FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	F 2024(536)		1
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL PROJECT NO. F 2024(536)

REEVES

IH 20

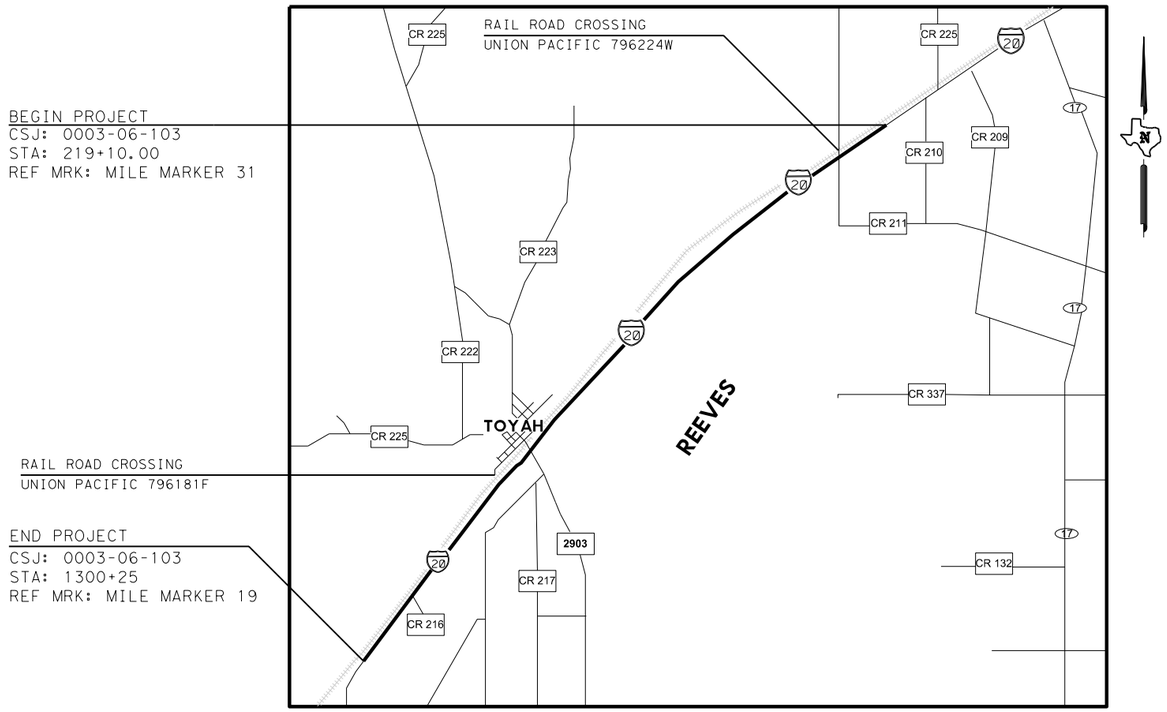
NET LENGTH OF PROJECT: 63,687 FT. = 12.1 MI.
LIMITS: FROM 3.5M W OF FM2903 TO 0.35MI W OF CR210

FOR THE CONSTRUCTION AND REHABILITATION OF EXISTING ROADWAY

CONSITING OF PLANE ACP, SMAR-F, SEAL COAT, MBGF, SIGNS, AND PAVEMENT MARKINGS

INDEX OF SHEETS

SEE SHEET 2



BEGIN PROJECT
CSJ: 0003-06-103
STA: 219+10.00
REF MRK: MILE MARKER 31

RAIL ROAD CROSSING
UNION PACIFIC 796181F

END PROJECT
CSJ: 0003-06-103
STA: 1300+25
REF MRK: MILE MARKER 19

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: UPRR
796181F
796224W

DESIGN SPEED = 70 MPH
ROADWAY CLASSIFICATION: FREEWAY
ADT (CURRENT, 2023): 10,900
ADT (FUTURE,2027, 2047) : 14,850

FINAL PLANS

CONTRACTOR:

LETTING DATE: 11/06/2024

DATE CONTRACTOR BEGAN WORK: XX/XX/XXXX

DATE WORK WAS COMPLETED: XX/XX/XXXX

DATE WORK WAS ACCEPTED: XX/XX/XXXX

FINAL CONTRACT COST: $X,XXX,XXX

TEXAS DEPARTMENT OF TRANSPORTATION

SUBMITTED FOR LETTING: _____ 20__

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...
, P.E.
AREA ENGINEER

9/27/2024

RECOMMENDED FOR LETTING: 10/2/2024 20__

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

APPROVED FOR LETTING: 10/2/2024 20__

DocuSigned by:
, P.E.
9D2D0C440F014A...DISTRICT ENGINEER

PROJ. NO._____
COUNTY_____LETTING DATE_____
HWY. NO._____
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: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS [(FORM FHWA 1273, OCTOBER, 2023)).]

SCALE = N.T.S.

STAT08

ver. 2013.04.06

INDEX OF SHEETS

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...
, PE 10/2/2024
DATE

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

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED
PROFESSIONAL ENGINEER

INDEX OF SHEETS

SHEET 1 OF 1

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
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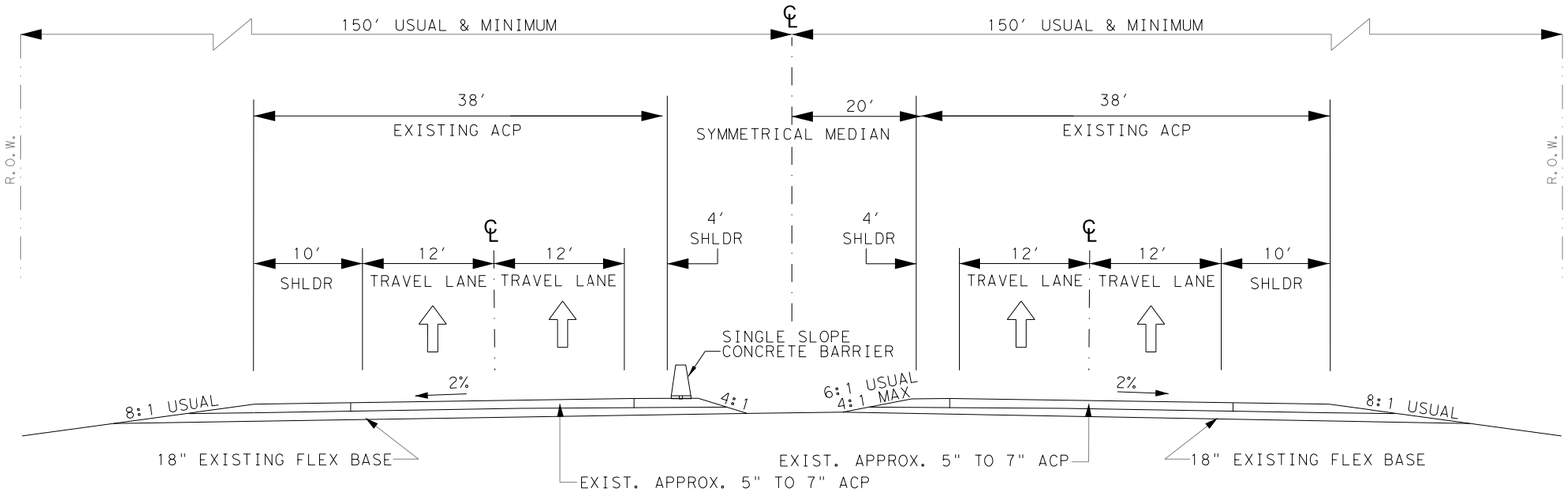
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

IH 20



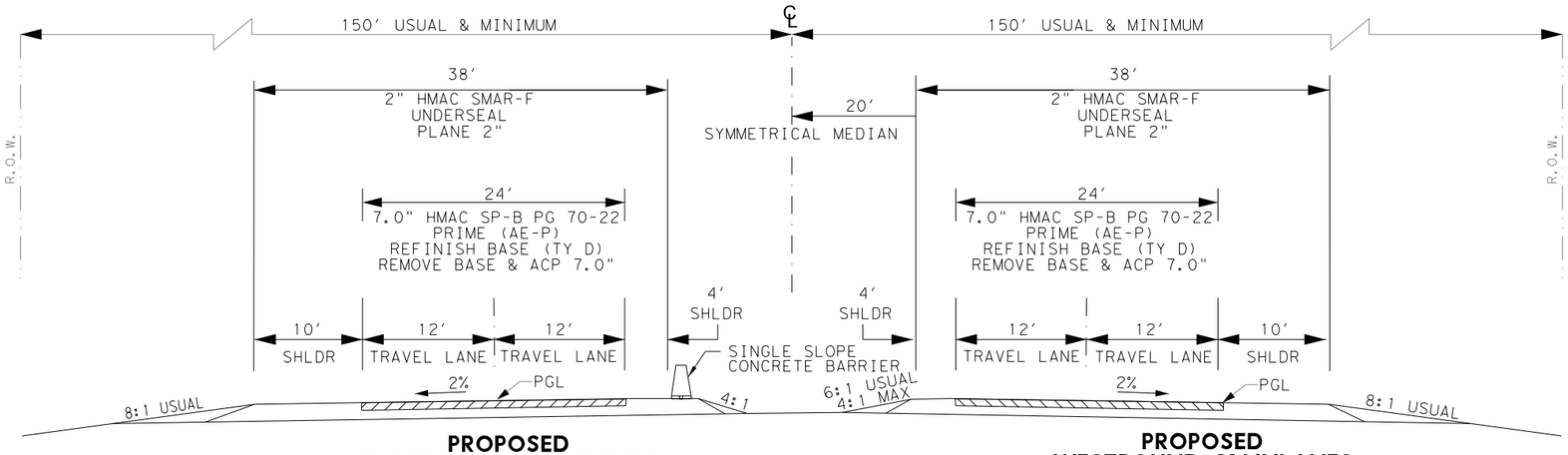
EXISTING EASTBOUND MAINLANES

STA.	1003+25.00	TO	STA.	1047+47.63
STA.	1050+53.93	TO	STA.	1071+50.00
STA.	1146+00.00	TO	STA.	1168+00.00
STA.	1196+68.00	TO	STA.	1247+96.07
STA.	1251+02.37	TO	STA.	1264+00.00
STA.	1317+00.00	TO	STA.	1380+00.00
STA.	1385+00.00	TO	STA.	3+76.26
STA.	13+97.82	TO	STA.	32+00.00
STA.	63+00.00	TO	STA.	137+35.60
STA.	150+40.74	TO	STA.	217+80.04

EXISTING WESTBOUND MAINLANES

STA.	1003+25.00	TO	STA.	1047+06.07
STA.	1050+12.37	TO	STA.	1071+50.00
STA.	1146+00.00	TO	STA.	1168+00.00
STA.	1196+68.00	TO	STA.	1248+37.63
STA.	1251+43.93	TO	STA.	1264+00.00
STA.	1317+00.00	TO	STA.	1380+00.00
STA.	1385+00.00	TO	STA.	3+22.92
STA.	13+46.06	TO	STA.	32+00.00
STA.	63+00.00	TO	STA.	134+84.00
STA.	144+30.00	TO	STA.	217+80.04

IH 20



PROPOSED EASTBOUND MAINLANES

STA.	1003+25.00	TO	STA.	1047+47.63
STA.	1050+53.93	TO	STA.	1071+50.00
STA.	1146+00.00	TO	STA.	1168+00.00
STA.	1196+68.00	TO	STA.	1247+96.07
STA.	1251+02.37	TO	STA.	1264+00.00
STA.	1317+00.00	TO	STA.	1380+00.00
STA.	1385+00.00	TO	STA.	3+76.26
STA.	13+97.82	TO	STA.	32+00.00
STA.	63+00.00	TO	STA.	137+35.60
STA.	150+40.74	TO	STA.	217+80.04

PROPOSED WESTBOUND MAINLANES

STA.	1003+25.00	TO	STA.	1047+06.07
STA.	1050+12.37	TO	STA.	1071+50.00
STA.	1146+00.00	TO	STA.	1168+00.00
STA.	1196+68.00	TO	STA.	1248+37.63
STA.	1251+43.93	TO	STA.	1264+00.00
STA.	1317+00.00	TO	STA.	1380+00.00
STA.	1385+00.00	TO	STA.	3+22.92
STA.	13+46.06	TO	STA.	32+00.00
STA.	63+00.00	TO	STA.	134+84.00
STA.	144+30.00	TO	STA.	217+80.04

STA. 1422+32.32 (EQUATION STATION) 0+00.00

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...
8/30/2024

TYPICAL SECTIONS

SHEET 1 OF 7

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
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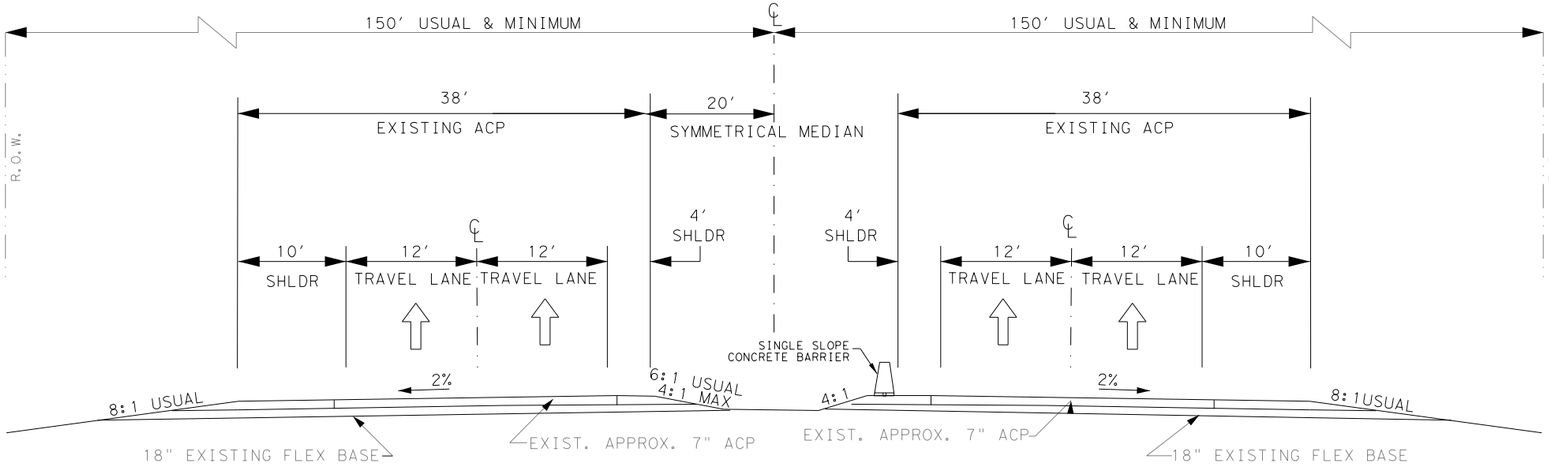
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

IH 20



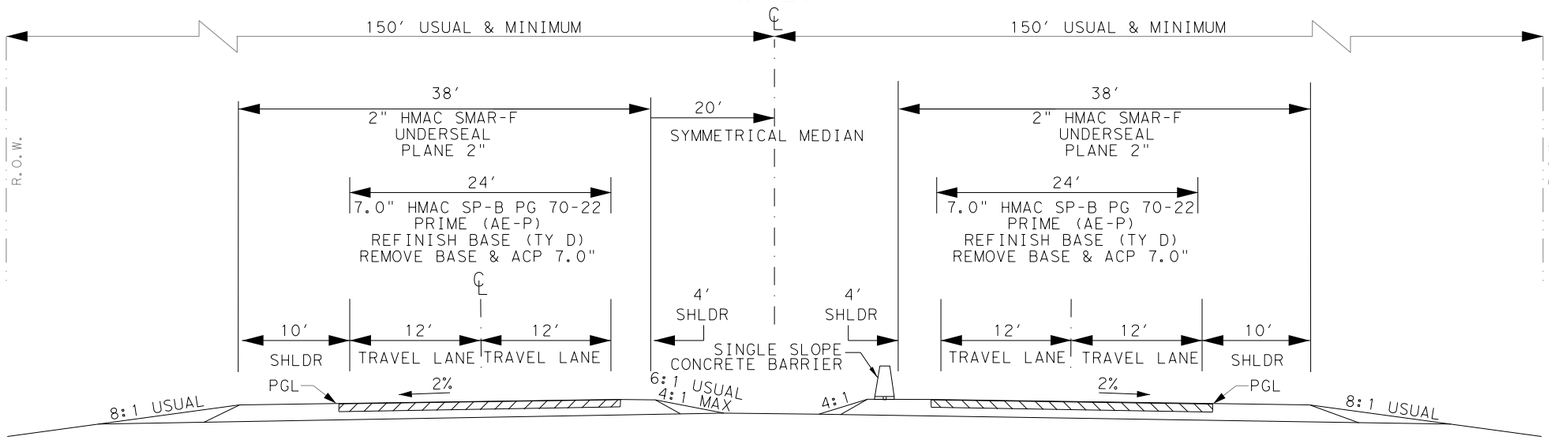
EXISTING EASTBOUND MAINLANES

STA.	1071+50.00	TO STA.	1146+00.00
STA.	1168+00.00	TO STA.	1188+52.50
STA.	1264+00.00	TO STA.	1317+00.00
STA.	1380+00.00	TO STA.	1385+00.00
STA.	32+00.00	TO STA.	63+00.00

EXISTING WESTBOUND MAINLANES

STA.	1071+50.00	TO STA.	1146+00.00
STA.	1168+00.00	TO STA.	1188+52.50
STA.	1264+00.00	TO STA.	1317+00.00
STA.	1380+00.00	TO STA.	1385+00.00
STA.	32+00.00	TO STA.	63+00.00

IH 20



PROPOSED EASTBOUND MAINLANES

STA.	1071+50.00	TO STA.	1146+00.00
STA.	1168+00.00	TO STA.	1188+52.50
STA.	1264+00.00	TO STA.	1317+00.00
STA.	1380+00.00	TO STA.	1385+00.00
STA.	32+00.00	TO STA.	63+00.00

PROPOSED WESTBOUND MAINLANES

STA.	1071+50.00	TO STA.	1146+00.00
STA.	1168+00.00	TO STA.	1188+52.50
STA.	1264+00.00	TO STA.	1317+00.00
STA.	1380+00.00	TO STA.	1385+00.00
STA.	32+00.00	TO STA.	63+00.00

STA. 1422+32.32 (EQUATION STATION) 0+00.00

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED
PROFESSIONAL ENGINEER

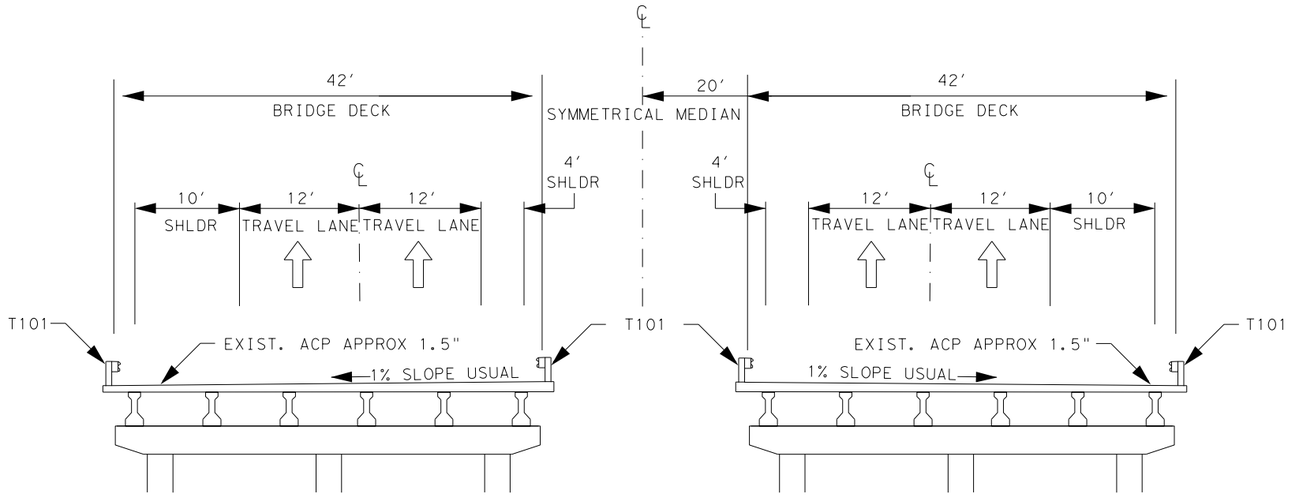
DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...
8/30/2024

