MANAGEMENT PRACTICES (BMPs):

EROSION AND SEDIMENT CONTROLS: Erosion and sediment controls have been designed to retain sediment on-site. Controls shall be utilized to reduce off site transport of suspended sediments and pollutants if it is necessary to pump water from the site. Control measures shall be installed per specifications or as directed. Sediment must be removed from controls per the plan requirements or manufacturers recommendations, but no later than the time that design capacity has been reduced by 50%. If sediment escapes the site, accumulations will be removed to minimize further negative effects. Controls will be developed to limit the off site transportation of litter, construction debris, and construction materials.

INTERIM(INT), PERMANENT(PER), AND 401 CERTIFICATION BMP'S:

EROSION CONTROLS:	401	INT	PER
☐ *Blankets and Matting*	__	__	__
☐ *Sod*	__	__	__
☒ *Preserve Existing Vegetation*	__	__	X
☐ *Soil Stabilization*	__	__	__
☐ *Permanent Vegetation*	__	__	__
☐ *No Erosion Controls are Required.*			

SEDIMENT CONTROLS:	401	INT	PER
☐ *Silt Fence*	__	__	__
☐ *Rock Berm*	__	__	__
☐ *Buffer Zones*	__	__	__
☐ *Vegetative Filter Strips*	__	__	__
☐ *Ditch Block*	__	__	__
☐ *No Sediment Controls are Required*	__	__	__
☒ *Biodegradable erosion control logs*	__	X	__

POST CONSTRUCTION TSS CONTROL (401 CERTIFICATION ONLY):

- ☐ *Vegetation Lined Drainage Ditch*
- ☐ *Retention/Irrigation*
- ☐ *Erosion Control Compost*
- ☐ *Grassy Swales*
- ☐ *Vegetative Filter Strips*
- ☒ *No Post Construction TSS Control Required.*

SEQUENCE OR SCHEDULE OF IMPLEMENTATION:

1. *Windrow topsoil*
2. *Install erosion control logs*
3. *Maintain erosion control logs*
4. *Inspect until 70% vegetative cover is attained*
5.
6.
7.
8.

The dates of major grading activities, when construction activities temporarily or permanently cease on a portion of the site, and when stabilization practices are initiated, are available in the project diary or SWP3. Stabilization measures must be initiated as soon as practicable in portions of the site where construction has temporarily or permanently ceased. The Odessa District is located in a semi-arid area and the 14 and 21 day requirements are not applicable except, as directed by the Engineer.

3. STRUCTURAL CONTROL PRACTICES:

Structural control practices for this project are listed elsewhere herein.

4. PERMANENT STORM WATER CONTROLS:

Structural control practices installed during construction will be maintained and inspected after construction has ceased on the site and until final stabilization is attained. Unless specified in the plans, after project acceptance TxDOT will assume maintenance responsibilities for the controls and measures. Other permanent controls include existing and proposed; riprap at culvert inlets and outlets, diversion dikes, swales, retaining walls, and other similar devices.

5. OTHER CONTROLS:

OFF-SITE VEHICLE TRACKING OF SEDIMENTS AND THE GENERATION OF DUST: The off site vehicle tracking of sediments shall be minimized by removal of excess dirt from the road and at entrances to the work site. Stabilized Construction Entrances and Exits shall be constructed per the plans or as directed by the Project Engineer. The generation of dust will be minimized as directed by the Project Engineer by dampening haul roads and covering haul trucks with a tarpaulin.

CONSTRUCTION AND WASTE MATERIALS: The contractor will maintain a clean, orderly construction site. Construction waste including trash, rubble, scrap and vegetation shall be disposed of in lidded dumpsters or in a manner approved by the Project Engineer. Disposal methods must meet Federal, State, and Local waste management guidelines. No construction waste will be buried or burned on site. Spoils disposal, material storage, and materials resulting from the destruction of existing roads and structures shall be stored in areas designated by the Project Engineer and protected from run-off. All waterways shall be cleared of temporary embankment, temporary bridges, matting, false work, piling, debris, or other obstructions placed during construction operations, that are not part of the finished work, as soon as practicable. All excess soil generated by the construction will be collected and disposed of by the contractor. Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, water body, or stream bed.

POLLUTANT SOURCES FROM AREAS OTHER THAN CONSTRUCTION: Staging areas and vehicle maintenance areas shall be located and constructed in a manner to minimize the runoff of pollutants. If potential pollutant sources are identified after the start of construction, controls and measures shall be implemented as directed by the Project Engineer.

5. OTHER CONTROLS (CONT):

DEDICATED ASPHALT PLANTS: Asphalt or asphaltic material for this project will be produced off site. If the project requires a dedicated asphalt plant and the plant within 1 mile of the project limits it will be considered an off site PSL. Consideration shall be given to on site plant and storage facilities and measures implemented as directed by the Project Engineer.

DEDICATED CONCRETE PLANTS: Cement or Concrete material for this project will be produced off site. If the project requires a dedicated concrete plant and the plant is within 1 mile of the project limits it will be considered an off site PSL. Consideration shall be given to on site plant and storage facilities and measures implemented as directed by the Project Engineer. Concrete trucks shall be wasted or washed out in locations designated by the Project Engineer. The locations shall be protected by a berm sufficient to contain all waste and wash water. Wash water shall not be allowed to enter any storm drainage system or waterway. The residual material and contaminated soil shall be collected and disposed of in accordance with Federal, State, and Local guidelines. Staging areas and vehicle maintenance areas shall be located and constructed in a manner to minimize the runoff of pollutants.

HAZARDOUS MATERIALS AND SPILL REPORTING: The contractor shall take appropriate measures to prevent, minimize, and control the spillage or leakage of hazardous materials and any associated wastes on site and in maintenance and staging areas. hazardous materials shall include but are not limited to paints, acids, solvents, asphalt products, chemical additives, curing compounds, oils, fuels, and lubricants. Hazardous materials shall not be stored, accumulated, or transported in open containers subject to precipitation or spillage, but shall be stored, accumulated, or transported in closed containers of the type recommended by the manufacturer. In the event of a spill the Project Engineer should be contacted immediately. All spills shall be immediately cleaned and any contaminated soil removed and disposed of in accordance with Local, State, and Federal laws. Fuel tanks shall be protected by a secondary containment, such as a lined berm, capable of containing 1.5 times the capacity of the tank, or as approved by the Project Engineer.

OFF SITE PSLs: All off site project specific locations including dedicated asphalt plants, concrete plants, or utility installations, required by the contractor, are the contractor's responsibility. The contractor shall secure all permits required by local, state, or federal laws for off site PSLs. The contractor shall provide diagrams and areas of disturbance for all PSL's within 1 mile of the project.

SANITARY FACILITIES: All sanitary or septic wastes that are generated onsite shall be treated and disposed of in accordance with state and local regulations. Raw sewage or septage shall not be discharged or buried on site. Precaution shall be taken to prevent illicit discharges to storm water. Licensed waste management contractors shall be required to dispose of sanitary waste. Porta johns will be required for the laboratory and construction site or as directed by the Project Engineer.

VELOCITY DISSIPATION DEVICES: Velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel as shown in the plans or as directed by the Project Engineer to provide a non-erosive flow velocity from the structure to a watercourse so that the natural physical and biological characteristics and functions are maintained and protected.

6. APPROVED STATE AND LOCAL PLANS:

This SWP3 is consistent with requirements specified in applicable sediment and erosion site plans or site permits, or storm water management site plans or permits approved by federal, state, or local officials.

7. MAINTENANCE:

Control measures shall be properly installed according to specifications. If inspections or other information indicates a control has been installed, used, or is performing inadequately, the contractor must replace or modify the control as soon as practicable after discovery. Control measures shall be maintained in effective operating condition. If inspections determine that BMPs are not operating effectively maintenance will be performed as necessary to continue the effectiveness of the controls. Maintenance must be accomplished as soon as practicable. Controls adjacent to creeks, culverts, bridges, and water crossings shall have priority. Controls that have been disabled, run over, removed, or otherwise rendered ineffective must be corrected immediately upon discovery.

8. INSPECTION OF CONTROLS:

A TxDOT inspector will inspect disturbed areas of the site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, and structural controls for evidence of, or the potential for, pollutants entering the drainage system. Sediment and erosion controls measures identified in the SWP3 will be inspected to ensure that they are operating correctly. Locations where vehicles enter or exit the site will be inspected for evidence of off-site vehicle tracking. Inspections will be conducted every month and within 24 hours after the end of a storm event of 0.5 inches or greater. The SWP3 will be modified based on the result of these inspections. Revisions will be completed within 7 Calendar days following the inspection. Revised implementation schedules will be described in the SWP3 and implemented as soon as practicable. Rain gages will be maintained on site for the duration of the project. Reports summarizing the scope of the inspections are included in the SWP3 file.