TYPICAL SECTIONS

SHEET 2 OF 7

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			4
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20



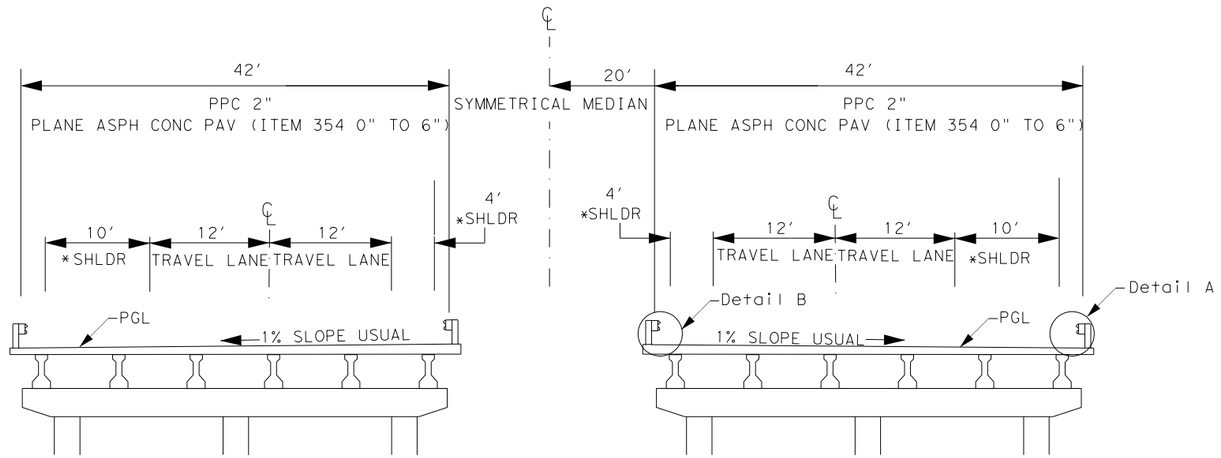
NBI:61-950-0-003-06-147 MOODY DRAW NBI:61-950-0-003-06-146

EXISTING EASTBOUND MAINLANES

STA. 1047+80.78 TO STA. 1050+20.78 (240')

EXISTING WESTBOUND MAINLANES

STA. 1047+39.22 TO STA. 1049+79.22 (240')



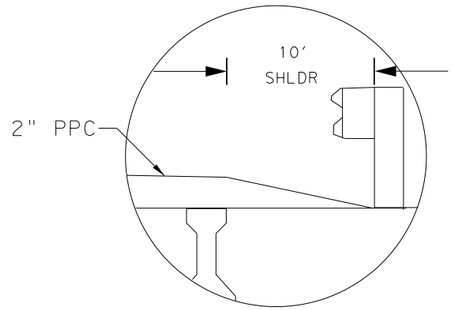
PROPOSED EASTBOUND MAINLANES

STA. 1047+80.78 TO STA. 1050+20.78 (240')

PROPOSED WESTBOUND MAINLANES

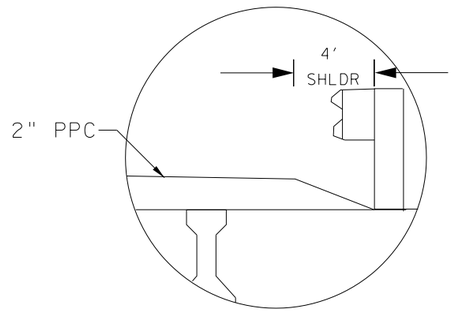
STA. 1047+39.22 TO STA. 1049+79.22 (240')

DETAIL A



**Taper shoulder to zero

DETAIL B



**Taper shoulder to zero

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

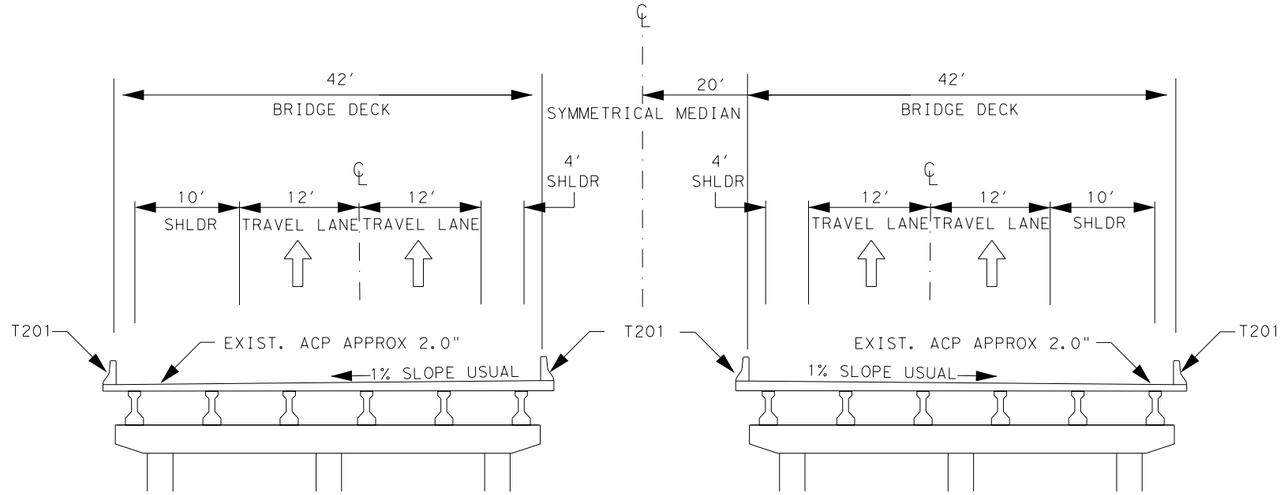
DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...
8/30/2024

TYPICAL SECTIONS

SHEET 3 OF 7

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			5
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20



NBI:06-195-0-0003-06-149

TOYAH
INTERCHANGE
(FM2903)

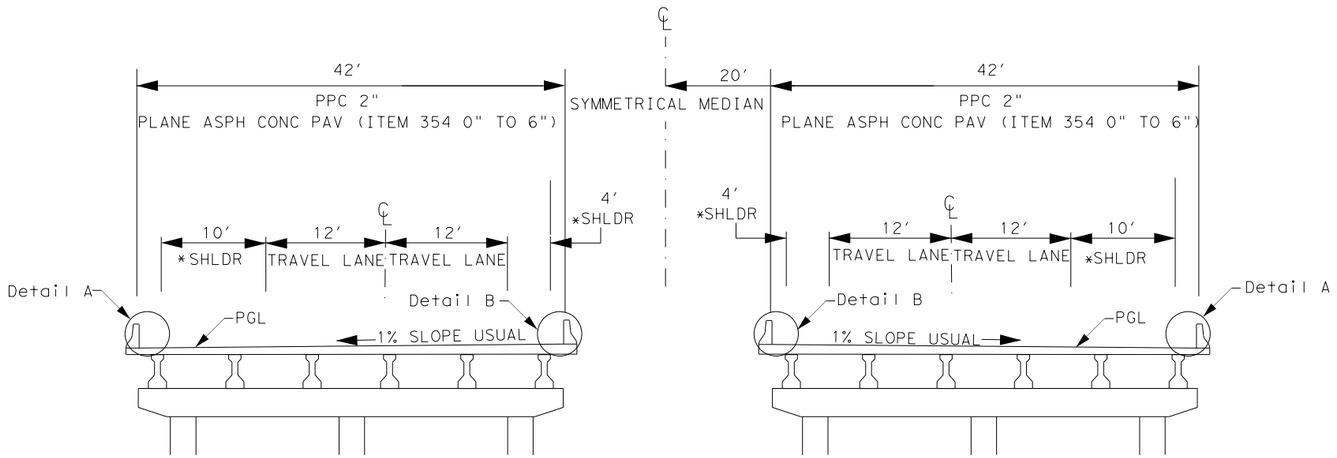
NBI:06-195-0-0003-06-148

EXISTING EASTBOUND MAINLANES

STA. 1188+72.50 TO STA. 1190+42.50 (170')

EXISTING WESTBOUND MAINLANES

STA. 1188+72.50 TO STA. 1190+42.50 (170')



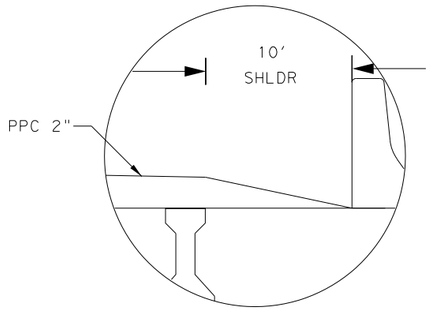
PROPOSED EASTBOUND MAINLANES

STA. 1188+72.50 TO STA. 1190+42.50 (170')

PROPOSED WESTBOUND MAINLANES

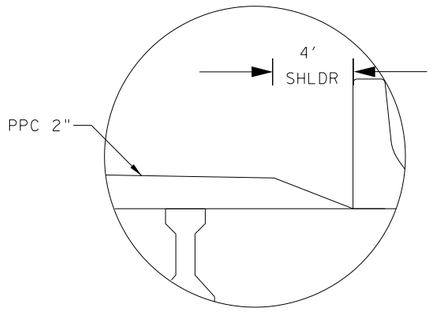
STA. 1188+72.50 TO STA. 1190+42.50 (170')

DETAIL A



*Taper shoulder to zero

DETAIL B



*Taper shoulder to zero

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...
8/30/2024

TYPICAL SECTIONS

SHEET 4 OF 7

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
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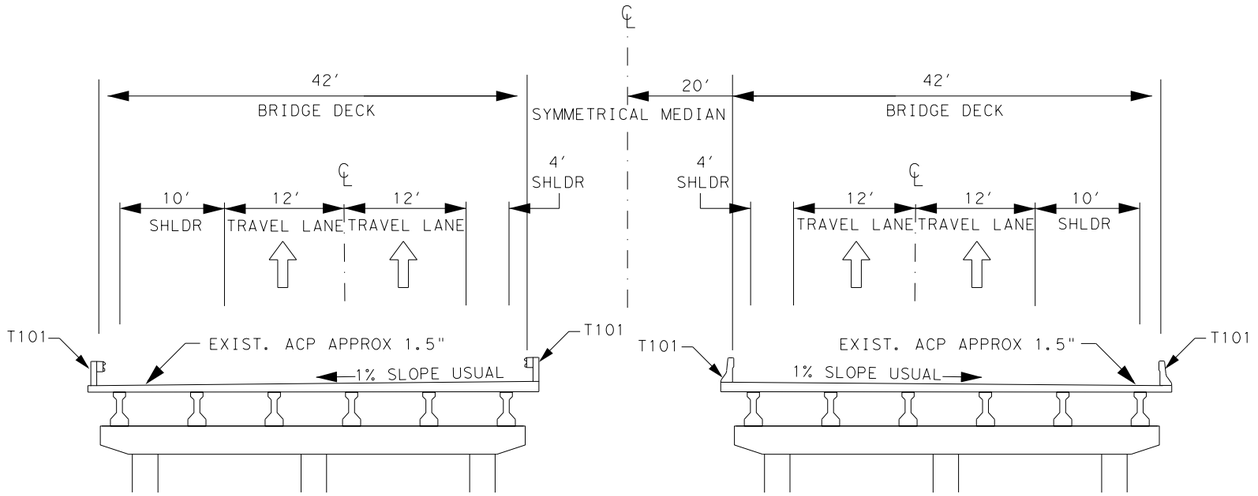
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20



NBI: 06-195-0-0003-06-151

BILLINGSLEA DRAW

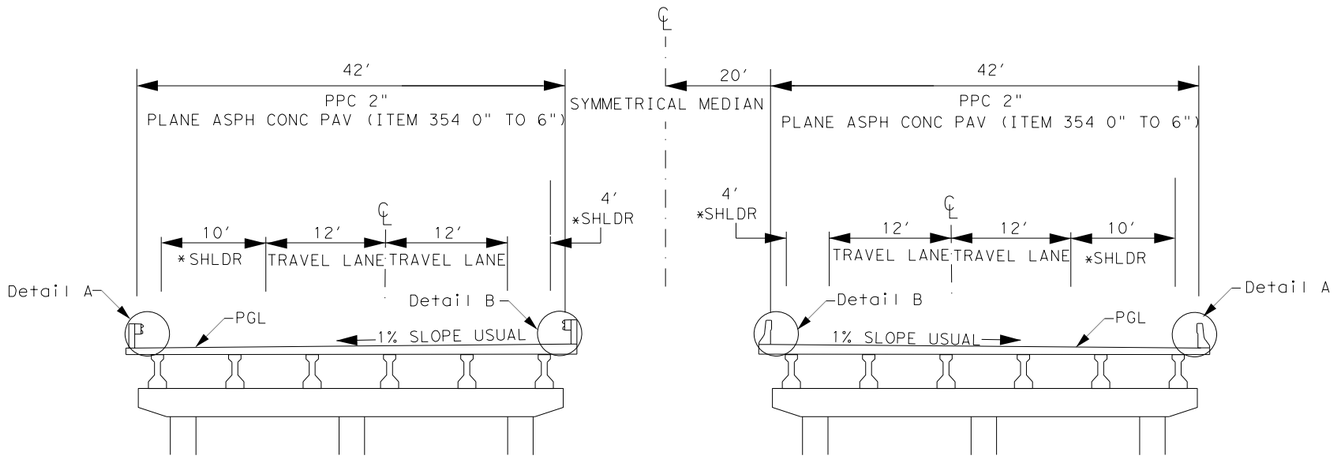
NBI: 61-950-0-0003-06-150

EXISTING EASTBOUND MAINLANES

STA. 1248+29.22 TO STA. 1250+69.22 (240')

EXISTING WESTBOUND MAINLANES

STA. 1248+70.78 TO STA. 1251+10.78 (240')



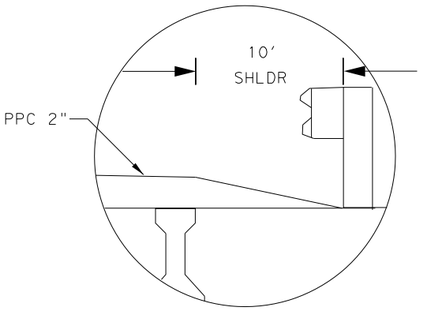
PROPOSED EASTBOUND MAINLANES

STA. 1248+29.22 TO STA. 1250+69.22 (240')

PROPOSED WESTBOUND MAINLANES

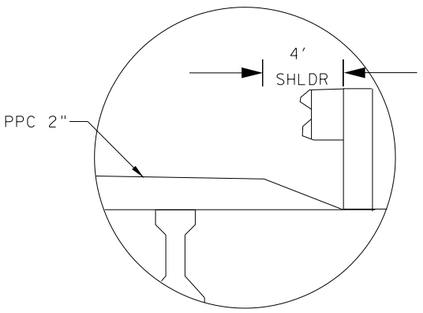
STA. 1248+70.78 TO STA. 1251+10.78 (240')

DETAIL A



*Taper shoulder to zero

DETAIL B



*Taper shoulder to zero

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...
8/30/2024

TYPICAL SECTIONS

SHEET 5 OF 7

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
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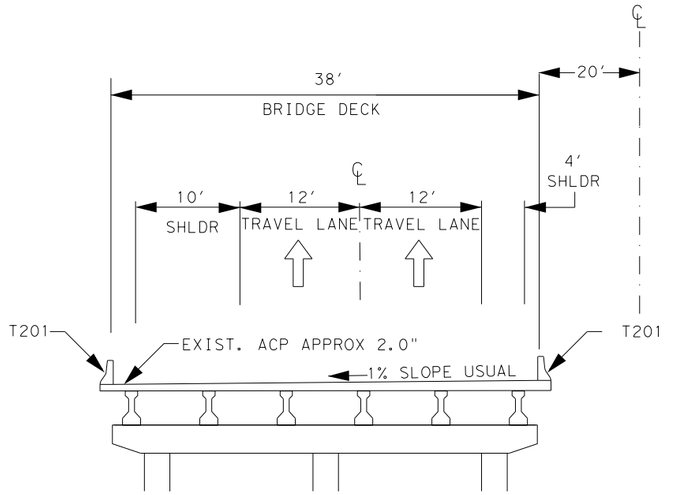
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

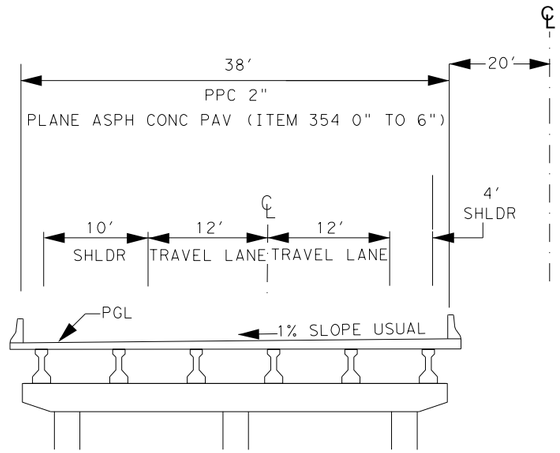


NBI:06-195-0-0003-06-075

SALT
DRAW

EXISTING
EASTBOUND MAINLANES

STA. 4+52.92 TO STA. 13+57.75 (833′)



PROPOSED
EASTBOUND MAINLANES

STA. 4+52.92 TO STA. 13+57.75 (833′)

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED
PROFESSIONAL ENGINEER

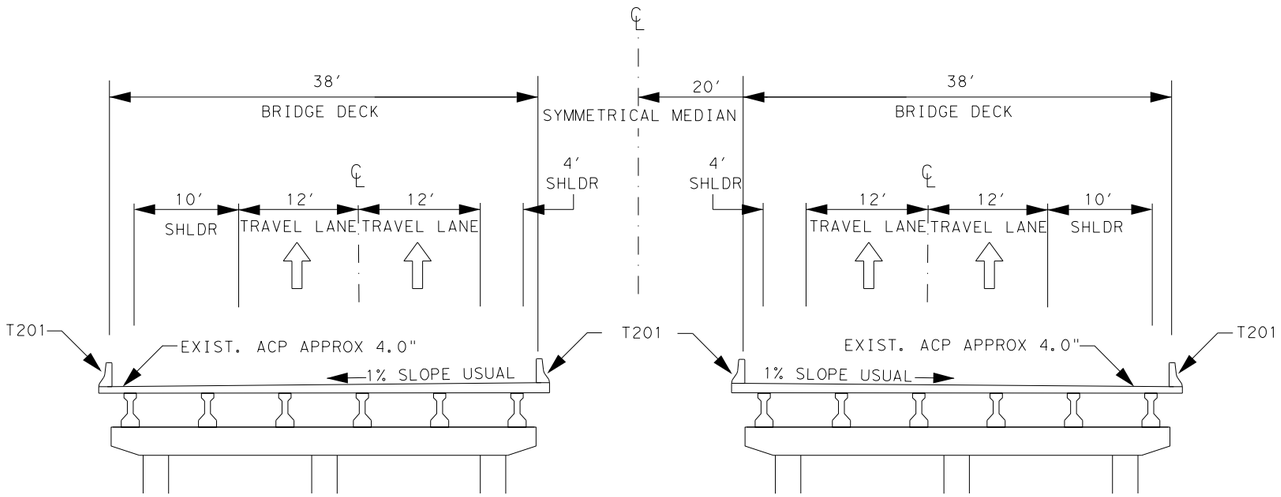
DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...
8/30/2024

TYPICAL SECTIONS

SHEET 6 OF 7

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			8
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20



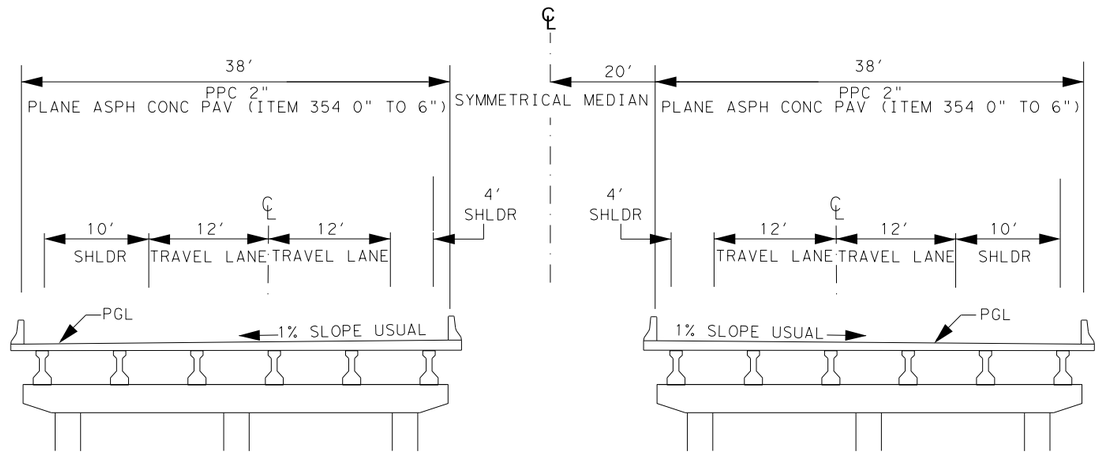
NBI:06-195-0003-07-077 SHAW ROAD NBI:06-195-0003-06-076

EXISTING EASTBOUND MAINLANES

STA. 137+94.74 TO STA. 140+40.74 (180′)

EXISTING WESTBOUND MAINLANES

STA. 134+84.00 TO STA. 140+80.00 (180′)



PROPOSED EASTBOUND MAINLANES

STA. 137+94.74 TO STA. 140+40.74 (180′)

PROPOSED WESTBOUND MAINLANES

STA. 134+84.00 TO STA. 140+80.00 (180′)

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...
8/30/2024

TYPICAL SECTIONS

SHEET 7 OF 7

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	06	103	IH 20

Material Specification Information

Contractor questions on this project are to be addressed to the following individual(s):
ODA-PreLettingQuestions@txdot.gov

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

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

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

Item 5: Control of the Work

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.

The Buy America Material Classification Sheet is located at the below link.
https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html for clarification on material categorization.

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

The West of Pecos Rodeo would be the only traffic generator event. Roadway closures during the special event are prohibited.

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 side streets and private property at all times.

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

Working day charges will start March 24, 2025.

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. Incentive for early contract completion shall be maxed out at 30 days.

The road-user cost liquidated damages are $25,359 per day.

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 105: Removing Treated and Untreated Base and Asphalt Pavement

Saw cut and remove existing asphaltic pavement by an approved method.

28,478 cubic yards of the removed material shall be hauled and delivered to the location shown in the plans.

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 on rock embankments where density tests are not practical and at other locations as directed.

Item 247: Flexible Base

The estimated quantity of flexible base shown includes all roadways. The measured area for payment will be the crown width only. The side slope tapers are not included in the measurements for the flexible base but are considered subsidiary to this item.

Assume responsibility for the disposal of all boulders not fractured during ordinary rolling methods and those too large to be incorporated into the foundation course as approved.

Maintain moisture during compaction as directed by the Engineer. Determine the moisture content of the material in accordance with Tex-115-E or Tex-103-E as directed by the Engineer.

Item 310: Prime Coat

MC-30 will have a minimum 72 hour curing time or as directed by the engineer.

Item 316: Seal Coat

Apply 1 surface treatment(s).

Furnish Class A aggregate for the surface course.

Do not apply asphalt cement between August 31st and May 1st unless authorized in writing.

Do not apply hot asphalt-rubber between August 31st and May 1st unless authorized in writing.

Place a string line or other suitable marking where needed to assure smooth neat lines or as directed.

Surface treat the existing surfaced intersections, auxiliary lanes, curve widenings and widened dip sections plus any additional areas encountered during construction to conform to the existing surface. The limits are the greater of the end of the curb returns, the right of way line, or the adjacent traffic lane.

Surface treat turnouts before the roadway is treated with the second one course surface treatment.

Rates are shown in the plans.

Perform rock land and shoot test strips for each day's work at each location or as directed by the Engineer.

Provide the Engineer with this information prior to the seal coat application. Provide control that is acceptable to the Engineer for yield calculations.

Ensure that all sealed expansion joints on bridges are covered by an approved method immediately prior to seal coat application. Keep the expansion joints covered until sweeping operations are complete. This work will be paid for under Item 316 as part of surface preparation.

Wet the stockpile of aggregate prior to use.

The use of a variable rate nozzle will be required on this project as determined by the engineer.

Contractor shall provide a list of stockpile locations prior to any material placed on the job site. Contractor shall have the Engineer and Odessa District Environmental Officer approve any and all stockpile locations prior to stockpiling of aggregate or other material. Stockpile locations will not be permitted on or adjacent to landscaped and non-mow areas.

As seal coat operations are completed at each location, clean and level all stockpile locations to the satisfaction of the Engineer.

Clean up paper, asphalt and excess rock after seal coat placement as each reference location is completed. Contractor shall not proceed ahead more than two reference locations before clean-up operations have been accomplished at the previous completed reference locations.

Contractor shall clean and remove asphalt from unauthorized concrete at the expense of the Contractor.

Item 344: 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 RAP will be allowed in the surface course.

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 346: Stone-Matrix Asphalt

Binder:

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

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

Aggregate quality:

Provide Class B aggregate. Blending of SAC A and SAC B material will not be allowed for the coarse 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 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 354: Planing and Texturing Pavement

Unused planed material will become the Contractor's property. Dispose of this material in accordance with applicable Federal, State, and local regulations.

5,932 cubic yards of the planed material shall be hauled and delivered to the location(s) shown in the plans.

Item 416: Drilled Shaft Foundations

For drilled shaft foundations for roadway illumination assemblies, provide Class C concrete with 6-1/2" slump for dry type placements in accordance with Table 2, Slump Requirements.

Rocky soil conditions may be encountered. Any boring logs shown in the plans are not indicative of all soil conditions that will be encountered. No additional compensation will be paid for excavation or drilling under hard soil conditions. Additional equipment to achieve grades and depths may be required.

Item 421: Hydraulic Cement Concrete

Furnish a job site curing tank equipped with a recording thermometer with the capability to chart temperatures for 24 hours, 7 days and 30 days. Furnish the Engineer with copies of the temperature records.

Furnish disposable 4" or 6" cylinder molds and caps that meet testing tolerances.

The Engineer will provide strength testing equipment for acceptance testing.

Within seven (7) days after concrete has been placed for foundations for traffic signals, roadway illumination assemblies, or high mast illumination assemblies, provide a rub finish for exposed surfaces in accordance with Item 427, Surface Finishes for Concrete, Article 427.4.3.3.

Furnish Type II or IP cement.

Furnish Type II or IP cement for cast-in-place concrete.

All plants and trucks may be inspected and approved by the Engineer in lieu of the NRMCA or Non-Department Engineer Sealed Certifications. The criteria and frequency of the Engineer approval of plants and trucks is the same used for NRMCA Certification.

Item 432: Riprap

Use approved expansion joint material and place between the proposed riprap and curb and gutter.

Reinforce all riprap on this project with no. 3 bars spaced 12 inches O.C.B.W. or no. 4 bars spaced at 18 inches O.C.B.W.

Broom finish all riprap on this project unless otherwise directed.

Polypropylene fiber may not be used in lieu of reinforcing steel.

In addition to reinforcing steel, polypropylene fiber is required at a rate of 1.5 lbs. /cy.

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.

Maintain "No Center Line", "Do Not Pass" and "Pass With Care" signs until the permanent lane markings have been placed in accordance with plans.

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 60 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.

This project has an advisory work zone speed plaque of xx mph to be placed on the reduce speed warning sign. This advisory plaque will be used to supplement the warning sign and to indicate speed for the condition indicated. The warning sign and advisory speed plaque will be removed by the State once the condition or need for the sign no longer exists.

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.

When construction operations result in a drop-off of more than 2 inches, a 3:1 or flatter slope will be required. The slope must be constructed with a compacted material capable of supporting vehicles as approved by the Engineer. This work shall be done expeditiously during daylight hours. Flaggers and appropriate signing to safely guide traffic through the work area will be required as directed by the Engineer. This shall be considered subsidiary to Item 502.

Item 503: 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;

When message boards are paid by the EACH, payment for each message board will be for the duration of the project regardless of traffic control phases. Use of the same message board will not be paid more than once.

Item 504: Field Office and Laboratory

Provide a Type C structure (field office) on the project site. The field office will be required to be piped for water. Furnish and install security lighting and potable water. The building will require a rest room with a toilet and lavatory. These requirements are subsidiary to the various bid items.

Provide a Type D structure (Hotmix asphalt mix control laboratory) for the Engineer's exclusive use at least 30 days prior to beginning a paving operation or as approved by the Engineer. 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. The structure will be 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. These requirements are subsidiary to the various bid items.

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 (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				
		TMA (STATIONARY)		
Phase	**Standard**	**Required**	**Optional**	**TOTAL**
1,2	TCP (1-5) -18	1	1	2

1,2	TCP (2-6) -18	1	1	2
6	TCP (5-1) -18	1	0	1
1,2	TCP (6-1) -12	1	0	1
1,2,5	TCP (6-2) -12	1	0	1
1,2,5	TCP (6-3) -12	1	0	1
1,2,5	TCP (6-4) -12	1	0	1
1,2,5	TCP (6-5) -12	1	0	1

The estimated number of stationary TMAs determined by the applicable TCP standards above is 2 in each direction therefore, the estimate number of stationary TMA is 4.

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 Stationary TMAs				
		TMA (STATIONARY)		
Phase	**Standard**	**Required**	**Optional**	**TOTAL**
1,2	TCP (3-2) -13	3	0	3
1,2	TCP (3-3) -14	3	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.

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.)

It is not anticipated that erosion control devices will be needed on this project. In the event that devices are needed, the Storm Water Pollution Prevention Plan shall consist of using the following items and/or items as directed by the Engineer. Payment for the work may be determined in accordance with Item 4, Article 4. "Changes in the Work".

-Temporary Sediment Control Fence

-Rock Filter Dams

-Biodegradable Erosion Control Logs

-Construction Exits

-Earthwork For Erosion Control

The total disturbed area for this project is 111.6 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 2 to evaluate ride quality of the travel lanes in accordance with Item 585, “Ride Quality for Pavement Surfaces.”

Use surface test Type B pay adjustment schedule 3 to evaluate ride quality of the shoulders and/or ramps in accordance with Item 585, “Ride Quality for Pavement Surfaces.”

Use surface test Type B pay adjustment schedule 2 to evaluate ride quality of the service roads in accordance with Item 585, “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.

Cup Mounted type delineation is needed for delineators on concrete barrier. (b658)

Install Shur-Tite® Concrete Traffic Barrier “8” Cup Mount Delineator on top of concrete barrier.

Install per table below:

Spacing Used	Delineator Spacing	Type	Note
Tangent	**100’**	**Single Directional Yellow**	
Taper	**100’**	**Bi-Directional Yellow**	
Curve	**100’**	**Single Directional Yellow**	
Bridge	**100’**	**Single Directional Yellow**	**100 within Min. 3**

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.

Materials used for non-removable work zone pavement markings will be paint and beads or other approved materials.

Item 666 Retroreflectorized Pavement Markings

Type I markings shall meet the minimum retroreflectivity values defined by Article 666.4.5.1 Retroreflectivity Requirements.

This Contract totals more than 50,000 feet of pavement markings; use a mobile retroreflectometer for retroreflectivity measurements. Portable retroreflectometers may not be used for this Contract.

Place Type I pavement markings with a ribbon-gun application.

Measure thickness for markings in accordance with Tex-854-B using usage rates (Part II).

Item 672: Raised Pavement Markers

Do not place raised pavement markers until the micro-surfacing has cured a minimum of 48 hours.

Item 677: Eliminating Existing Pavement Markings and Markers

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

Use Surface Treatment Method to eliminate existing pavement markings and markers.

Furnish Class B Grade 4 aggregate for the surface treatment and apply at a rate of 100 SY/CY or as directed by the Engineer.

Furnish AC 20-5TR/AC 20XP binder during warm weather and apply at a rate of 0.25 GAL/SY or as directed by the Engineer.

Furnish CRS-2P binder during cold weather and apply at a rate of 0.4

Item 690: Maintenance of Traffic Signals

Salvage signal equipment as determined. Salvaged signal equipment will be delivered to the Odessa District Signal Shop located at:

3901 East Highway 80
Odessa, Texas 79761
(432) 498-4960

Item 3007: Bonding Course

An average rate of 0.20 GAL/SY was used for estimation purpose. Contractor shall choose an option show below and bid accordingly.
OPTIONS:

MATERIAL	MINIMUM TYPICAL APPLICATION RATE (GAL/SY)
TRAIL – Emulsified Asphalt	#
TRAIL – Hot Applied	#
Spray Applied Underseal Membrane	#

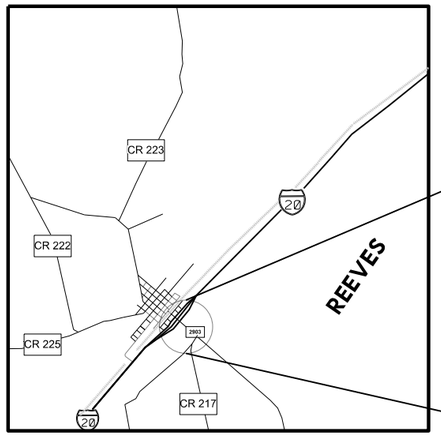
Typical Application Rate may vary from 0.07 to 0.20 GAL/SY depending on option.

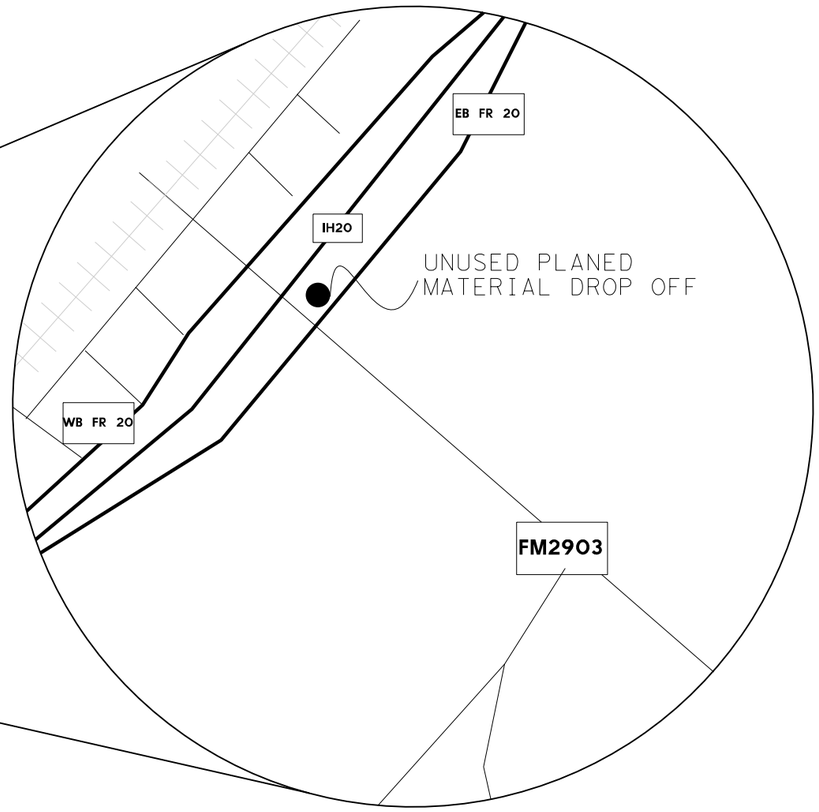
Apply bonding course at every intermediate layer, unless otherwise directed. The Type of tack coat must be approved by the Engineer.

The Engineer may adjust the application rates as per field conditions.

Shear Bond Strength Test will be performed for information purposes and will not be used to specification compliance. The target shear bond strength is a minimum of 40 psi and for final surface layer a minimum of 50 psi.