9. NON-STORM WATER COMPONENTS:

The contractor shall be required to implement appropriate pollution prevention controls and measures for all eligible non-storm water components of the discharge as approved and directed by the Project Engineer.

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED PROFESSIONAL ENGINEER

Ricardo C Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

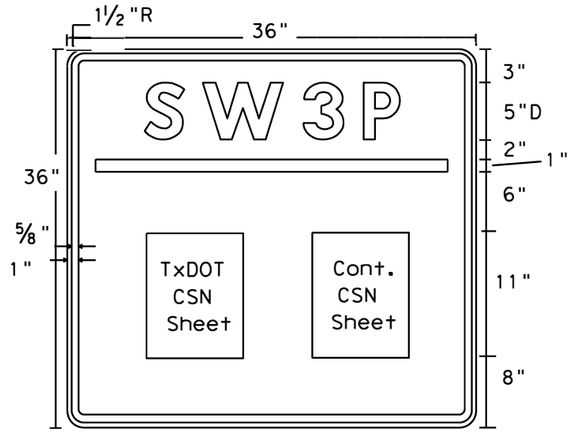
SWP3 NOTES

Texas Department of Transportation

REV: 10-25-16

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			171
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	S EC.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

SWP3 Notes.dgn



SW3P SIGN

TxDOT & Contractor Construction Site Note (CSN)

Sign Dimensions

36" X 36"

Letters - White
Numbers - White
Border - White
Background - Blue

GENERAL NOTES:

1. The alphabets and lateral spacing between letters and numerals shall conform with the "Texas Manual on Uniform Traffic Control Devices for Streets and Highways", (TMUTCD) latest edition, and the "Compliant Work Zone Traffic Control Devices List". Lateral spacing of text shall provide a balanced appearance. All materials shall conform to Department Specifications.
2. Legend and border may be applied by reverse screening process with transparent colored ink, cut-out white reflective sheeting applied to colored background or combination thereof. Background shall be reflective sheeting Type C.
3. CSN Sheets will be laminated and attached to the sign with an adhesive. Ensure sheets remain dry. (See Figure 1).
4. SW3P Signs should be placed just inside the ROW line at the project limits at a readable height. It may be placed perpendicular or parallel to ROW line. If the sign cannot be placed outside the clear zone, it will be mounted per TMUTCD requirements.
5. Final location of the signs will be as approved by the Engineer.

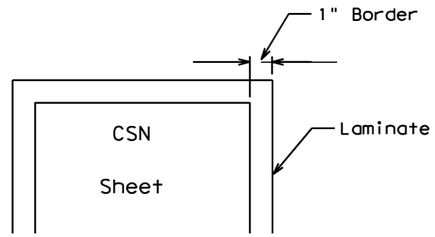
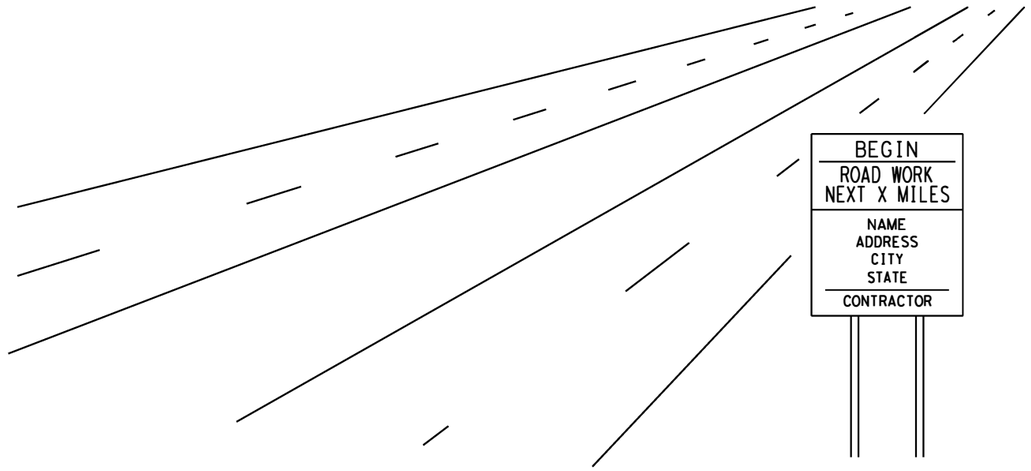
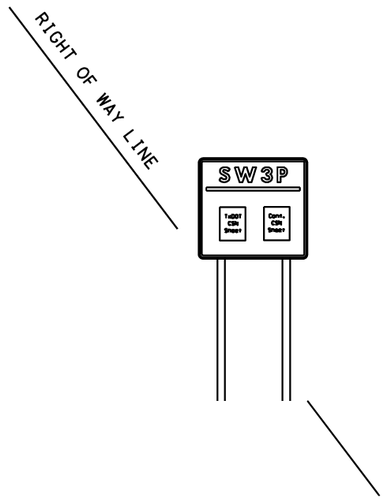


Figure 1





DEPARTMENT MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
FLAT SURFACE REFLECTIVE SHEETING	DMS-8300
VINYL NON-REFLECTIVE DECAL SHEETING	DMS-8320

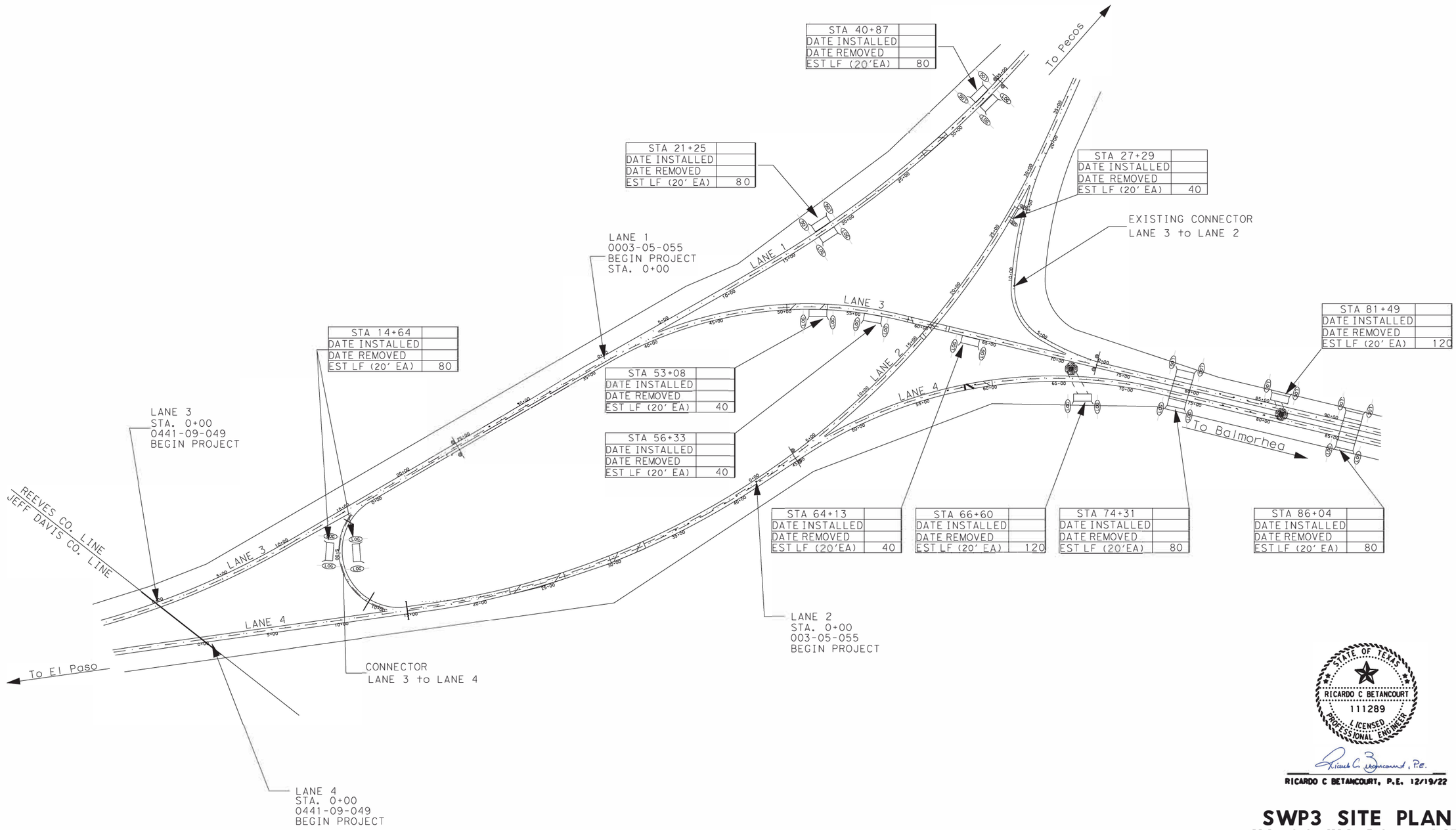
COLOR	USAGE	REFLECTIVE SHEETING OR OTHER MATERIAL
BLUE	BACKGROUND	TYPE C (FLUORESCENT PRISMATIC)
WHITE	LEGEND & BORDERS	VINYL NON-REFLECTIVE DECAL SHEETING