CK:
DW:
CK:
DW:





STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...
8/30/2024

UNUSED PLANED MATERIAL LOCATION MAP

SHEET 1 OF 1

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			011
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

DATE: $DATE$ $TIME$
FILE: $FILE$

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0003-06-103 **DISTRICT** Odessa **COUNTY** Reeves
HIGHWAY IH 20

							TOTAL EST.	TOTAL FINAL
			CONTROL SECTION JOB		**0003-06-103**			
			PROJECT ID		**A00180194**			
			COUNTY		**Reeves**			
			HIGHWAY		**IH 20**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL			
	104-7016	REMOV CONC (CURB)	LF	1,240.000		1,240.000		
	105-7027	RMV (7") TRT/UNTRT BASE & ASPH PAV	SY	329,531.000		329,531.000		
	112-7001	SUBGR WIDEN (OC)	STA	35.000		35.000		
	150-7002	BLADING	HR	70.000		70.000		
	216-7001	PROOF ROLLING	HR	70.000		70.000		
	247-7064	FL BS (CMP IN PLC)(TY A OR B GR 4)(6")	SY	24,611.000		24,611.000		
	251-7075	REWORK BS MTL (TY D)(8")(ORD COMP)	SY	329,531.000		329,531.000		
	310-7001	PRIME COAT (AE-P)	GAL	70,828.000		70,828.000		
	316-7007	ASPH (AC-20-5TR)	GAL	127,280.000		127,280.000		
	316-7136	AGGR (TY-PB, GR-4)(SAC-A)	CY	4,280.000		4,280.000		
	344-7005	SP MIXES SP-B SAC-B PG70-22	TON	119,534.000		119,534.000		
	354-7005	PLANE & TEXT ASPH CONC PAV(0" TO 6")	SY	11,103.000		11,103.000		
	354-7019	PLANE & TEXT ASPH CONC PAV(2")	SY	609,233.000		609,233.000		
	416-7004	DRILL SHAFT (24 IN)	LF	4.000		4.000		
	416-7027	DRILL SHAFT (SIGN MTS) (12 IN)	LF	15.000		15.000		
	429-7006	CONC STR REPR(RAPID DECK REP(FULL DPT))	SF	11,103.000		11,103.000		
	432-7013	RIPRAP (MOW STRIP)(4 IN)	CY	102.000		102.000		
	438-7001	CLEANING AND SEALING EXISTING JOINTS	LF	4,558.000		4,558.000		
	439-7017	POLYESTER POLYMER CONC OVERLAY (2")	SY	11,103.000		11,103.000		
	454-7010	JOINT SEALANT	LF	4,558.000		4,558.000		
	500-7001	MOBILIZATION	LS	1.000		1.000		
	502-7001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	10.000		10.000		
	503-7002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	4.000		4.000		
	505-7001	TMA (STATIONARY)	DAY	368.000		368.000		
	505-7003	TMA (MOBILE OPERATION)	DAY	736.000		736.000		
	506-7045	BIODEG EROSN CONT LOGS (INSTL) (18")	LF	1,320.000		1,320.000		
	506-7046	BIODEG EROSN CONT LOGS (REMOVE)	LF	1,320.000		1,320.000		
	512-7001	PORT CTB (FUR & INST)(SGL SLOPE)(TY 1)	LF	1,023.000		1,023.000		
	512-7025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	1,023.000		1,023.000		
	512-7049	PORT CTB (REMOVE)(SGL SLP)(TY 1)	LF	1,023.000		1,023.000		
	514-7001	PERM CTB (SGL SLOPE) (TY 1) (42)	LF	1,350.000		1,350.000		
	533-7001	MILL RUMBLE STRIPS (ASPHALT) (SHLDR)	LF	255,552.000		255,552.000		
	540-7002	MTL W-BEAM GD FEN (STEEL POST)	LF	10,950.000		10,950.000		
	540-7005	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	21.000		21.000		
	540-7041	TERMINAL ANCHOR SECTION	EA	10.000		10.000		
	542-7001	REMOVE METAL BEAM GUARD FENCE	LF	10,950.000		10,950.000		
	542-7002	REMOVE TERMINAL ANCHOR SECTION	EA	8.000		8.000		

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0003-06-103 **DISTRICT** Odessa **COUNTY** Reeves
HIGHWAY IH 20

			CONTROL SECTION JOB		**0003-06-103**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00180194**		
			COUNTY		**Reeves**		
			HIGHWAY		**IH 20**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	542-7003	REMOVE DOWNSTREAM ANCHOR TERMINAL	EA	4.000		4.000	
	542-7004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	19.000		19.000	
	544-7001	GUARDRAIL END TREATMENT (INSTALL)	EA	17.000		17.000	
	544-7003	GUARDRAIL END TREATMENT (REMOVE)	EA	17.000		17.000	
	545-7002	CRASH CUSH ATTEN (MOVE & RESET)	EA	12.000		12.000	
	545-7004	CRASH CUSH ATTEN (REMOVE)	EA	12.000		12.000	
	545-7014	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	14.000		14.000	
	636-7002	ALUMINUM SIGNS (TY G)	SF	1,428.000		1,428.000	
	644-7001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	52.000		52.000	
	644-7004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	8.000		8.000	
	644-7073	REMOVE SM RD SN SUP&AM	EA	62.000		62.000	
	647-7001	INSTALL LRSS (STRUCT STEEL)	LB	6,454.000		6,454.000	
	647-7003	REMOVE LRSA	EA	17.000		17.000	
	658-7014	INSTL DEL ASSM (D-SW)SZ 1(BRF)CTB (BR)	EA	24.000		24.000	
	658-7018	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	100.000		100.000	
	658-7033	INSTL DEL ASSM (D-SY)SZ 1(BRF)CTB (BR)	EA	32.000		32.000	
	658-7036	INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	EA	100.000		100.000	
	658-7058	INSTL OM ASSM (OM-2Z)(WFLX)GND	EA	32.000		32.000	
	658-7078	REMOVE DELIN & OBJECT MARKER ASSMS	EA	210.000		210.000	
	662-7005	WK ZN PAV MRK NON-REMOV (W)6"(BRK)	LF	31,944.000		31,944.000	
	662-7008	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	LF	127,776.000		127,776.000	
	662-7038	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	LF	127,776.000		127,776.000	
	662-7112	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	1,597.000		1,597.000	
	666-7024	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	69,100.000		69,100.000	
	666-7030	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	LF	270.000		270.000	
	666-7408	REFL PAV MRK TY I (W)6"(BRK)(100MIL)	LF	31,944.000		31,944.000	
	666-7411	REFL PAV MRK TY I (W)6"(SLD)(100MIL)	LF	127,776.000		127,776.000	
	666-7423	REFL PAV MRK TY I (Y)6"(SLD)(100MIL)	LF	127,776.000		127,776.000	
	672-7003	REFL PAV MRKR TY I-R	EA	84.000		84.000	
	672-7006	REFL PAV MRKR TY II-C-R	EA	2,158.000		2,158.000	
	677-7001	ELIM EXT PM & MRKS (4")	LF	127,776.000		127,776.000	
	677-7004	ELIM EXT PM & MRKS (8")	LF	30,439.000		30,439.000	
	3007-7001	BONDING COURSE	GAL	61,041.000		61,041.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
1A	346-7009	STONE-MTRX-ASPH SMA-D SAC-A PG76-22	TON	55,224.000		55,224.000	
1	346-7023	STONE-MTRX-ASPH SMAR-F SAC-A	TON	55,224.000		55,224.000	

ROADWAY ITEMS

	DESCRIPTION	STA.	TO	STA	Length (FT)	Beg Width (FT)	End Width (FT)	AVG Width (FT)	One Lane Width	One Lane Width Area (SY)	Full Width Area (SY)	Undersea Area (SY)	105 7027 RMV (7") TRT/UNTR BASE & ASPH PAV SY	150 7002 BLADING HR	216 7001 PROOF ROLLING HR	251 7075 REWORK BS MTL (TY D)(8") (ORD COMP) SY	310 7001 PRIME COAT (AE-P) GAL/SY 0.2 GAL	316 7007 ASPH (AC-20-5 TR) GAL/SY 0.38 GAL	316 7136 AGGR (TY-PB, GR-4)(SAC-A) CY	344 7005 SP MIXES SP-B SAC-B PG70-22 110 LBS/SY*I 7 IN TON
EASTBOUND	BEGIN CONSTRUCTION PROJECT	1003+25.00		1047+47.63	4,423	38			12	5,897	18,673	18,673	11,794	35	35	11,794	2,359	4,482	156	
	APPROACH SLAB	1047+47.63		1047+80.78	33	42			12	44	155									
	APPROACH SLAB	1050+20.78		1050+53.93	33	42			12	44	155									
	ROADWAY SECTION	1050+53.93		1188+52.50	13,799	38			12	18,398	58,261	58,261	36,796			36,796	7,359	13,983	486	14167
	TOYAH INT. EXIT RAMP	1167+00.00		1189+40.00	2,240	24	118	71	12	-	3,439									
	APPROACH SLAB	1188+52.50		1188+70.50	18	42			12	24	84									
	APPROACH SLAB	1190+42.50		1190+62.50	20	42			12	27	93									
	TOYAH INT. ENTRANCE RAMP	1189+40.00		1112+85.30	7,655	118	24	71	12	-	1,331									
	ROADWAY SECTION	1190+62.50		1247+96.07	5,734	38			12	7,645	24,208	24,208	15,290			15,290	3,058	5,810	133	5887
	APPROACH SLAB	1247+96.07		1248+29.22	33	42			12	44	155									
	APPROACH SLAB	1250+69.22		1251+02.37	33	42			12	44	155									
	ROADWAY SECTION	1251+02.37		1422+32.32	17,130	38			12	22,840	72,326	72,326	45,680			45,680	9,136	17,358	603	17587
	START STA. CONT ROADWAY	0+00.00		3+76.26	376	38			12	502	1,589	1,589	1,003			1,003	201	381	13	387
	PICNIC AREA EXIT RAMP	1294+45.00		1308+00.00	1,355	20	40	30	12	-	1,232									
	PICNIC AREA ENTRANCE RAMP	1308+00.00		1322+85.35	1,485	40	20	30	12	-	1,163									
	APPROACH SLAB	3+76.26		4+52.92	77	42			12	102	358									
	APPROACH SLAB	13+57.75		13+97.82	40	42			12	53	187									
	ROADWAY SECTION	13+97.82		140+40.74	12,643	38			12	16,857	53,381	53,381	33,714			33,714	6,743	12,811	445	12981
	SHAW ROAD EXIT RAMP	119+00.00		139+00.00	2,000	22	129	76	12	-	1,642									
	APPROACH SLAB	137+35.60		137+94.74	59	42			12	79	276									
	SHAW ROAD ENTRANCE RAMP	139+00.00		163+25.00	2,425	129	19	74	12	-	1,559									
	APPROACH SLAB	140+40.74		140+79.02	38	42			12	51	179									
	ROADWAY SECTION	140+79.02		219+10.00	7,831	38			12	10,441	33,064	33,064	20,883			20,883	4,177	7,935	276	8040
	FRONTAGE ROADS	-		-	-	VAR					23,430									
SUBTOTAL					79,480					83093	297,095	261,503	165,160			165,160	33,032	62,761	2,111	59,049
WESTBOUND	BEGIN CONSTRUCTION PROJECT	1003+25.00		1047+06.07	4,381	38			12	5,841	18,498	18,498	11,683	35	35	11,683	2,337	4,439	154	4,498
	APPROACH SLAB	1047+06.07		1047+39.22	33	42			12	44	155									
	APPROACH SLAB	1049+79.22		1050+12.37	33	42			12	44	155									
	ROADWAY SECTION	1050+12.37		1188+52.50	13,840	38			12	18,454	58,436	58,436	36,907			36,907	7,381	14,025	487	14,210
	TOYAH INT. EXIT RAMP	1158+13.00		1189+40.00	3,126	24	110	67	12	4,168	2,098									
	APPROACH SLAB	1188+52.50		1188+72.50	20	42			12	27	93									
	APPROACH SLAB	1190+42.50		1190+62.50	20	42			12	27	93									
	TOYAH INT. EXIT RAMP	1189+40.00		1167+89.32	2,151	110	25	68	12	2,868	1,960									
	ROADWAY SECTION	1190+62.50		1248+37.63	5,775	38			12	7,700	24,384	24,384	15,400			15,400	3,080	5,852	203	5,930
	APPROACH SLAB	1248+37.63		1248+70.78	33	42			12	44	155									
	APPROACH SLAB	1251+10.78		1251+43.93	33	42			12	44	155									
	ROADWAY SECTION	1251+43.93		1422+32.32	17,088	38			12	22,785	72,151	72,151	45,569			45,569	9,114	17,316	601	17,545
	START STA. ROADWAY	0+00.00		3+22.92	323	38			12	431	1,363		861			861	172	327	11	332
	REST AREA EXIT RAMP	1326+75.5		1314+00.00	1,276	20	40	30	12	1,701	1,144									
	REAST AREA ENTRANCE RAMP	1314+00.00		1291+74.00	2,226	40	20	30	12	2,968	1,211									
	APPROACH SLAB	3+22.92		3+84.92	62	42			12	83	289									
	APPROACH SLAB	12+89.75		13+46.06	56	42			12	75	263									
	ROADWAY SECTION	13+46.06		137+72	12,426	38			12	16,568	52,465	52,465	33,136			33,136	6,627	12,592	437	
	SHAW ROAD EXIT RAMP	160+38.00		139+30.00	2,108	21	90	56	12	2,811	1,970									
	APPROACH SLAB	137+72		138+34	62	42			12	83	289									
	SHAW ROAD ENTRANCE RAMP	139+30.00		115+38.00	2,392	90	21	56	12	3,189	5,685									
	APPROACH SLAB	140+80		141+04.28	24	42			12	32	112									
	ROADWAY SECTION	141+04.28		219+10.00	7,806	38			12	10,408	32,957	32,957	20,815			20,815	4,163	7,910	275	8,014
	FRONTAGE ROADS	-		-		VAR					36,056									
SUBTOTAL					75,295					100,393	312,138	258,891	164,371			164,371	32,874	62,461	2,169	50,529
PROJECT TOTALS					154,774						609,233	520,394	329,531	70	70	329,531	65,906	125,222	4,280	109,578

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

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Nestor T Mendoza, P.E.
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9/27/2024

CONSOLIDATED SUMMARY

SHEET 1 OF 4

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	06	103	IH 20

ROADWAY ITEMS

	DESCRIPTION	STA.	TO	STA	Length (FT)	Beg Width	End Width	AVG Width	One Lane Width	One Lane Width	Full Width	Undersea Area	ALTERNATE 1 346 7023 SE-MTRX-ASPH-SMAR-F SAC A 110 LBS/SY*IN 2 IN TON	ALTERNATE 1A 346 7009 STONE-MTRX-ASPH SMA-D SAC-A PG76-22 110 LBS/SY*IN 2 IN TON	354 7019 PLANE ASPH CONC PAV (2") SY	3007 7001 BONDING 0.1 GAL/SY
EASTBOUND	BEGIN CONSTRUCTION PROJECT	1003+25.00		1047+47.63	4,423	38			12	5,897	18,673	18,673			18,673	1,867
	APPROACH SLAB	1047+47.63		1047+80.78	33	42			12	44	155		18	18	155	15
	APPROACH SLAB	1050+20.78		1050+53.93	33	42			12	44	155		18	18	155	16
	ROADWAY SECTION	1050+53.93		1188+52.50	13,799	38			12	18,398	58,261	58,261	6,409	6,409	58,261	5,826
	TOYAH INTERCHANGE EXIT RAMP	1167+00.00		1189+40.00	2,240	24	118	71	12	-	3,439		379	379	3,439	344
	APPROACH SLAB	1188+52.50		1188+70.50	18	42			12	24	84		10	10	84	8
	APPROACH SLAB	1190+42.50		1190+62.50	20	42			12	27	93		11	11	93	9
	TOYAH INT. ENTRANCE RAMP	1189+40.00		1112+85.30	7,655	118	24	71	12	-	1,331		147	147	1,331	133
	ROADWAY SECTION	1190+62.50		1247+96.07	5,734	38			12	7,645	24,208	24,208	2,663	2,663	24,208	2,421
	APPROACH SLAB	1247+96.07		1248+29.22	33	42			12	44	155		18	18	155	15
	APPROACH SLAB	1250+69.22		1251+02.37	33	42			12	44	155		18	18	155	15
	ROADWAY SECTION	1251+02.37		1422+32.32	17,130	38			12	22,840	72,326	72,326	7,956	7,956	72,326	7,233
	START STA. CONT ROADWAY	0+00.00		3+76.26	376	38			12	502	1,589	1,589	175	175	1,589	159
	PICNIC AREA EXIT RAMP	1294+45.00		1308+00.00	1,355	20	40	30	12	-	1,232		136	136	1,232	123
	PICNIC AREA ENTRANCE RAMP	1308+00.00		1322+85.35	1,485	40	20	30	12	-	1,163		128	128	1,163	116
	APPROACH SLAB	3+76.26		4+52.92	77	42			12	102	358		40	40	358	36
	APPROACH SLAB	13+57.75		13+97.82	40	42			12	53	187		21	21	187	19
	ROADWAY SECTION	13+97.82		140+40.74	12,643	38			12	16,857	53,381	53,381	5,872	5,872	53,381	5,338
	SHAW ROAD EXIT RAMP	119+00.00		139+00.00	2,000	22	129	76	12	-	1,642		181	181	1,642	164
	APPROACH SLAB	137+35.60		137+94.74	59	42			12	79	276		31	31	276	28
	SHAW ROAD ENTRANCE RAMP	139+00.00		163+25.00	2,425	129	19	74	12	-	1,559		172	172	1,559	156
	APPROACH SLAB	140+40.74		140+79.02	38	42			12	51	179		20	20	179	18
	ROADWAY SECTION	140+79.02		219+10.00	7,831	38			12	10,441	33,064	33,064	3,638	3,638	33,064	3,306
	FRONTAGE ROADS	-		-	-	VAR					23,430		2,578	2,578	23,430	2,343
SUBTOTAL					79,480					83093	297,095	261,503	30,639	30,639	297,095	27,366
WESTBOUND	BEGIN CONSTRUCTION PROJECT	1003+25.00		1047+06.07	4,381	38			12	5,841	18,498	18,498	2,035	2,035	18,498	1,850
	APPROACH SLAB	1047+06.07		1047+39.22	33	42			12	44	155		18	18	155	15
	APPROACH SLAB	1049+79.22		1050+12.37	33	42			12	44	155		18	18	155	15
	ROADWAY SECTION	1050+12.37		1188+52.50	13,840	38			12	18,454	58,436	58,436	6,428	6,428	58,436	5,844
	TOYAH INTERCHANGE EXIT RAMP	1158+13.00		1189+40.00	3,126	24	110	67	12	4,168	2,098		231	231	2,098	210
	APPROACH SLAB	1188+52.50		1188+72.50	20	42			12	27	93		11	11	93	9
	APPROACH SLAB	1190+42.50		1190+62.50	20	42			12	27	93		11	11	93	9
	TOYAH INT. ENTRANCE RAMP	1189+40.00		1167+89.32	2,151	110	25	68	12	2,868	1,960		216	216	1,960	196
	ROADWAY SECTION	1190+62.50		1248+37.63	5,775	38			12	7,700	24,384	24,384	2,683	2,683	24,384	2,438
	APPROACH SLAB	1248+37.63		1248+70.78	33	42			12	44	155		18	18	155	15
	APPROACH SLAB	1251+10.78		1251+43.93	33	42			12	44	155		18	18	155	15
	ROADWAY SECTION	1251+43.93		1422+32.32	17,088	38			12	22,785	72,151	72,151	7,937	7,937	72,151	7,215
	START STA. ROADWAY	0+00.00		3+22.92	323	38			12	431	1,363		150	150	1,363	136
	REST AREA EXIT RAMP	1326+75.5		1314+00.00	1,276	20	40	30	12	1,701	1,144		126	126	1,144	114
	REAST AREA ENTRANCE RAMP	1314+00.00		1291+74.00	2,226	40	20	30	12	2,968	1,211		134	134	1,211	121
	APPROACH SLAB	3+22.92		3+84.92	62	42			12	83	289		32	32	289	29
	APPROACH SLAB	12+89.75		13+46.06	56	42			12	75	263		29	29	263	26
	ROADWAY SECTION	13+46.06		137+72	12,426	38			12	16,568	52,465	52,465	5,772	5,772	52,465	5,247
	SHAW ROAD EXIT RAMP	160+38.00		139+30.00	2,108	21	90	56	12	2,811	1,970		217	217	1,970	197
	APPROACH SLAB	137+72		138+34	62	42			12	83	289		32	32	289	29
	SHAW ROAD ENTRANCE RAMP	139+30.00		115+38.00	2,392	90	21	56	12	3,189	5,685		626	626	5,685	569
	APPROACH SLAB	140+80		141+04.28	24	42			12	32	112		13	13	112	11
	ROADWAY SECTION	141+04.28		219+10.00	7,806	38			12	10,408	32,957	32,957	3,626	3,626	32,957	3,296
	FRONTAGE ROADS	-		-		VAR					36,056		3,967	3,967	36,056	3,606
SUBTOTAL					75,295					100,393	312,138	258,891	34,348	34,348	312,138	31,214
PROJECT TOTALS					**154,774**						**609,233**	**520,394**	**52,516**	**52,516**	**609,233**	**58,580**

STATE OF TEXAS
NESTOR MENDOZA
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8/30/2024