Texas Department of Transportation
DALLAS DISTRICT STANDARD

SW3P SIGN SHEET

FILE:	DN: TxDOT	CK:	DW:	CK:	
©TxDOT 2016	DISTRICT	FEDERAL AID PROJECT			SHEET
	18				172
REVISION DATE: 10-16-15	COUNTY		CONTROL	SECT	JOB	HIGHWAY
	REEVES		0003	05	055	IH 20, ETC

LEVELS DISPLAYED
PATH:



LEGEND

- LOG — EROSION CONTROL LOG
- BRIDGE/HYDRAULIC STRUCTURE
- GRATE INLET

SHEET TOTALS (LANE 1)	0506 6042	0506 6043
	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF
CULVERT STA 21+25	80	80
CULVERT STA 40+87	80	80

SHEET TOTALS (LANE 2)	0506 6042	0506 6043
	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF
CULVERT STA 27+29	40	40

SHEET TOTALS (LANE 3)	0506 6042	0506 6043
	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF
CULVERT STA 14+64	80	80
CULVERT STA 53+08	40	40
CULVERT STA 56+33	40	40
CULVERT STA 81+49	120	120

SHEET TOTALS (LANE 4)	0506 6042	0506 6043
	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF
CULVERT STA 64+13	40	40
CULVERT STA 66+60	120	120
CULVERT STA 74+31	80	80
CULVERT STA 86+04	80	80
SHEET TOTAL	800	800

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

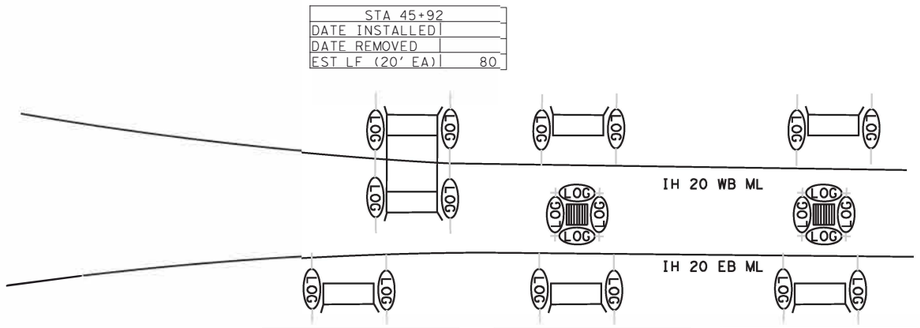
RICARDO C BETANCOURT, P.E. 12/19/22

SWP3 SITE PLAN
IH 20/IH 10 SPLIT

PAGE 1 OF 8

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			173
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

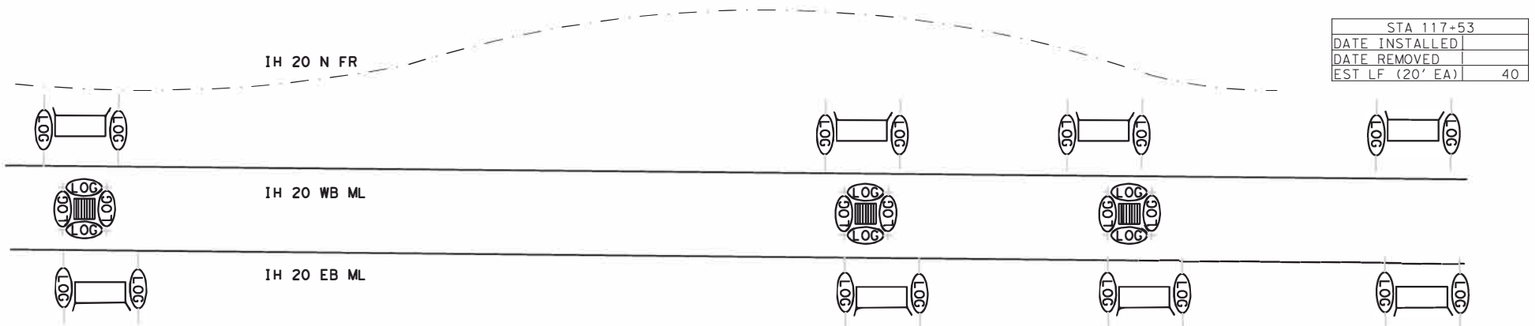


STA 45+92	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 44+72	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	40

STA 48+52	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	160

STA 61+18	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	160



STA 88+56	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	160

STA 102+68	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	160

STA 108+65	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	160

STA 117+53	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	40

SHEET TOTALS		
	0506 6042	0506 6043
	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF
CULVERT STA 44+72	40	40
CULVERT STA 45+92	80	80
CULVERT STA 48+52	160	160
CULVERT STA 61+18	160	160
CULVERT STA 88+56	160	160
CULVERT STA 102+68	160	160
CULVERT STA 108+65	160	160
CULVERT STA 117+53	40	40
SHEET TOTAL	960	960

LEGEND

LOG — EROSION CONTROL LOG

BRIDGE/HYDRAULIC STRUCTURE

GRATE INLET

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

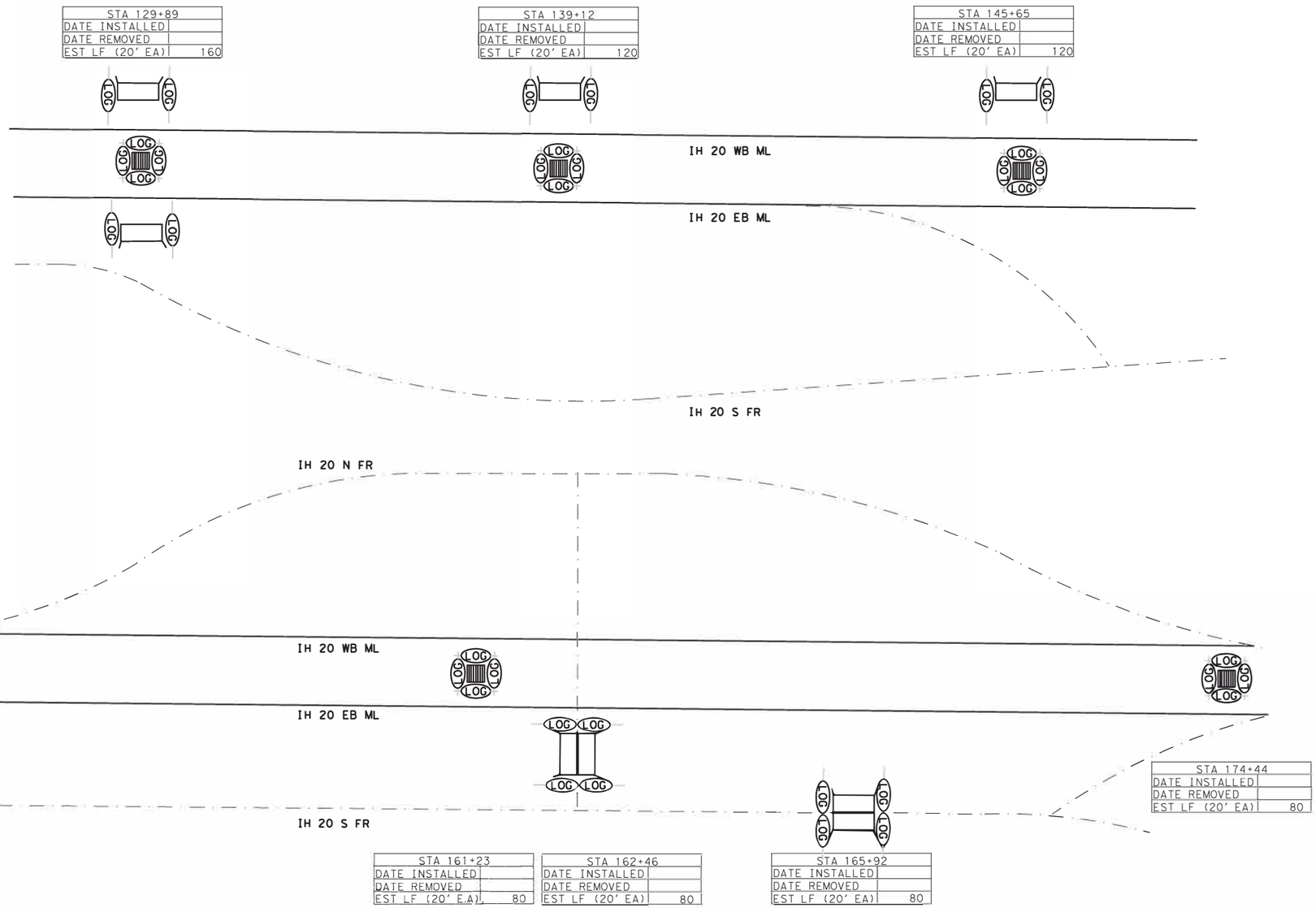
Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