CONSOLIDATED SUMMARY

SHEET 2 OF 4

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	06	103	IH 20

BRIDGE ROADWAY ITEMS

	DESCRIPTION	STA.	TO	STA	Length (FT)	Beg Width (FT)	One Lane Width	One Lane Width Area (SY)	Full Width Area (SY)	Underseal Area (SY)	354 7074 PLANE ASPH CONC PAV(0"TO 6") SY	*429 7005 CONC STR REPR (RAPID DECK REP (FULL DPT)) SF	439 7017 POLYESTER POLYMER CONC OVERLAY (2") SY
EASTBOUND	MOODY DRAW	1047+80.78		1050+20.	240	42	12	320	1,120	1,120	1120	1120	1120
	NBI:	61-950-0-003-06-147											
	TOYAH INT. (FM2903)	1188+70.50		1190+42.	170	42	12	227	793	793	793	793	793
	NBI:	06-195-0-0003-06-149											
	BILLINGSLEA DRAW	1248+29.22		1250+69.	240	42	12	320	1,120	1,120	1120	1120	1120
	NBI:	06-195-0-0003-06-151											
	SALT DRAW	4+52.92		13+57.75	833	38	12	1,111	3,517	3,517	3517	3517	3517
	NBI:	06-195-0-0003-06-075											
	SHAW ROAD	137+94.71		140+40.7	180	38	12	240	760	760	760	760	760
	NBI:	06-195-0-0003-06-077											
										EASTBOUND SUBTOTAL	7,310	7,310	7,310
WESTBOUND	MOODY DRAW	1047+39.22		1049+79.	240	42	12	320	1,120	1,120	1120	1120	1120
	NBI:	61-950-0-003-06-146											
	TOYAH INT. (FM2903)	1188+72.50		1190+42.	170	42	12	227	793	793	793	793	793
	NBI:	61-950-0-003-06-148											
	BILLINGSLEA DRAW	1248+70.78		1251+10.	240	42	12	320	1,120	1,120	1120	1120	1120
	NBI:	61-950-0-003-06-150											
	SHAW ROAD	134+84		140+80	180	38	12	240	760	760	760	760	760
	NBI:	61-950-0-003-06-076											
										WESTBOUND SUBTOTAL	3,793	3,793	3,793
										PROJECT TOTAL	11,103	11,103	11,103

* SEE ITEM 429 "Concrete Structure Repair"

MBGF SUMMARY

	542 7001 REMOVE METAL BEAM GUARD FENCE	542 7002 REMOVE TERMINAL ANCHOR SECTION	542 7003 REMOVE DOWNSTREAM ANCHOR TERMINAL	542 7004 RM MTL BM GD FENCE TRANS (THRIE-BEAM)	544 7003 GUARDRAIL END TREATMENT (REMOVE)	658 7078 REMOVE DEL IN & OBJECT MARKER ASSMS	540 7002 MTL W-BEAM GD FEN (STEEL POST)	540 7041 TERMINAL ANCHOR SECTION	540 7005 MTL BEAM GD FEN TRANS (THRIE-BEAM)	540 7015 DOWNSTREAM ANCHOR TERMINAL SECTION	544 7001 GUARDRAIL END TREATMENT (INSTALL)	658 7036 INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	658 7018 INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	658 7033 INSTL DEL ASSM (D-SY)SZ 1(BRF)CTB (BR)	658 7014 INSTL DEL ASSM (D-SW)SZ 1(BRF)CTB (BR)	658 7058 INSTL OM ASSM (OM-2Z)(WFLX)GND	432 7013 RIPRAP (MOW STRIP)(4 IN)
DESCRIPTION	LF	EA	EA	EA	EA	EA	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	CY
EASTBOUND	5525	5	1	10	9	106	5525	6	9	1	8	47	47	20	12	10	52
WESTBOUND	5425	3	3	9	8	104	5425	4	10	3	8	51	51	12	20	8	50
PROJECTTOTAL	**10950**	**8**	**4**	**19**	**17**	**210**	**10950**	**10**	**19**	**4**	**16**	**98**	**98**	**32**	**32**	**18**	**102**

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
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8/30/2024

CONSOLIDATED SUMMARY

SHEET 3 OF 4

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	06	103	IH 20

PAVEMENT MARKING SUMMARY

					677	677	672	672	666	666	666	666	666	533
					7001	7004	7006	7003	7024	7030	7408	7411	7423	7001
					ELIM EXT PM & MRKS (4")	ELIM EXT PM & MRKS (8")	REFL PAV MRKR TY II-C-R	REFL PAV MRKR TY I-R	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	REFL PAV MRK TY I (W)12"(SLD)(100MIL)	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	MILL RUMBLE STRIPS (ASPHALT) (SHOULDER)
MAINLANES	STA	TO	STA	LENGTH FT	LF	LF	EA	EA	LF	LF	LF	LF	LF	LF
EASTBOUND	1003+25.00		219+10.00	63,888	63,888		799				15,972	63,888	63,888	127,776
WESTBOUND	1003+25.00		219+10.00	63,888	63,888		799				15,972	63,888	63,888	127,776
RAMPS (OFF) (ON)						30,439	560	84	30,751	270				
PROJECT TOTALS				63,888	127,776	30,439	2,158	84	30,751	270	31,944	127,776	127,776	255,552

TRAFFIC CONTROL SUMMARY

662	662	662	662	503	505	512	512	512
7005	7008	7038	7112	7002	7002	7001	7025	7049
WK ZN PAV MRK NON-REMOV (W)6"(BRK)	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	WK ZN PAV MRK SHT TERM (TAB)TY W	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (MOBILE OPERATION)	PORT CTB (FUR & INST) (SGL SLOPE) (TY 1)	PORT CTB (REMOVE) (SGL SLOPE) (TY 1)	PORT CTB (MOVE) (SGL SLOPE) (TY 1)
31944	127776	127776	1597	4	736	1023	1023	1023

SIGN SUMMARY

644	644	644	647	647	636	416	416
7001	7004	7073	7001	7003	7002	7027	7004
IN SM RD SN SUP&AM TY10BWG(1) SA(P)	IN SM RD SN SUP&AM TY10BWG(1) SA(T)	REMOVE SM RD SN SUP&AM	INSTALL LRSS (STRUCT STEEL)	REMOVE LRSA	ALUMINUM SIGNS (TY G)	DRILL SHAFT (SIGN MTS) (12 IN)	DRILL SHAFT (24 IN)
EA	EA	EA	LB	EA	SF	LF	LF
48	8	62	6454	17	1428	15	4

BRIDGE JOINTS

					454	438
					7010	7001
					JOINT SEALANT	CLEANING AND SEALING EXISTING JOINTS
	STA	to	STA	BRIDGES	LF	LF
EASTBOUND	1003+25.00		219+10.00	5	2750	2750
WESTBOUND	1003+25.00		219+10.00	4	1808	1808
PROJECT TOTALS					4558	4558

ERROSION CONTROL LOGS

506	506
7045	7046
BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
LF	LF
1320	1320

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CONSOLIDATED SUMMARY

SHEET 4 OF 4

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	06	103	IH 20

MISC. ROADWAY ITEMS

				112	104	247	514	540	545	658	310	316	344	3007	ALT. 1 346	ALT. 1A 346	666	666	644
				7001	7016	7064	7001	7005	7014	7058	7001	7007	SP MIXES SP-B SAC-B PG70-22	7001	7023	7009	7024	7423	7001
				SUBGRWIDEN (OC)	REMOV CONC (CURB)	FL BS (CMP IN PLC) (TY A OR B GR 4) (6")	PERM CTB (SGL SLOPE) (TY 1) (42")	MTL BEAM GD FEN TRANS (THRIE-BEAM)	CRASH CUSH ATTEN (INSTL) (S) N) (TL3)	INSTL OM ASSM (OM-2Z) (WF LX) GND	PRIME COAT (AE-P)	ASPH (AC-20 -5TR)	110	BONDING COURSE	STONE-MTRX-ASPH SMAR-F SAC-A 110	STONE-MTRX-ASPH SMAR-D SAC-A PG76-22 110	REFL PAV MRK TY I (W) 8" (SLD) 100MIL)	RE PM W/RET REQ TY I (W) 8" (SLD) (100MIL)	IN SM RDSN SUP&AM TY10BWG(1) SA(P)
											GAL/SY 0.2	GAL/SY 0.38	LBS/SY*I 4IN	GAL/SY 0.1	LBS/SY*I 2IN	LBS/SY*I 2IN			
	STA.	TO	STA	STA	LF	SY	LF	EA	EA	EA	GAL	GAL	TON	GAL	TON	TON	LF	LF	EA
EB TRUCK PARKING	1298+77.21		1316+76.78	17+99.57	670	11836	775	1	1	8	2367	990	2604	1183.6	1302	1302	3255	1722	2
WB TRUCK PARKING	1303+96.00		1320+86.95	16+90.95	565	12775	575	1	1	6	2555	1068	2811	1277.5	1406	1406	3150	1521	2
PROJECT TOTALS				34+90.52	1235	24611	1350	2	2	14	4922	2058	5415	2461	2708	2708	6405	3243	4

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MISC. CONSOLIDATED SUMMARY

SHEET 1 OF 1

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			18
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

LEGEND
- SIGNS
- X SIGN LETTER
- WORK AREA

A — OBSERVE WARNING SIGNS STATE LAW
R20-3T
48"X42"

B — STAY ALERT
TALK OR TEXT LATER
G20-10T
60"X48"

C — BEGIN WORK ZONE / TRAFFIC FINES DOUBLE / WHEN WORKERS ARE PRESENT
G20-9TP 36"X30"
R20-5T 36"X36"
R20-5aTP 36"X18"

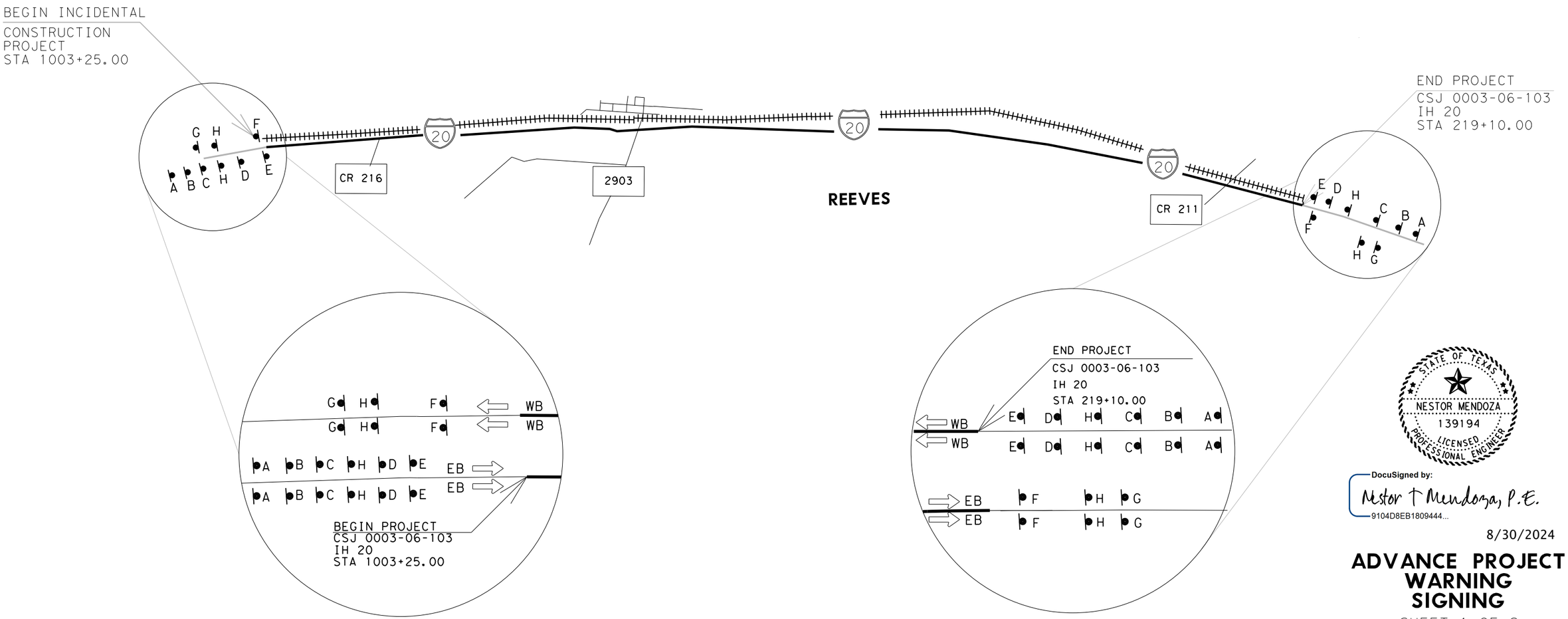
D — ROAD WORK AHEAD
CW20-1D
48"X48"

E — BEGIN / ROAD WORK NEXT 16 MILES / NAME ADDRESS CITY STATE / CONTRACTOR
G20-5T 48"X24"
G20-6T 48"X30"

F — END ROAD WORK
G20-2
36"X18"

G — END WORK ZONE
G20-2bT
36"X18"

H — SPEED LIMIT 65
R2-1
48"X60"



STATE OF TEXAS
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8/30/2024

ADVANCE PROJECT WARNING SIGNING

SHEET 1 OF 2

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			19
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

LEGEND

SIGNS

X SIGN LETTER

WORK AREA

A — OBSERVE WARNING SIGNS STATE LAW
R20-3T
48"X42"

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G20-2
36"X18"

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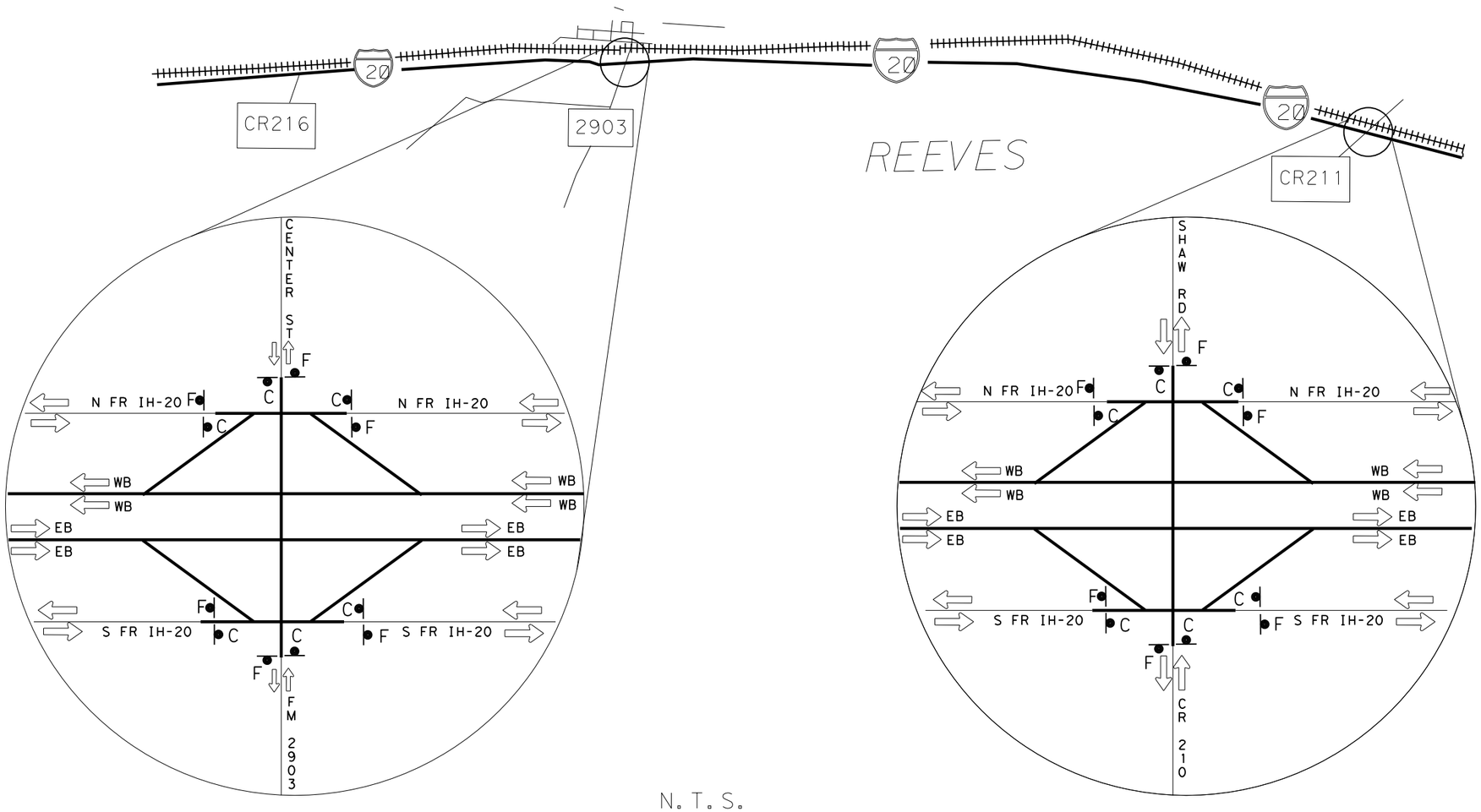
G20-2bT
36"X18'

H — SPEED LIMIT 65
R2-1
48"X60"



N. T. S.

NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

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8/30/2024

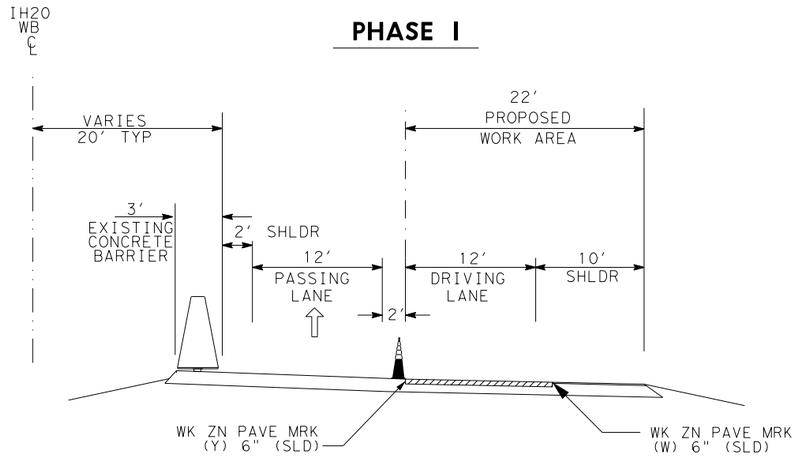
ADVANCED PROJECT WARNING SIGNING

SHEET 2 OF 2

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			20
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

PHASE I



NTS

1. CONTRACTOR TO SUBMIT WORKPLAN FOR LENGTH OF WORKZONE, NOT TO EXCEED 2 MILES OR AS APPROVED BY ENGINEER PRIOR TO CONSTRUCTION.

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

2. PLACE ADVANCE WARNING SIGNS AND TRAFFIC CONTROL DEVICES.
3. MOVE TRAFFIC INTO TRAVEL LANES
4. INSTALL EROSION CONTROL LOGS.
5. FOR REQUIRED RAMP CLOSURES UTILIZE PCMC DEVICES AS SHOWN WITH TCP STANDARDS 6-3b & 6-4a AS DIRECTED BY ENGINEER.
6. PLANE 2" OF EXISTING ACP ON DRIVING LANE AND SHOULDER IN ACCORDANCE WITH TYPICAL SECTIONS.

   -PLANE 2" OF EXISTING ACP AT BRIDGE TIE-IN SECTIONS.

   -PLANE APPROX. 0" TO 6" OF EXISTING ACP AT BRIDGES IN ACCORDANCE WITH TYPICAL SECTIONS.