003-05-055(IH 20)
SWP3 SITE PLAN
PAGE 2 OF 8

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			174
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



LEGEND

- EROSION CONTROL LOG
- BRIDGE/HYDRAULIC STRUCTURE
- GRATE INLET

SHEET TOTALS	0506 6042	0506 6043
	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF
CULVERT STA 129+89	160	160
CULVERT STA 139+12	120	120
CULVERT STA 145+65	120	120
CULVERT STA 161+23	80	80
CULVERT STA 162+46	80	80
CULVERT STA 165+92	80	80
CULVERT STA 174+44	80	80
SHEET TOTAL	720	720

STATE OF TEXAS
RICARDO C BETANCOURT
111289
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PROFESSIONAL ENGINEER

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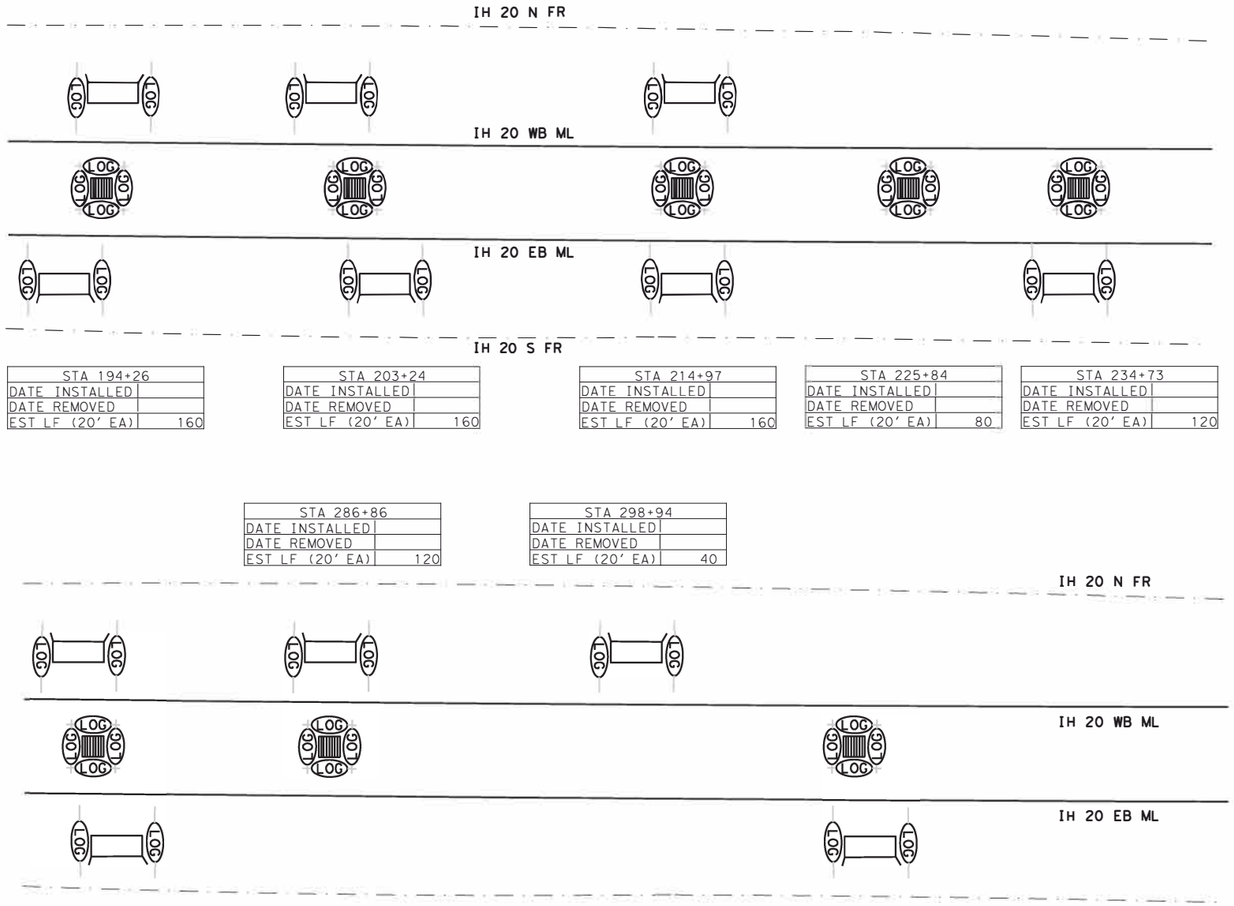
003-05-055(IH 20)
SWP3 SITE PLAN
PAGE 3 OF 8

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			175
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



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DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	160

STA 203+24	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	160

STA 214+97	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	160

STA 225+84	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 234+73	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	120

STA 286+86	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	120

STA 298+94	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	40

STA 251+05	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	160

STA 312+65	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	120

SHEET TOTALS		
	0506 6042	0506 6043
	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF
CULVERT STA 194+26	160	160
CULVERT STA 203+24	160	160
CULVERT STA 214+97	160	160
CULVERT STA 225+84	80	80
CULVERT STA 234+75	120	120
CULVERT STA 251+05	160	160
CULVERT STA 286+86	120	120
CULVERT STA 298+94	40	40
CULVERT STA 312+65	120	120
SHEET TOTAL	1120	1120

LEGEND

LOG EROSION CONTROL LOG

BRIDGE/HYDRAULIC STRUCTURE

GRATE INLET

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

003-05-055(IH 20)
SWP3 SITE PLAN
PAGE 4 OF 8

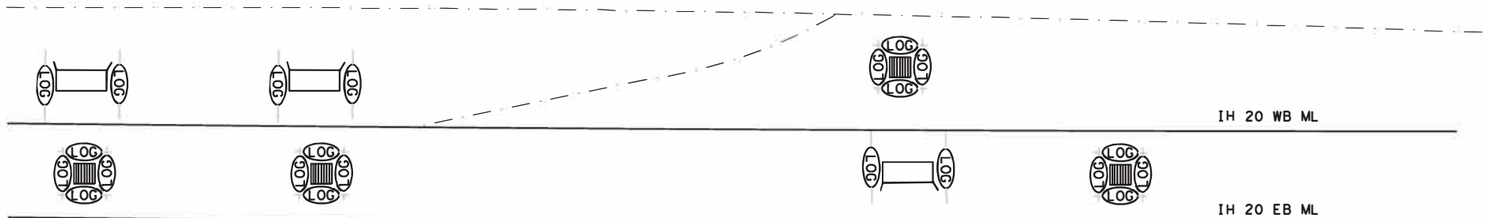
Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			176
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

STA 346+77	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	120

STA 361+81	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	120

STA 387+09	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	120

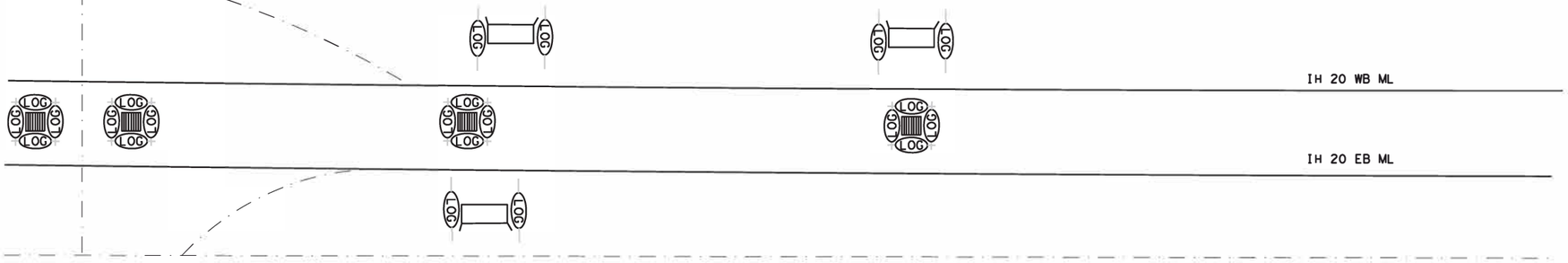


STA 395+12	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 396+07	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 445+80	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	120

003-05-055
END OF PROJECT
STA. 471+06
REF MRKR 9



STA 399+53	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 422+81	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	160

SHEET TOTALS		
	0506 6042	0506 6043
	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF
CULVERT STA 346+77	120	120
CULVERT STA 361+81	120	120
CULVERT STA 387+09	120	120
CULVERT STA 395+12	80	80
CULVERT STA 396+07	80	80
CULVERT STA 399+53	80	80
CULVERT STA 422+81	160	160
CULVERT STA 445+80	120	120
SHEET TOTAL	880	880

LEGEND

LOG EROSION CONTROL LOG

BRIDGE/HYDRAULIC STRUCTURE

GRATE INLET

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

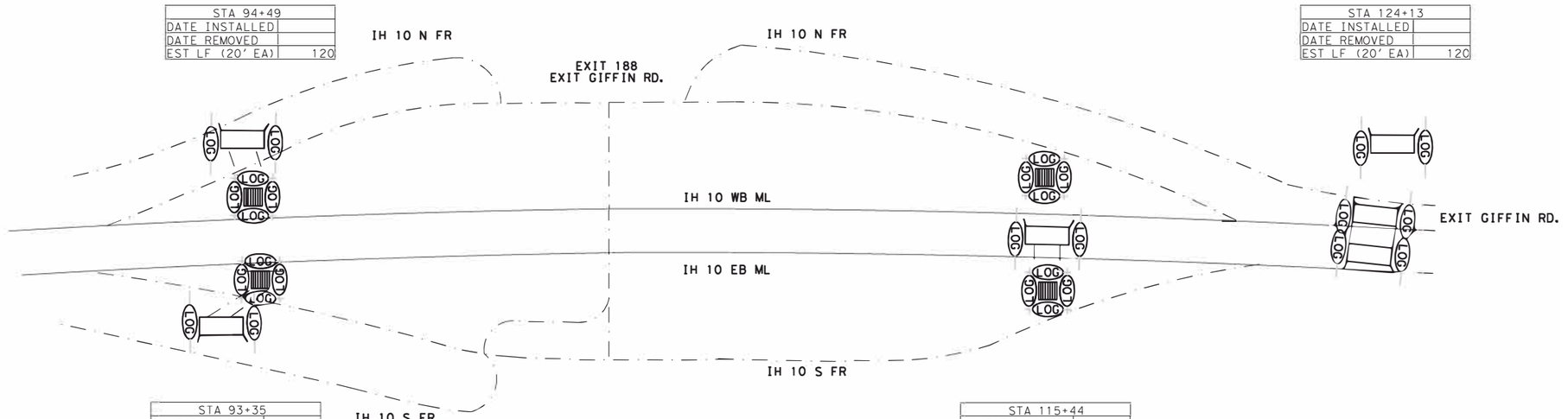
Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

003-05-055(IH 20)
SWP3 SITE PLAN
PAGE 5 OF 8

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			177
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

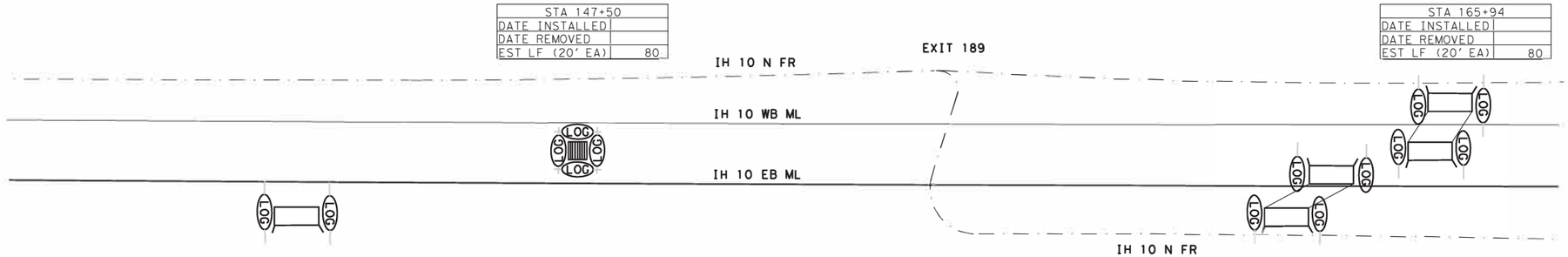


STA 94+49	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	120

STA 124+13	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	120

STA 93+35	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	120

STA 115+44	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	200



STA 147+50	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 165+94	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 132+45	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	40

STA 163+92	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

SHEET TOTALS		
	0506 6042	0506 6043
	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF
CULVERT STA 93+35	120	120
CULVERT STA 94+49	120	120
CULVERT STA 115+44	200	200
CULVERT STA 124+13	120	120
CULVERT STA 132+45	40	40
CULVERT STA 147+50	80	80
CULVERT STA 163+92	80	80
CULVERT STA 165+94	80	80
SHEET TOTAL	840	840

LEGEND

- EROSION CONTROL LOG
- BRIDGE/HYDRAULIC STRUCTURE
- GRATE INLET

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

0441-09-049(IH 10)
SWP3 SITE PLAN
PAGE 6 OF 8

Texas Department of Transportation

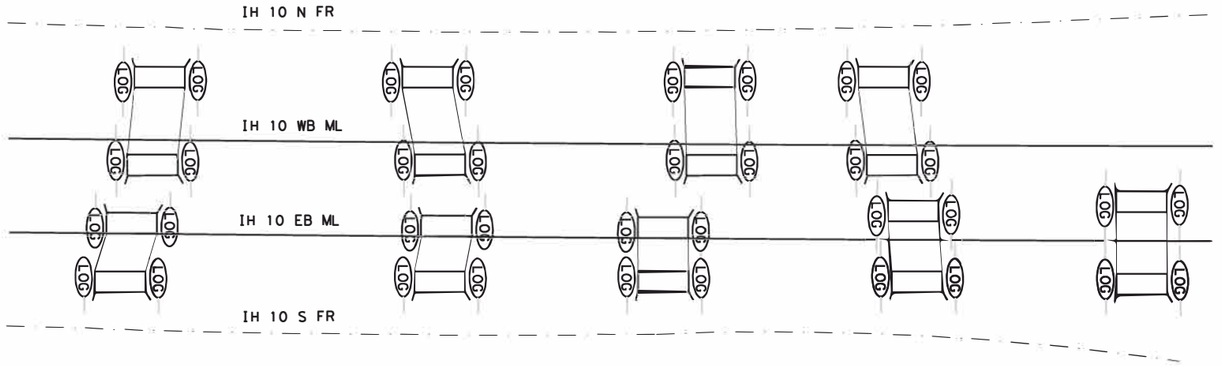
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			178
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

STA 179+96	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 186+43	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 192+44	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 197+48	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80



STA 174+49	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 181+48	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 186+28	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 192+83	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

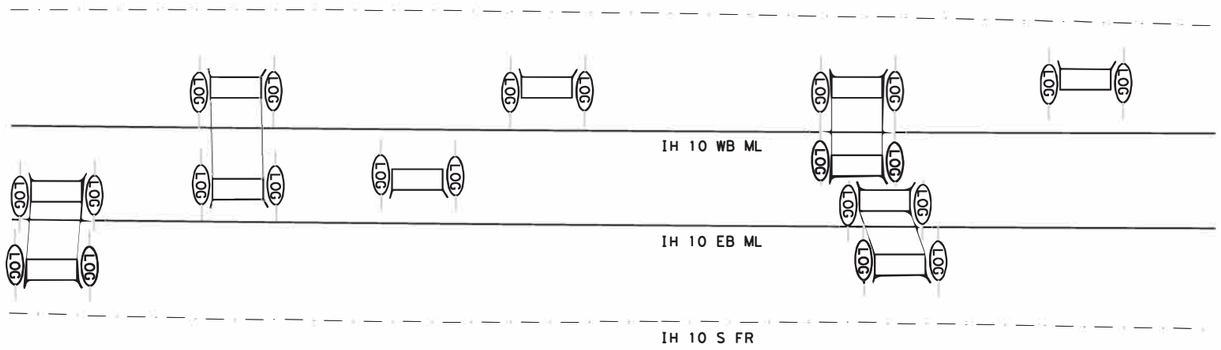
STA 198+46	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 223+25	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 229+28	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	40