7. REMOVE STABILIZED BASE 7" DRIVING LANE IN ACCORDANCE WITH TYPICAL SECTIONS.
8. SWEEP AND REFINISH BASE, PRIME AE-P.
9. BASE SHALL NOT BE LEFT EXPOSED, AT MINIMUM FIRST LIFT SHALL BE PLACED IN ORDER TO COVER EXISTING BASE
10. SAFETY SLOPE AT END OF EACH WORKING DAY WHEN EDGE CONDITIONS REQUIRE IT (SEE TREATMENT FOR VARIOUS EDGE CONDITIONS).
11. PLACE SUPERPAVE B IN TWO EQUAL LIFTS.
12. CONTINUE UNTIL ALL SP-B IS PLACED.
13. PLACE WORK ZONE TABS/STRIPING.
14. REPLICATE EB

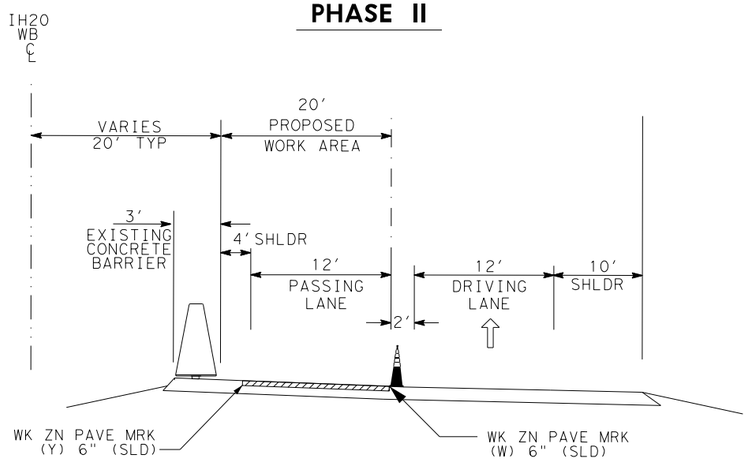
LEGEND

-- WORK ZONE PAVEMENT MARKINGS AND MARKERS

CHANNELIZING DEVICES

MODIFIED TRAFFIC

PHASE II



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2. PLACE ADVANCE WARNING SIGNS AND TRAFFIC CONTROL DEVICES.
3. MOVE TRAFFIC INRO TRAVEL LANES
4. INSTALL EROSION CONTROL LOGS.
5. FOR REQUIRED RAMP CLOSURES UTILIZE PCMC DEVICES AS SHOWN WITH TCP STANDARDS 6-3b & 6-4a AS DIRECTED BY ENGINEER.
6. PLANE 2" OF EXISTING ACP ON DRIVING LANE AND SHOULDER IN ACCORDANCE WITH TYPICAL SECTIONS.

   -PLANE 2" OF EXISTING ACP AT BRIDGE TIE-IN SECTIONS.

   -PLANE APPROX. 0" TO 6" OF EXISTING ACP AT BRIDGES IN ACCORDANCE WITH TYPICAL SECTIONS.

7. REMOVE STABILIZED BASE 7" DRIVING LANE IN ACCORDANCE WITH TYPICAL SECTIONS.
8. SWEEP AND REFINISH BASE, PRIME AE-P.
9. BASE SHALL NOT BE LEFT EXPOSED, AT MINIMUM FIRST LIFT SHALL BE PLACED IN ORDER TO COVER EXISTING BASE
10. SAFETY SLOPE AT END OF EACH WORKING DAY WHEN EDGE CONDITIONS REQUIRE IT (SEE TREATMENT FOR VARIOUS EDGE CONDITIONS).
11. PLACE SUPERPAVE B IN TWO EQUAL LIFTS.
12. CONTINUE UNTIL ALL SP-B IS PLACED.
13. PLACE WORK ZONE TABS/STRIPING.
14. REPLICATE EB

STATE OF TEXAS
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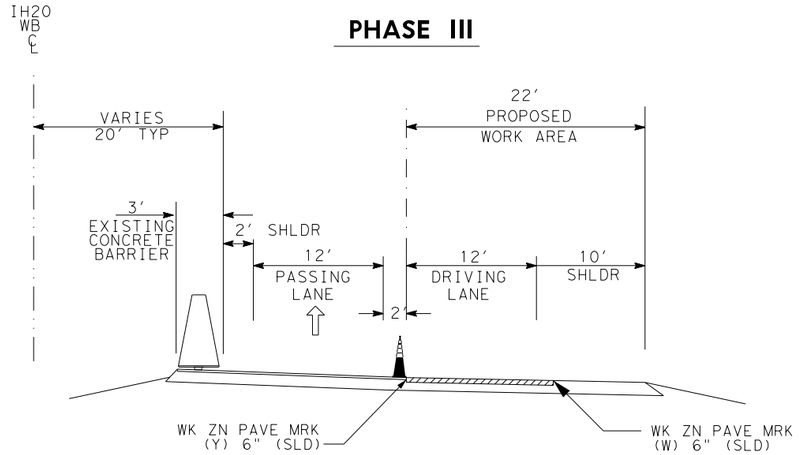
PHASE NARRATIVE

SHEET 1 OF 2

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			21
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

PHASE III



NTS

1. CONTRACTOR TO SUBMIT WORKPLAN FOR LENGTH OF WORKZONE, NOT TO EXCEED 2 MILES OR AS 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 PCMC DEVICES AS SHOWN WITH TCP STANDARDS 6-3b & 6-4a AS DIRECTED BY ENGINEER.

3. FOR REQUIRED BRIDGE WORK UTILIZE BRIDGE TRAFFIC CONTROL DETAILS AS DIRECTED BY ENGINEER.

4. PLACE UNDERSEAL IN ACCORDANCE WITH TYPICAL SECTIONS

5. PLACE BONDING COURSE
   *PLACE 2" PPC FOR BRIDGES ACCORDING TO BRIDGE TYPICAL SECTIONS AS DIRECTED BY ENGINEER.

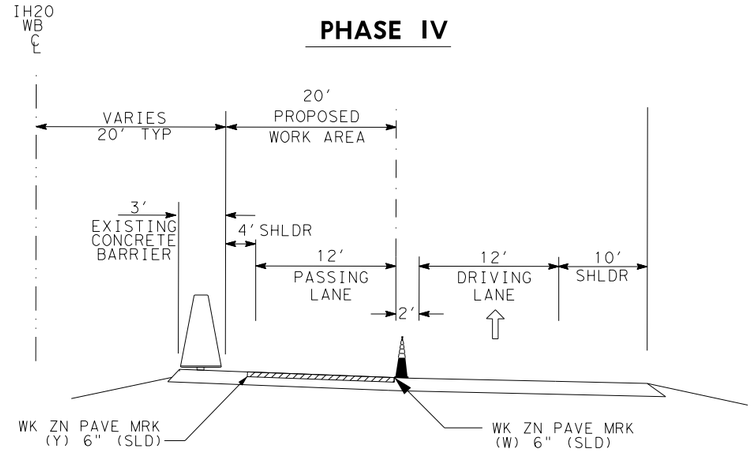
6. PLACE 2" SMAR-F HOTMIX PAVEMENT:

   -FIRST IN DRIVING LANE AND OUTSIDE SHOULDER
   -THEN IN PASSING LANE AND OUTSIDE SHOULDER

7. CONTINUE UNTIL ALL SMAR-F IS PLACED

8. REPLICATE EB

PHASE IV



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   -FIRST IN DRIVING LANE AND OUTSIDE SHOULDER
   -THEN IN PASSING LANE AND OUTSIDE SHOULDER

7. CONTINUE UNTIL ALL SMAR-F IS PLACED

8. REPLICATE EB

LEGEND

-- WORK ZONE PAVEMENT MARKINGS AND MARKERS

CHANNELIZING DEVICES

MODIFIED TRAFFIC

PHASE V

1. PLACE FINAL PAVEMENT MARKINGS.
2. REMOVE AND REPLACE GUARDFENCE ELEMENTS.
3. INSTALL DELINEATORS & OBJECT MARKERS.
4. CONSTRUCT BRIDGE JOINTS ACCORDING TO BRIDGE JOINT DETAILS.
5. PLACE RUMBLE STRIPS.
6. INSTALL SIGNS.
7. REMOVE EROSION CONTROL LOGS
8. FINAL CLEAN UP.

STATE OF TEXAS
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PHASE NARRATIVE

SHEET 2 OF 2

Texas Department of Transportation

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TEXAS	ODA	REEVES	
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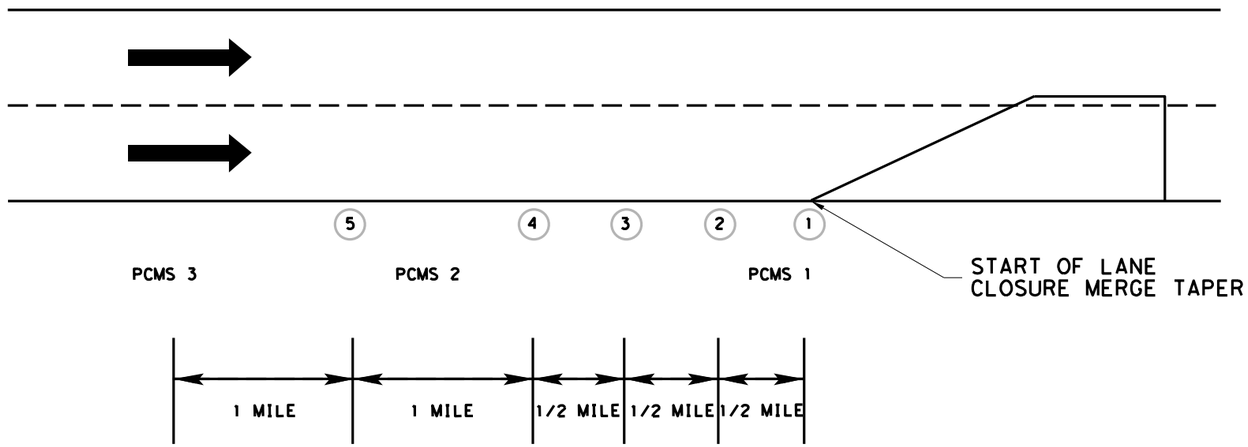
PCMS OPERATIONS RULES: DEPLOYMENT PLAN 1 (MAX DESIGN QUEUE ≤ 3.5 MILES)



PCMS 3		PCMS 2		PCMS 1		Q					
(BLANK)		ROAD WORK 2 MILES		(BLANK)		=0	F	F	F	F	F
(BLANK)		SLOW TRAFFIC 2 MILES		(BLANK)		=0.25	F	F	F	F	M
		SLOW TRAFFIC 2 MILES		(BLANK)		=0.75	F	F	F	M	IS
(BLANK)		STOPPED TRAFFIC 2 MILES		(BLANK)		=0.25	F	F	F	F	S
STOPPED TRAFFIC 2 MILES		STOPPED TRAFFIC 2 MILES		(BLANK)		=0.75	F	F	F	IF	S
										S	A
STOPPED TRAFFIC 2 MILES	USE BOTH LANES	STOPPED TRAFFIC AHEAD	USE BOTH LANES	MERGE HERE	TAKE TURNS	=1.25	F	F	IF	A	A
STOPPED TRAFFIC 1 MILES	USE BOTH LANES	ROAD WORK 2 MILES	USE BOTH LANES	MERGE HERE	TAKE TURNS	=2	F	IF	A	A	A
STOPPED TRAFFIC AHEAD	USE BOTH LANES	ROAD WORK 2 MILES	USE BOTH LANES	MERGE HERE	TAKE TURNS	>=3	IF	A	A	A	A

Symbol	Condition	Avg Speed (V)
F	Free Flow	40mph<V
IF	Non Free Flow	V<=40mph
M	Moderate/Slow	25mph<=V <=40mph
IS	Non Stopped	25mph<=V
S	Stopped	v<25mph
A	Any	0<=V

LEGEND

(1) NON-INTRUSIVE TRAFFIC-SPEED DETECTOR

PCMS 1 PORTABLE CHANGEABLE MESSAGE SIGN

NOTE:
1. LOCATIONS OF THE SENSORS AND PCMS CAN BE ADJUSTED AS DIRECTED BY THE ENGINEER BASED ON THE SITE CONDITIONS.
2. ADDITIONAL TRAFFIC CONTROL DEVICES SHALL BE INTALLED PER APPLICABLE TXDOT TRAFFIC CONTROL PLAN STANDARDS.

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LANE CLOSURE MONITORING SYSTEM PLAN 1 WIDTH DYNAMIC LATE LANE MERGE

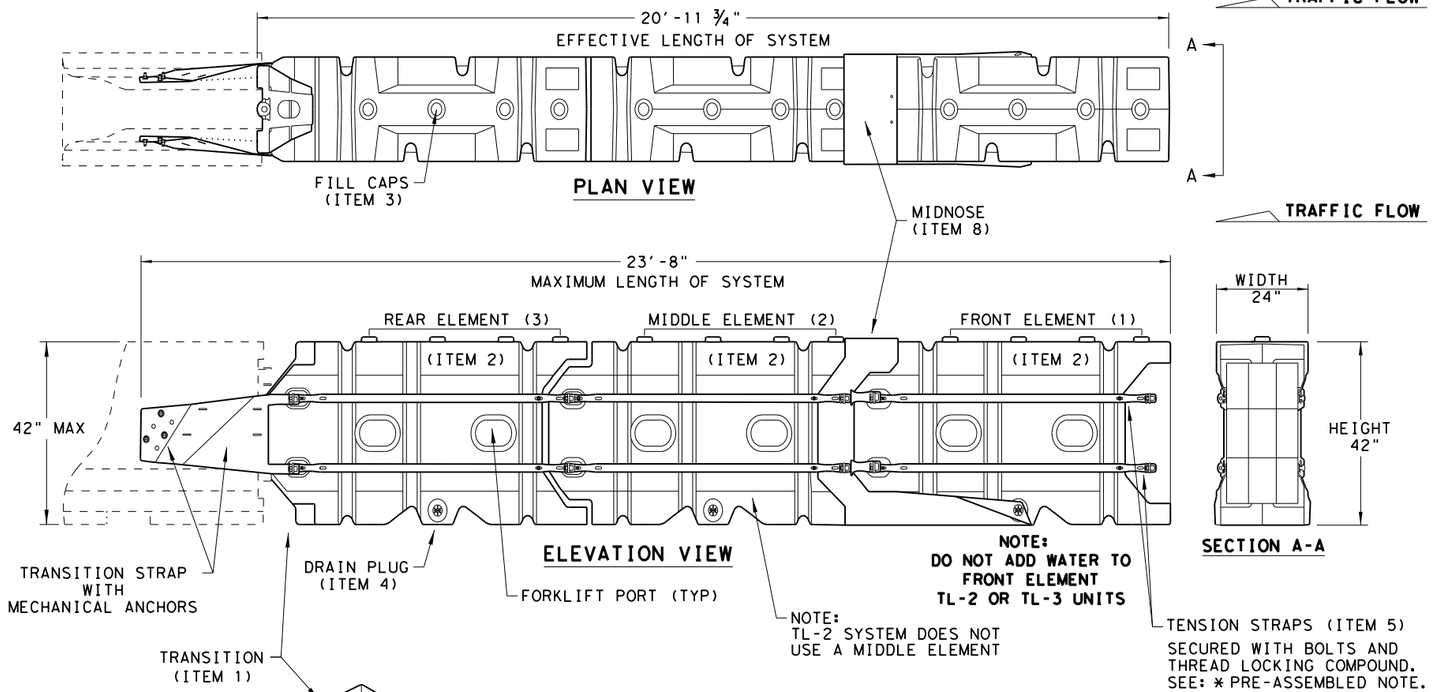
SHEET 1 OF 1

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			23
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

DATE:
FILE:

SYSTEM SHOWN - ABSORB-M TL-3



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

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

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

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

GENERAL NOTES

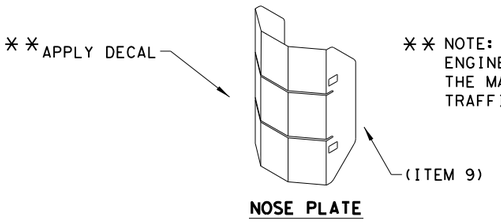
1. FOR SPECIFIC INFORMATION REGARDING THE INSTALLATION AND TECHNICAL GUIDANCE, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800. 180 RIVER ROAD, RIO VISTA, CA 94571
2. THE ABSORB-M SYSTEM IS ONLY APPROVED FOR USE IN (TEMPORARY WORK ZONE) LOCATIONS.
3. THE ABSORB-M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

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

*COMPONENTS PRE-ASSEMBLED WITH ELEMENT ASSEMBLY

DELINEATION DECAL PLACEMENT GUIDE

TRAFFIC FLOW LEFT-SIDE BARRIER | TRAFFIC FLOW BOTH-SIDE BARRIER | TRAFFIC FLOW RIGHT-SIDE BARRIER



NOSE PLATE

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

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

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

SACRIFICIAL

Texas Department of Transportation

Design Division Standard

LINDSAY TRANSPORTATION SOLUTIONS

CRASH CUSHION (MASH TL-3 & TL-2)

TEMPORARY - WORK ZONE

ABSORB(M)-19

FILE: absorbm19	DN: TxDOT	CK: KM	DW: VP	CK:
© TxDOT: JULY 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
	DIST	COUNTY		SHEET NO.
	06	REEVES		24

DATE:
FILE:

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

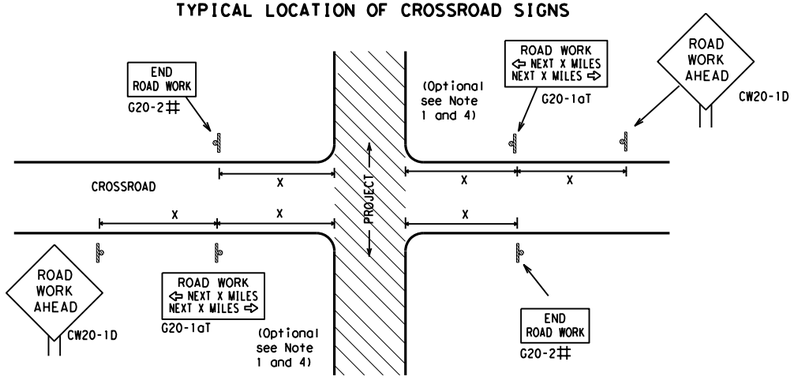
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	ODA	REEVES		25
5-10 5-21				

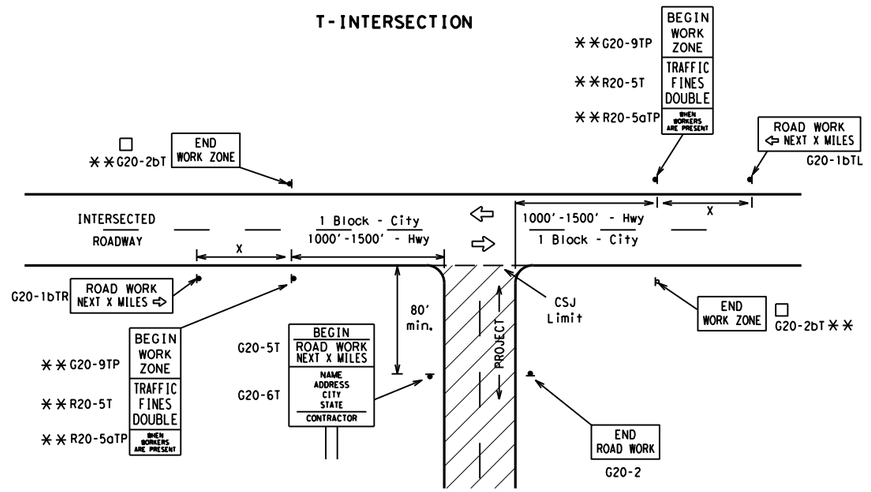
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