STA 234+32	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 252+72	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	40



STA 214+88	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

STA 220+06	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	40

STA 231+39	
DATE INSTALLED	
DATE REMOVED	
EST LF (20' EA)	80

SHEET TOTALS	0506 6042	0506 6043
	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF
CULVERT STA 174+49	80	80
CULVERT STA 179+96	80	80
CULVERT STA 181+48	80	80
CULVERT STA 186+28	80	80
CULVERT STA 186+43	40	40
CULVERT STA 147+50	80	80
CULVERT STA 192+44	80	80
CULVERT STA 192+83	80	80
CULVERT STA 198+46	80	80

SHEET TOTALS	0506 6042	0506 6043
	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF
CULVERT STA 214+88	80	80
CULVERT STA 223+25	80	80
CULVERT STA 220+06	40	40
CULVERT STA 229+28	40	40
CULVERT STA 231+39	80	80
CULVERT STA 234+32	80	80
CULVERT STA 252+72	40	40
SHEET TOTAL	440	1120

LEGEND

LOG — EROSION CONTROL LOG

BRIDGE/HYDRAULIC STRUCTURE

GRATE INLET

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

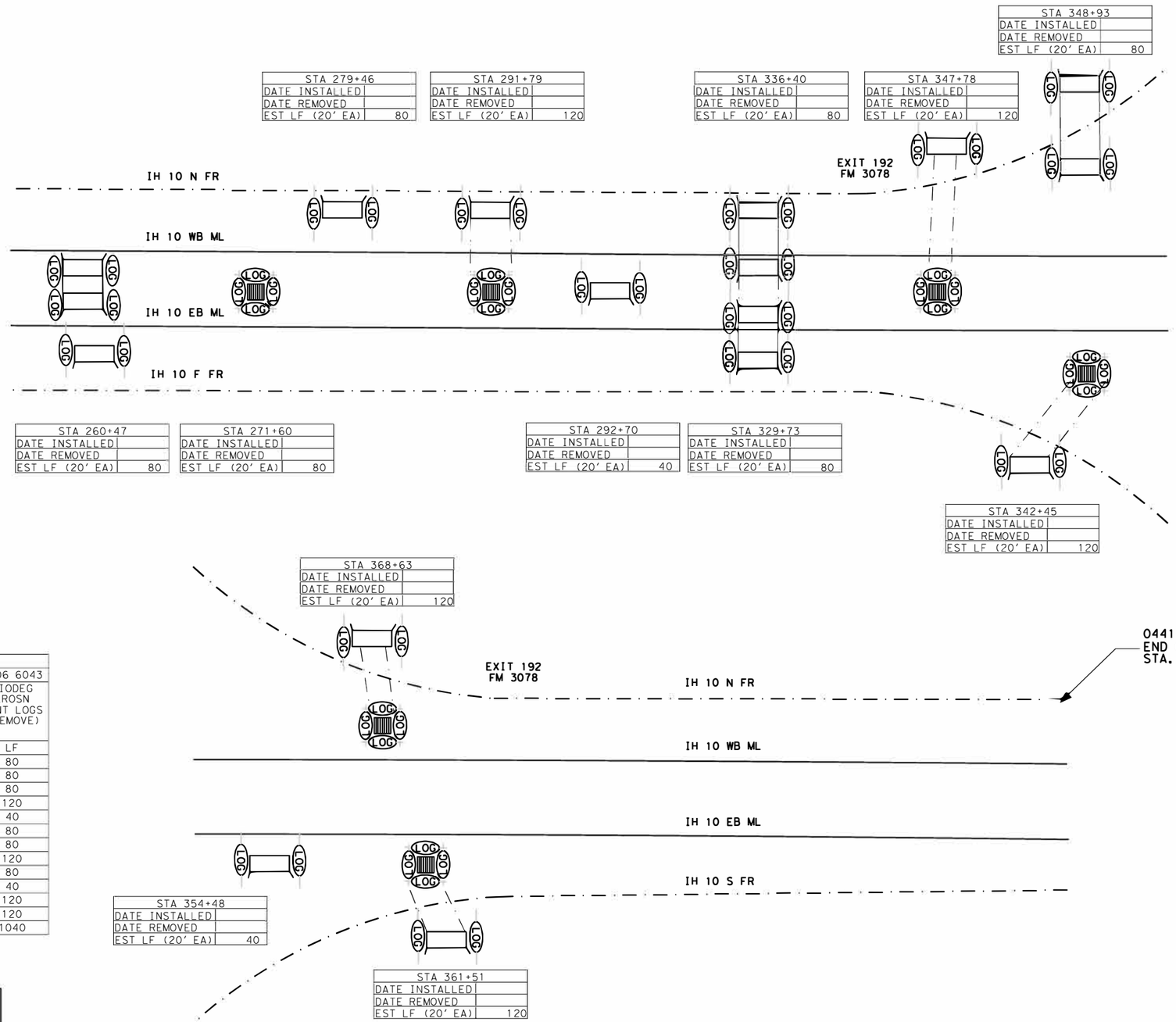
Ricardo C. Betancourt, P.E.

RICARDO C BETANCOURT, P.E. 12/19/22

0441-09-049(IH 10)
SWP3 SITE PLAN
PAGE 7 OF 8

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			179
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC



SHEET TOTALS		
	0506 6042	0506 6043
	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF
CULVERT STA 260+47	80	80
CULVERT STA 271+60	80	80
CULVERT STA 279+46	80	80
CULVERT STA 291+79	120	120
CULVERT STA 292+70	40	40
CULVERT STA 329+73	80	80
CULVERT STA 336+40	80	80
CULVERT STA 347+78	120	120
CULVERT STA 348+93	80	80
CULVERT STA 354+48	40	40
CULVERT STA 361+51	120	120
CULVERT STA 368+63	120	120
SHEET TOTAL	1040	1040

LEGEND

- LOG — EROSION CONTROL LOG
- BRIDGE/HYDRAULIC STRUCTURE
- GRATE INLET

STATE OF TEXAS
RICARDO C BETANCOURT
111289
LICENSED
PROFESSIONAL ENGINEER

RICARDO C BETANCOURT, P.E. 12/19/22

0441-09-049(IH 10)
SWP3 SITE PLAN
PAGE 8 OF 8

Texas Department of Transportation
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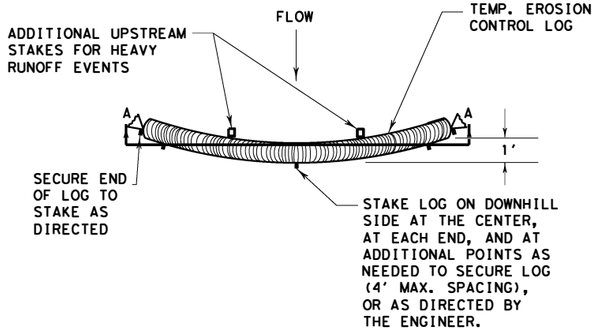
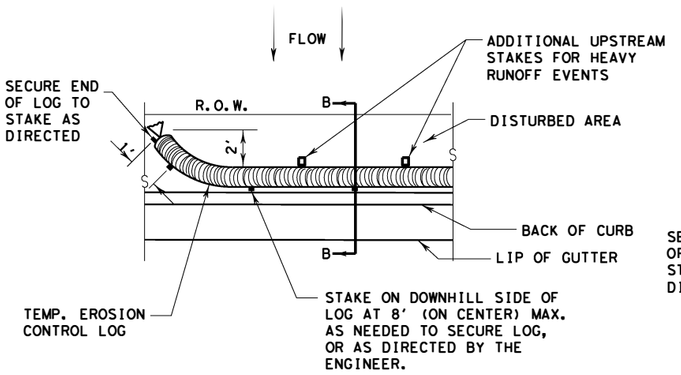
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			180
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	05	055	IH 20, ETC

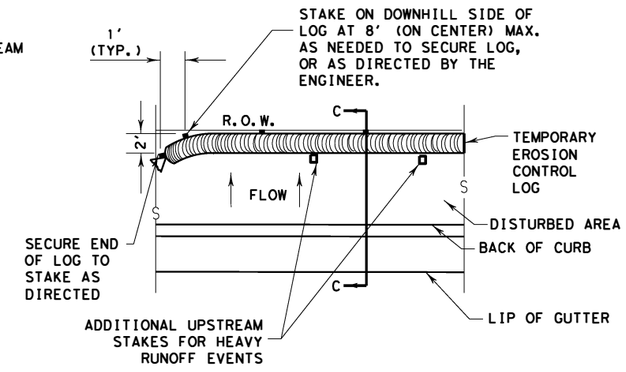
DATE:
FILE:



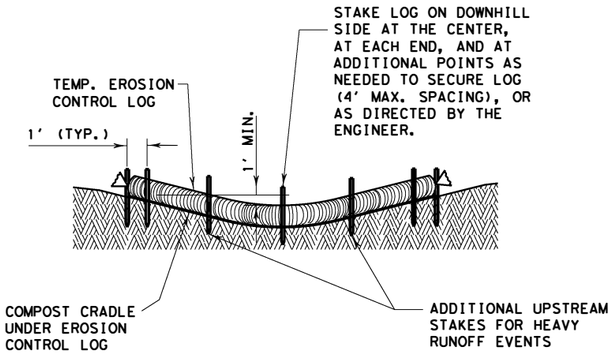
PLAN VIEW



PLAN VIEW



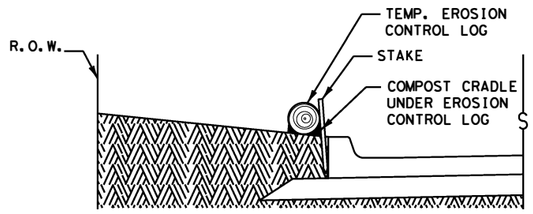
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

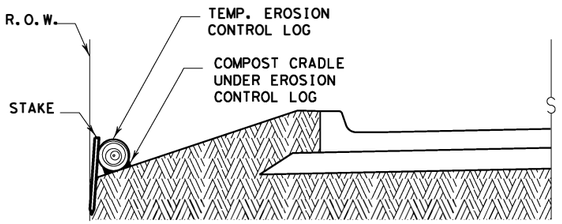
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

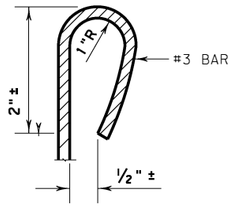
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

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

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.

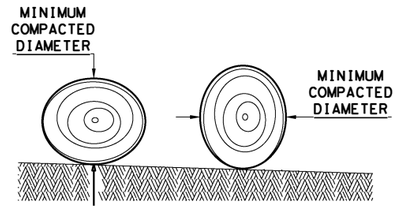
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

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

SHEET 1 OF 3

Texas Department of Transportation — Design Division Standard

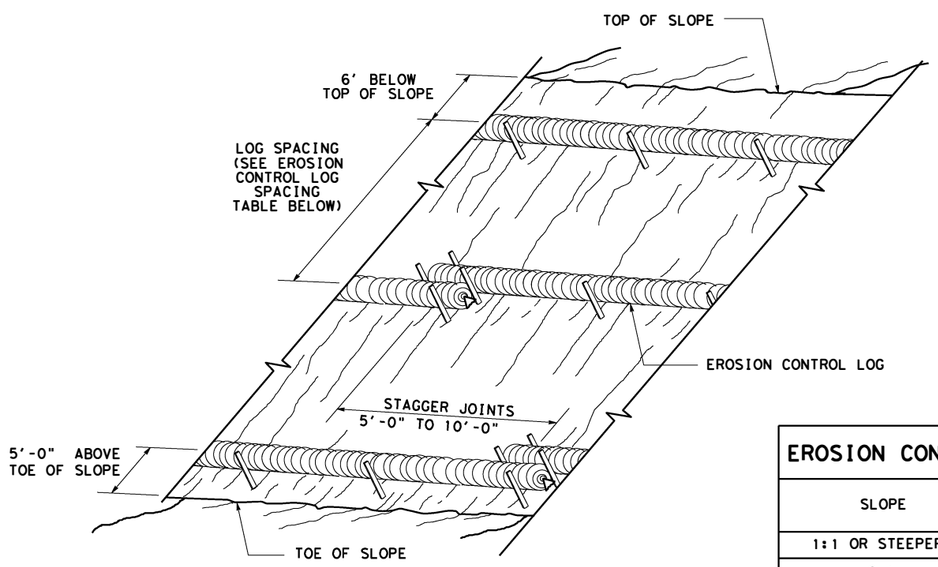
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

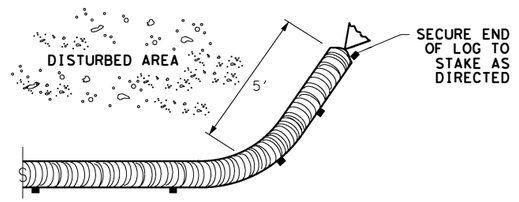
FILE: ec916		DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0003	05	055		IH 20, ETC	
		DIST		COUNTY			SHEET NO.
		ODA		REEVES			182

DATE:
FILE:



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

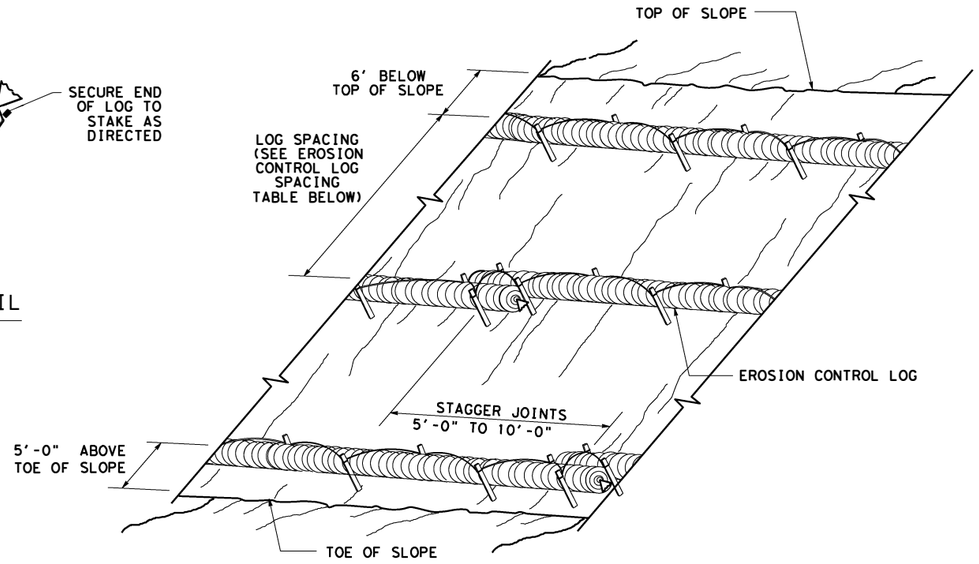
CL-SST



END SECTION RAP DETAIL

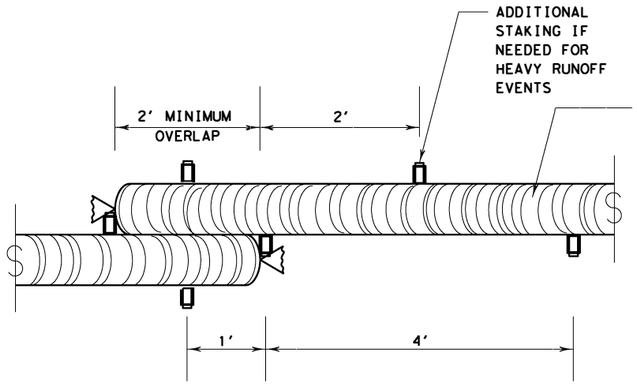
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

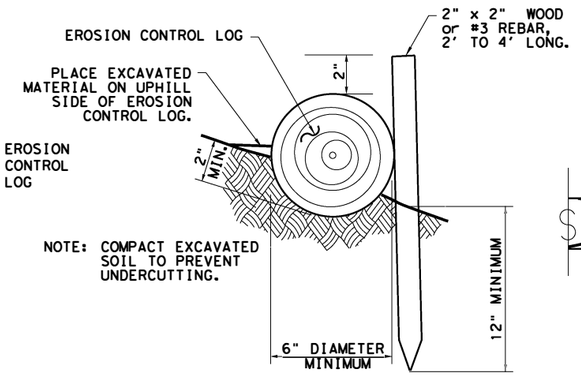
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