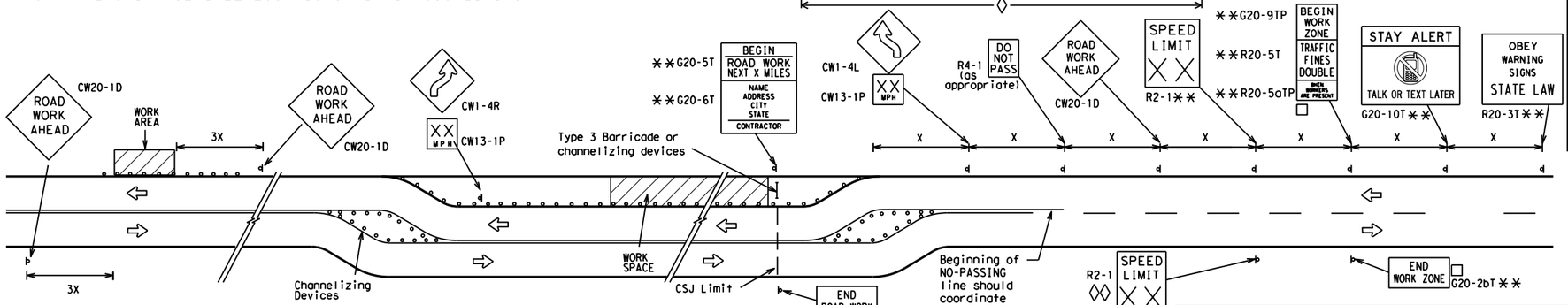
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

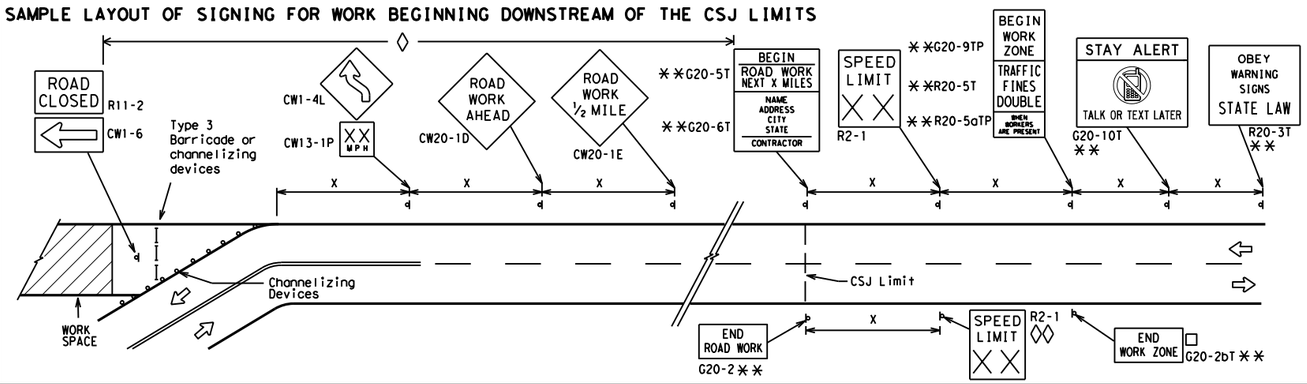
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21__

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0003	06	103	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ODA	REEVES		26

DATE:
FILE:

DATE:
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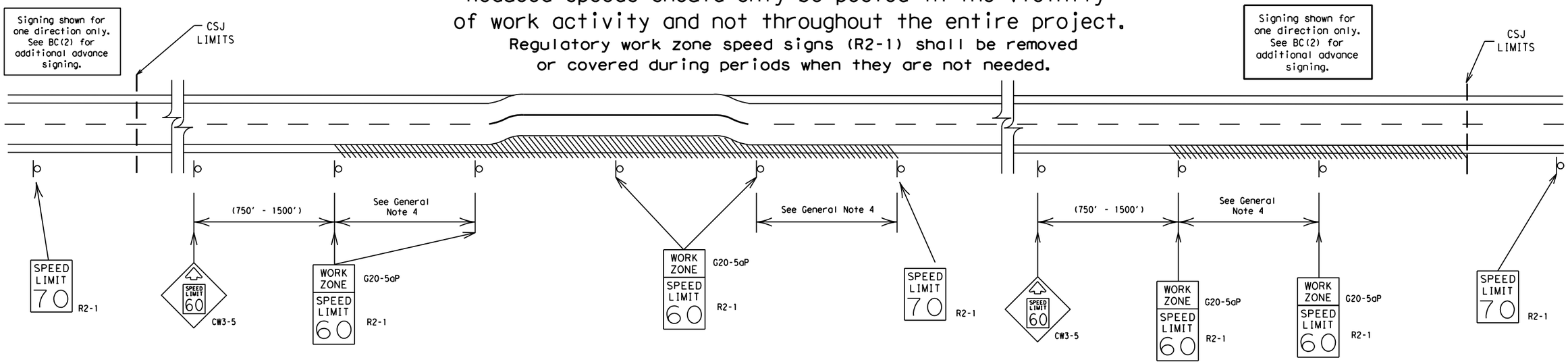
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21__

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0003	06	103	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	ODA	REEVES		27

DATE:
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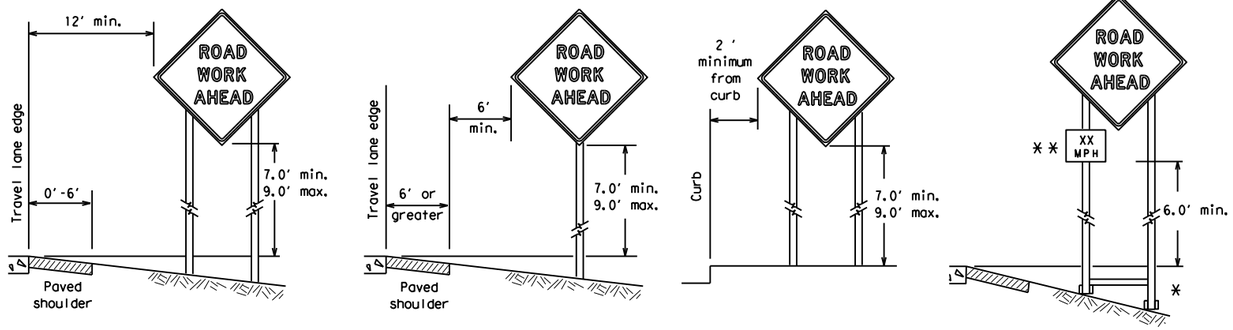
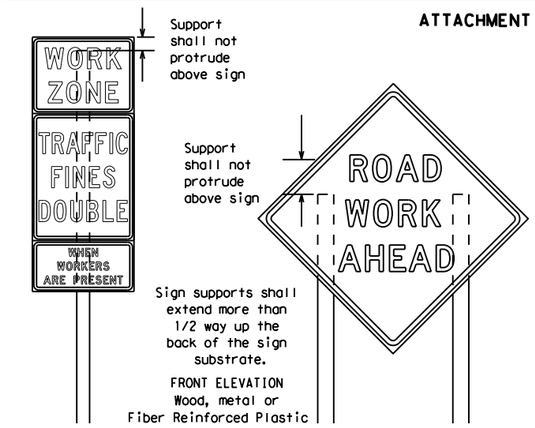
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

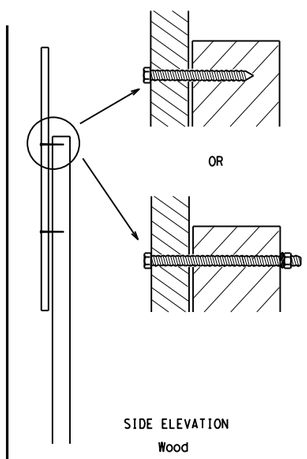


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

** 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





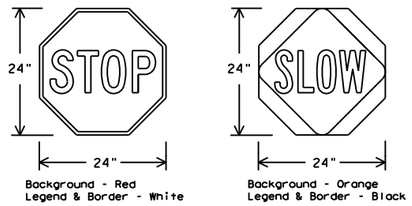
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

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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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9-07 8-14	DIST	COUNTY		SHEET NO.
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DATE:
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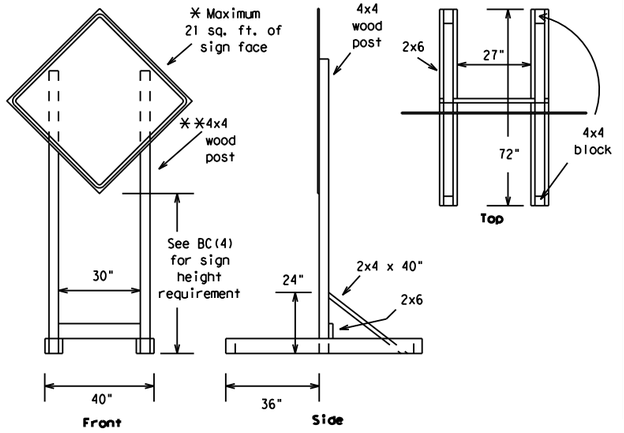
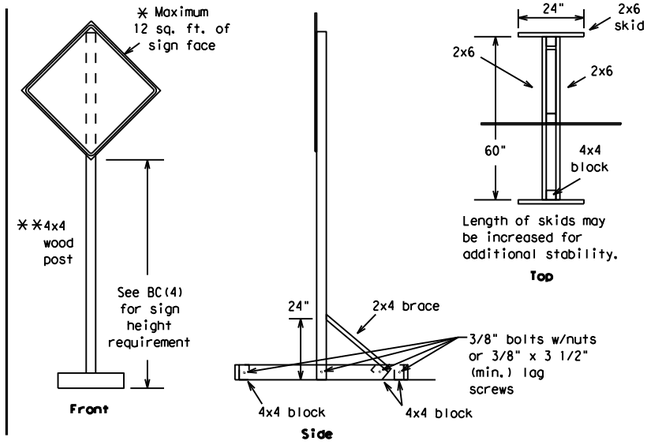
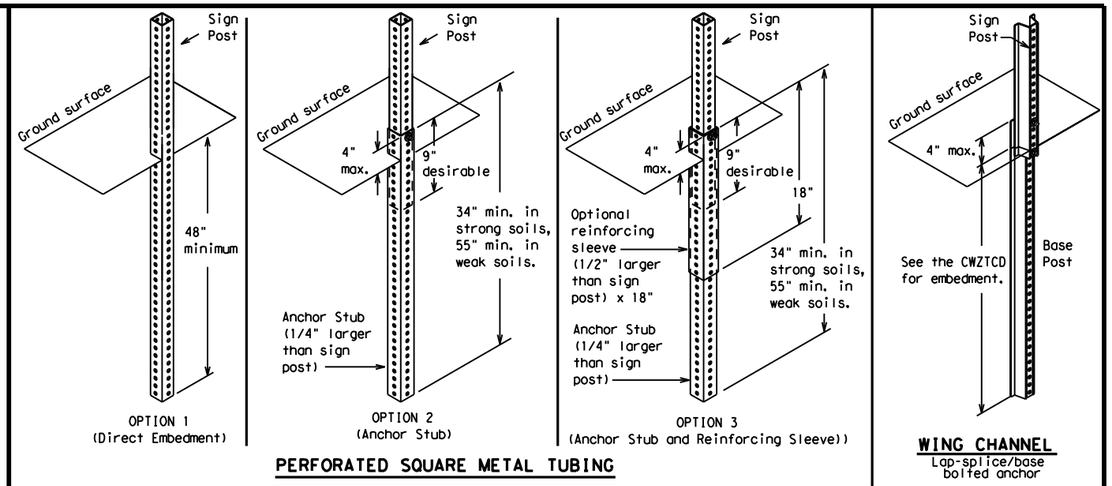




SKID MOUNTED WOOD SIGN SUPPORTS

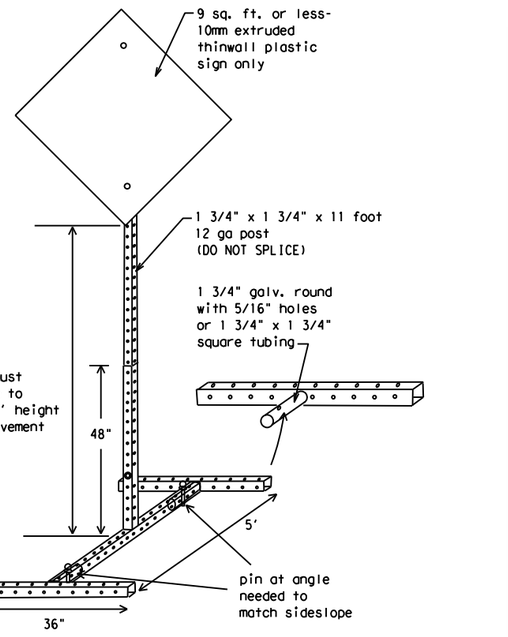
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

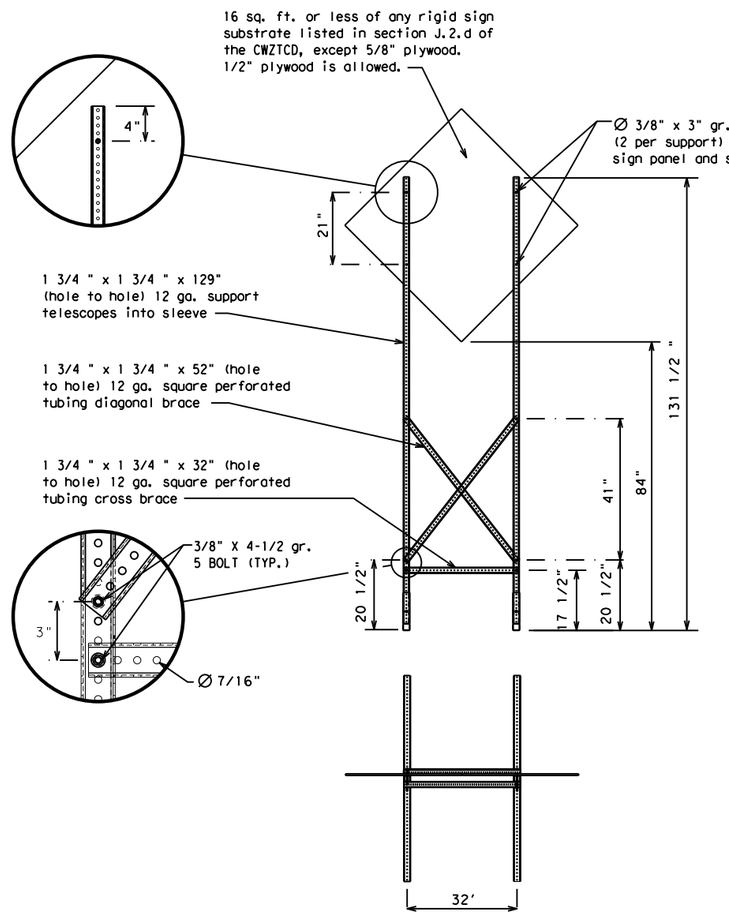


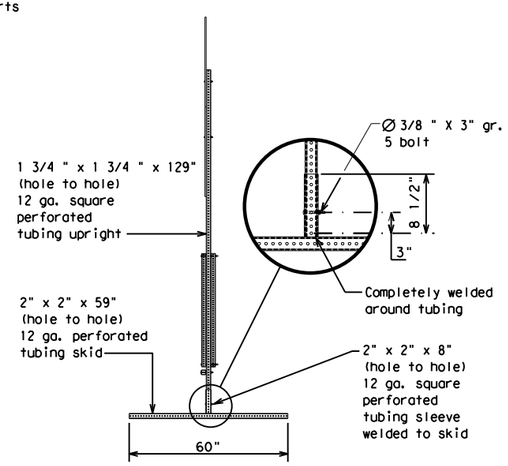
PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21__

FILE: _bc-21.dgn_	DN: _TxDOT_	CK: TxDOT	DW: _TxDOT_	CK: TxDOT
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WHEN NOT IN USE, REMOVE THE PCMS FROM THE RIGHT-OF-WAY OR PLACE THE PCMS BEHIND BARRIER OR GUARDRAIL WITH SIGN PANEL TURNED PARALLEL TO TRAFFIC

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

* 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__

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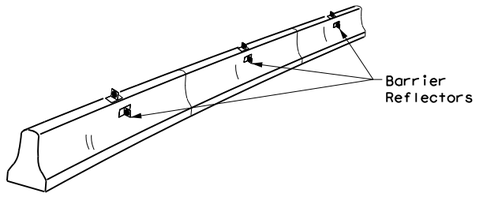
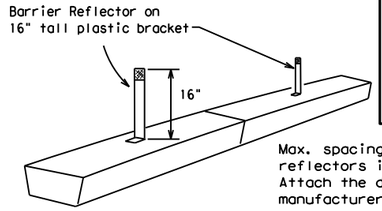
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

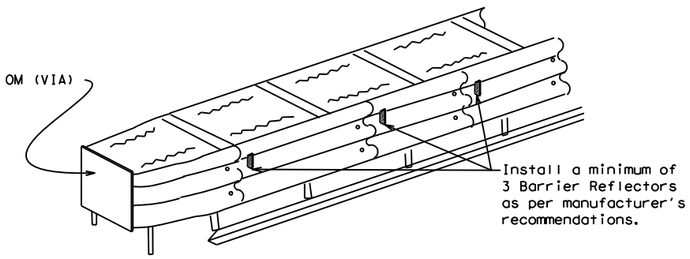


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

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)

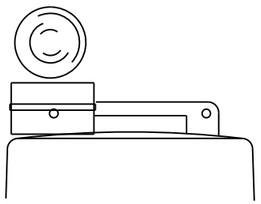


DELINEATION OF END TREATMENTS

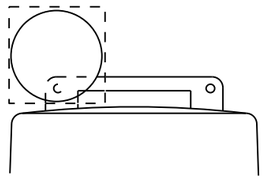
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

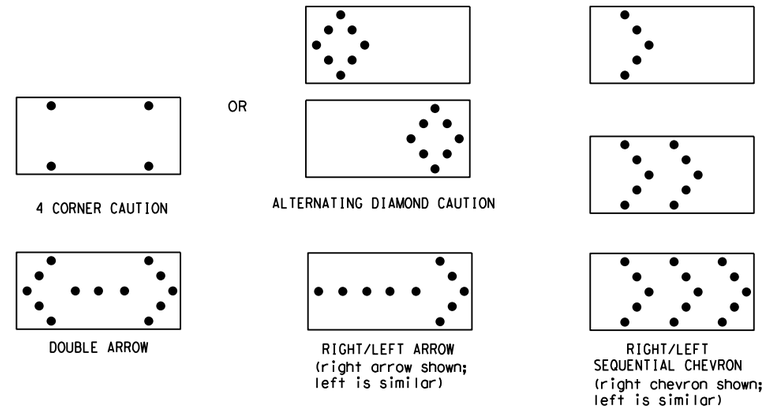
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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
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REVISIONS	0003	06	103	IH 20
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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:

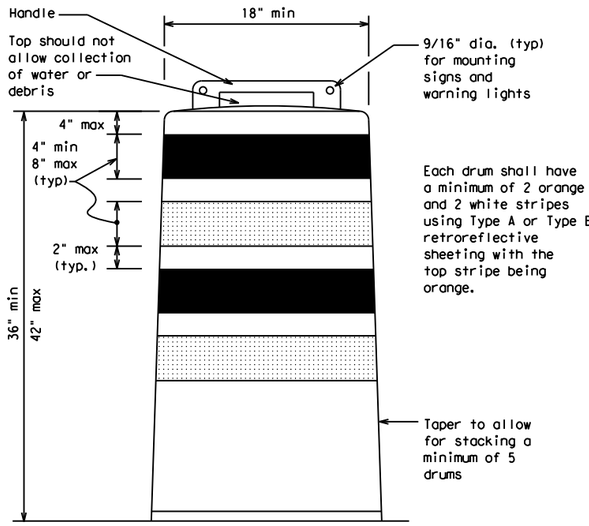
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents 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.