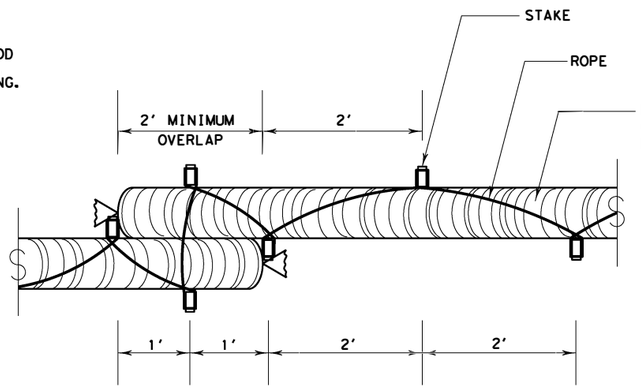


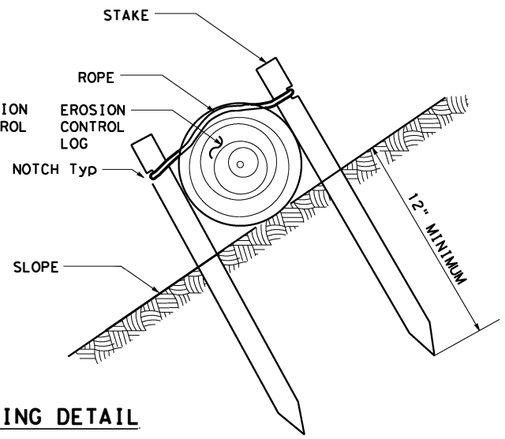


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

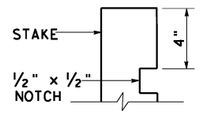
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

Design Division Standard

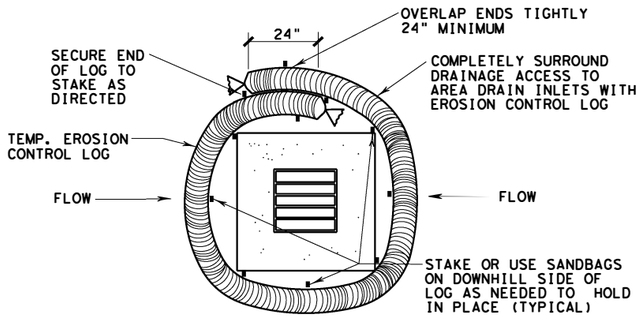
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

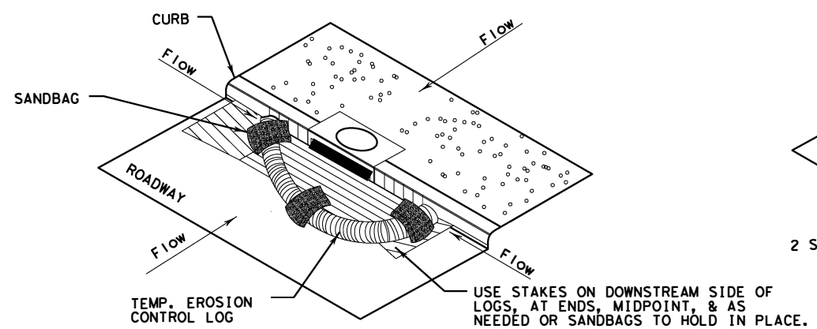
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0003	05	055	IH 20, ETC	
	DIST	COUNTY		SHEET NO.	
	ODA	REEVES		183	

DATE:
FILE:



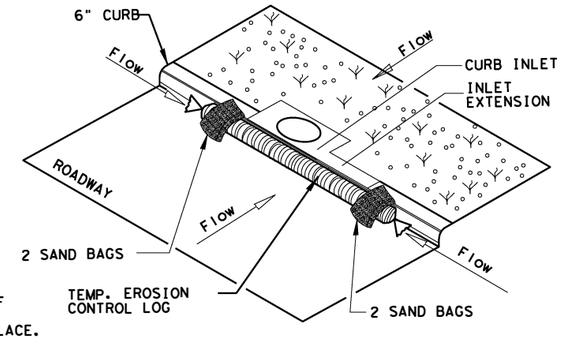
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

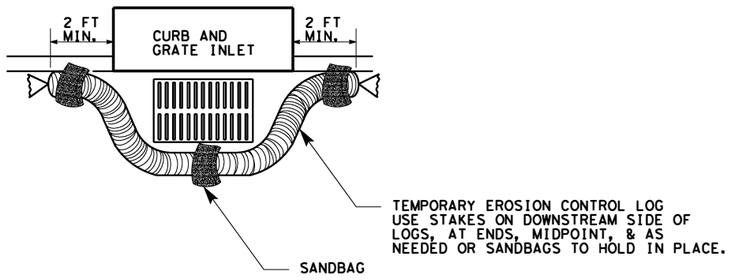
CL-CI



EROSION CONTROL LOG AT CURB INLET

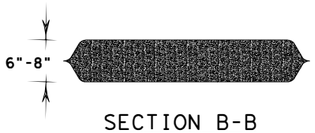
CL-CI

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.

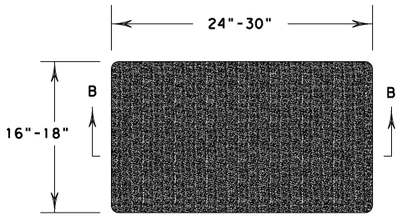


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SECTION B-B



SANDBAG DETAIL

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	0003	05	055		IH 20, ETC		
	DIST	COUNTY			SHEET NO.		
	ODA	REEVES			184		

DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1.

2.

☐ No Action Required ☒ Required Action

Action No.

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

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

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

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

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

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

1.

2.

3.

4.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

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 No.

1.

2.

3.

4.

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

☐ No Action Required ☒ Required Action

Action No.

1. If encountered during construction, every effort will be made to protect the Texas Horned Lizard.
2. Avoid harvester ant mounds where possible.
3.
4.

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

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

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

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☒ Yes ☐ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☒ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☐ No Action Required ☒ Required Action (CONT. PAGE 2)

Texas Department of Transportation — Design Division Standard

ENVIROMENTAL PERMITS ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	000305		055	IH 20, ETC
12-12-2011 (DS):	DIST	COUNTY		SHEET NO.
05-07-14 ADDED NOTE SECTION IV.	ODA	REEVES		185
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.				

DATE:
FILE:

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES (CONT.)

Required Action

Action No.

1. Lead-containing paint (LCP) is located on or near the following structures and will need to be removed if construction activities will disturb the LCP:
   a. NBI# 061950044109058: Approximately 10,000 SF of silver LCP on beams at 10,100 ppm.
   b. NBI# 061950000305089: Approximately 13,500 SF of silver LCP on steel beams and cross members at 7,690 ppm.
2. The location of lead-containing paint (LCP) shall be identified in the project plans. For tasks which might expose an employee to lead above the permissible exposure limit (PEL), the Contractor shall be responsible for providing exposure assessment and worker protection as required under OSHA 1926.62 (Lead in Construction). Where stripping back of lead paint is performed as a protective measure, strip back sufficient LCP to facilitate the project work, as outlined in the project plans.
3. Lead-Containing Paint Inspection Reports dated June 14, 2022 were performed by InControl Technologies and are available for reference at the Odessa District Office.

Required Action

Action No.

1. Asbestos-containing material (ACM) is located within the following bridge components and will need to be removed if construction activities will disturb the ACM:
   a. NBI# 061950044109061: Approximately 12,000 SF of texture on concrete surfaces including wingwalls, abutments, concrete guardrails, pier caps, and columns at 4-9% chrysotile asbestos. Approximately 3,000 SF of concrete rip raps at 4-9% chrysotile asbestos.
   b. NBI# 061950044109063: Approximately 7,200 SF of texture on concrete surfaces including wing walls, abutments, outer beams, pier caps, and columns containing 4-9% chrysotile asbestos.
   c. NBI# 061950044109064: Approximately 7,200 SF of texture on concrete surfaces including wing walls, abutments, outer beams, pier caps, and columns containing 4-9% chrysotile asbestos.
   d. NBI# 061950044109067: Approximately 10,000 SF of texture on concrete surfaces including wingwalls, abutments, and outer concrete beams containing 4-9% chrysotile asbestos.
   e. NBI# 061950044109068: Approximately 13,500 SF of texture on concrete surfaces including wing walls, abutments, outer beams, pier caps, and columns containing 4-9% chrysotile asbestos.
   f. NBI# 061950044109069: Approximately 12,000 SF of texture on concrete surfaces including wingwalls, abutments, pier caps, columns and concrete guardrails containing 4-9% chrysotile asbestos.

Asbestos Survey Reports dated May 24, 2022 were performed by InControl Technologies and are available for reference at the Odessa District Office.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

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Texas Department of Transportation — Design Division Standard

ENVIROMENTAL PERMITS ISSUES AND COMMITMENTS

EPIC

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© TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	000305		055	IH 20, ETC
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