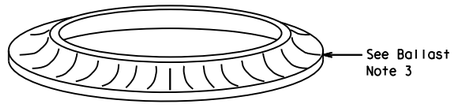
RETROREFLECTIVE SHEETING

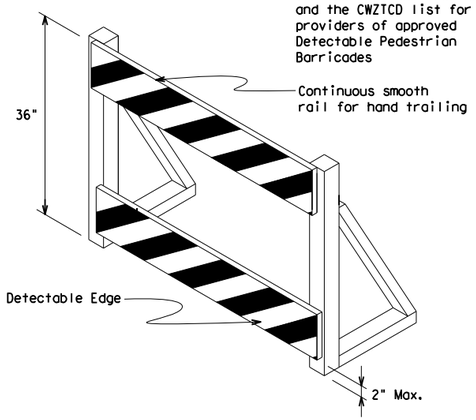
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall 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.

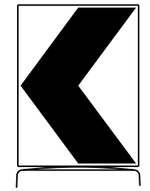




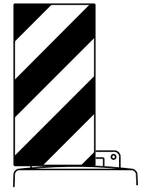


DETECTABLE PEDESTRIAN BARRICADES

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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Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21__

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4-03 8-14	DIST	COUNTY		SHEET NO.
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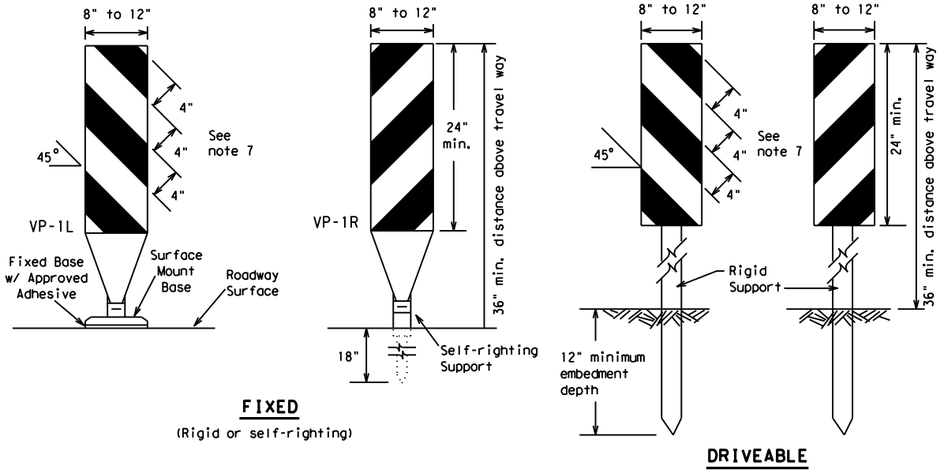
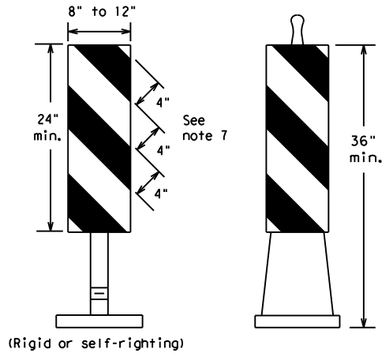


FIXED
(Rigid or self-righting)

DRIVEABLE

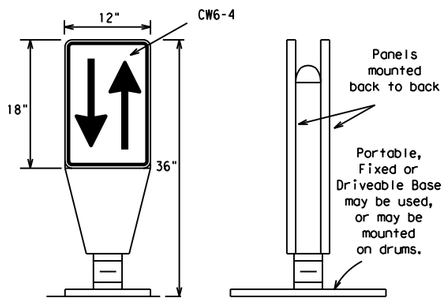


(Rigid or self-righting)

PORTABLE

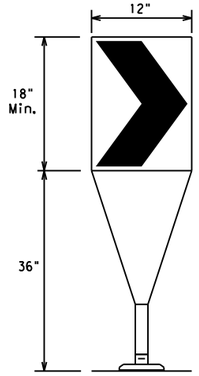
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



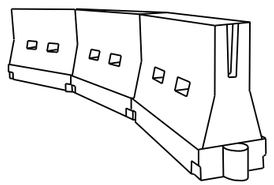
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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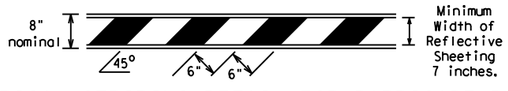
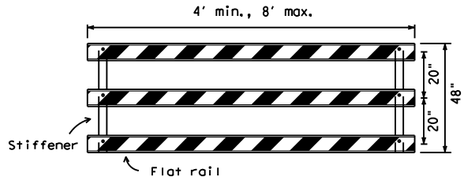
TYPE 3 BARRICADES

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.



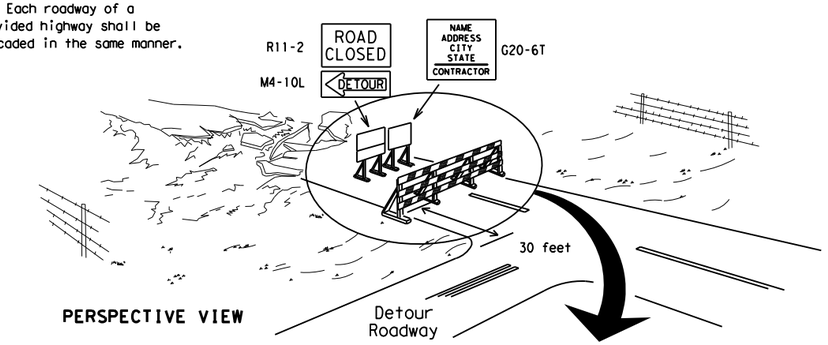
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

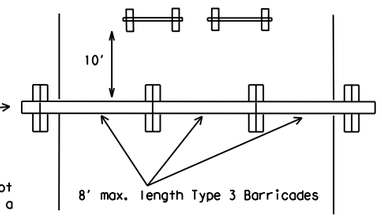
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

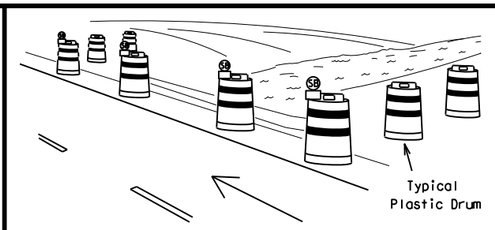
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

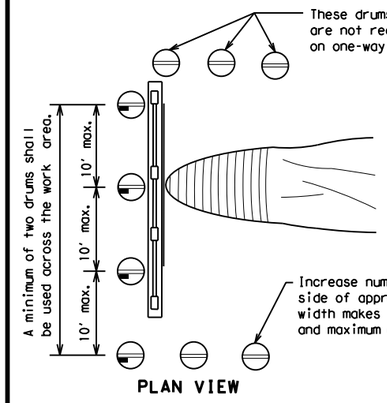
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

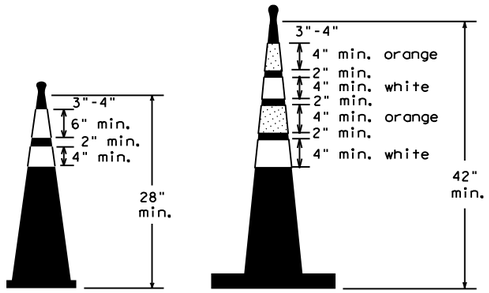
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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

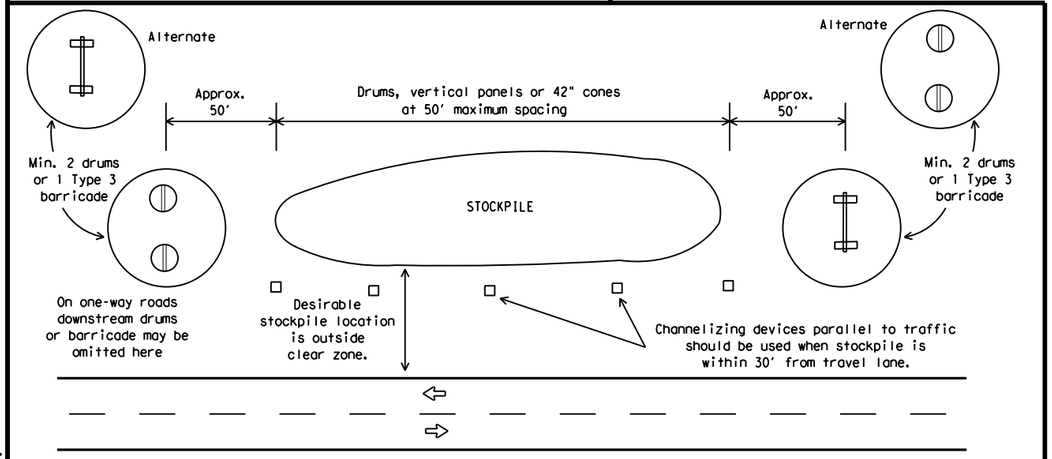
PLAN VIEW

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

DATE:
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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	06	103	IH 20
9-07 8-14	DIST	COUNTY		SHEET NO.
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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

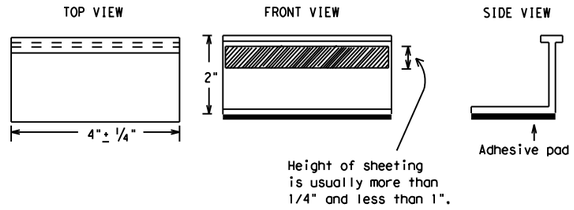
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0003	06	103	IH 20
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
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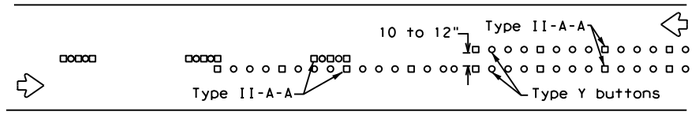
11-02 8-14				

105

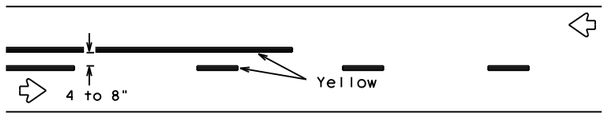
DATE:
FILE:

PAVEMENT MARKING PATTERNS

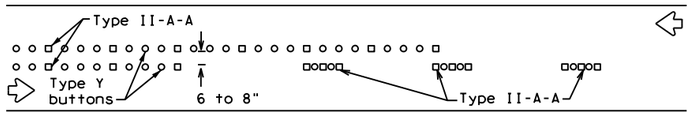
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



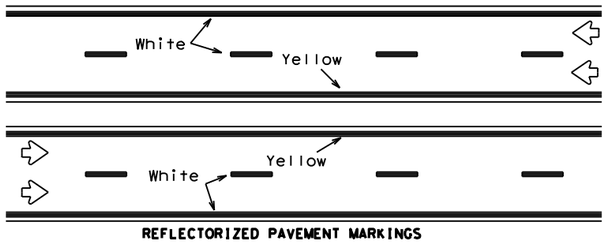
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



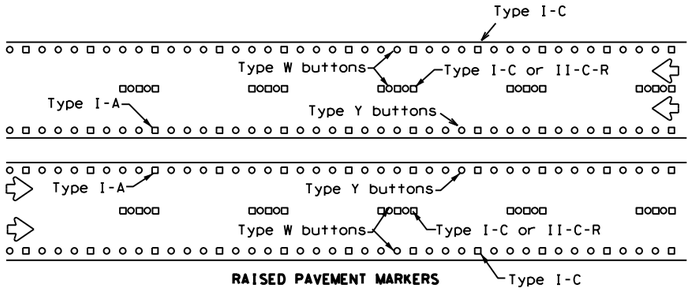
RAISED PAVEMENT MARKERS - PATTERN B

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

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



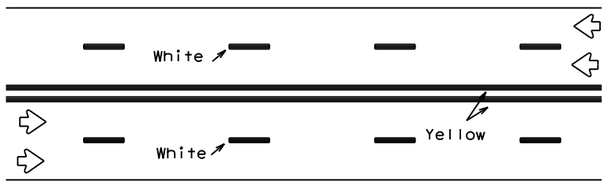
REFLECTORIZED PAVEMENT MARKINGS



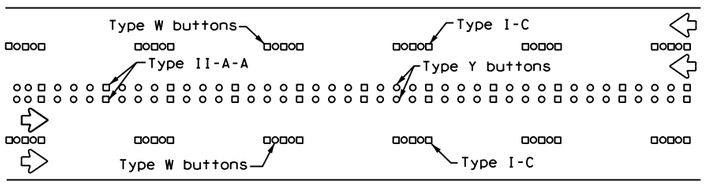
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



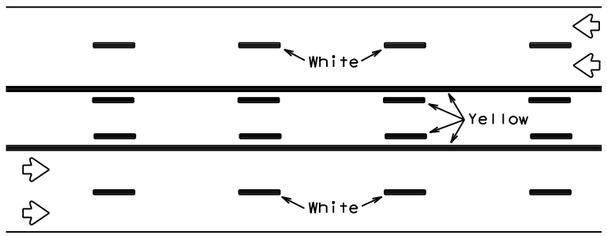
REFLECTORIZED PAVEMENT MARKINGS



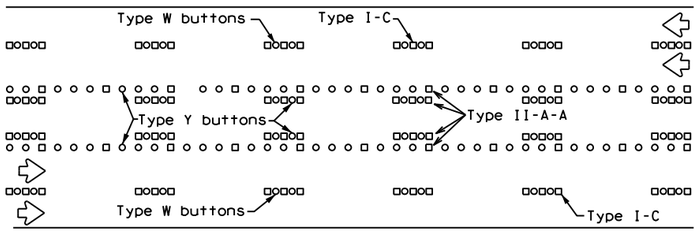
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

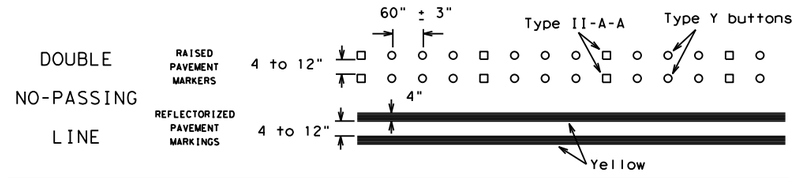
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

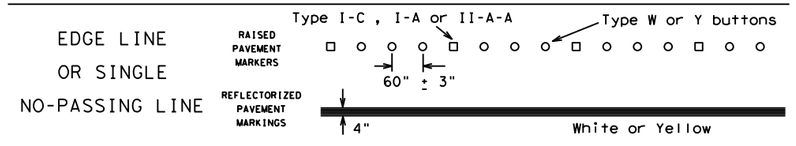
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

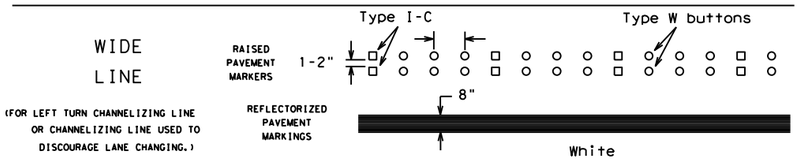


EDGE LINE OR SINGLE NO-PASSING LINE



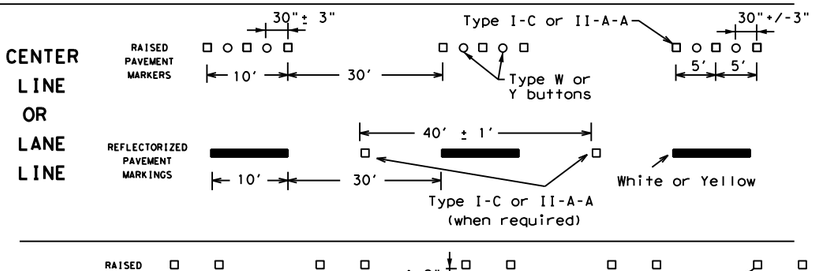
WIDE LINE

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

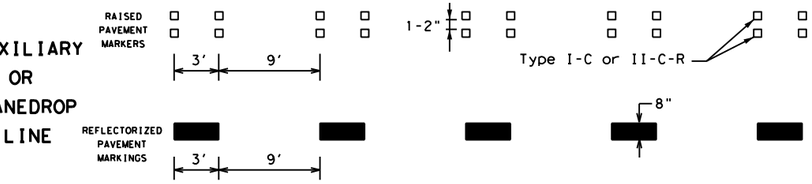


BROKEN LINES

CENTER LINE OR LANE LINE

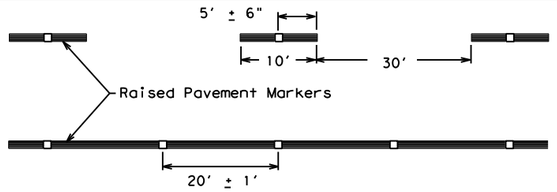


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

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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
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REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0003	06	103	IH 20
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	ODA	REEVES		36

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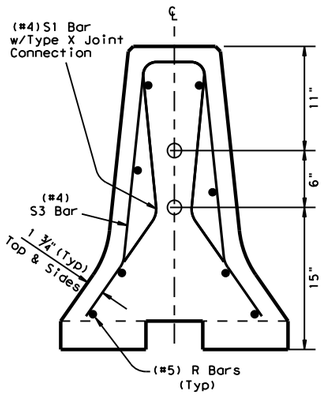
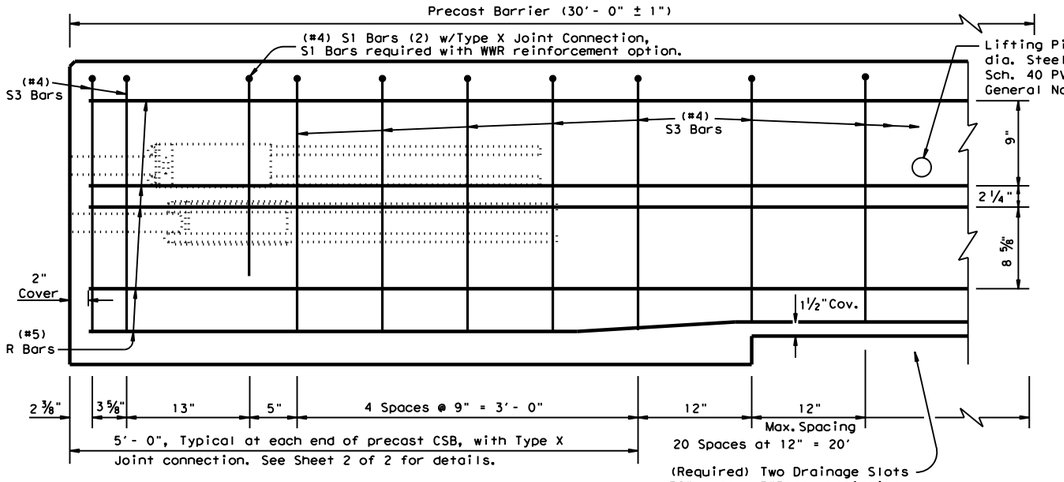


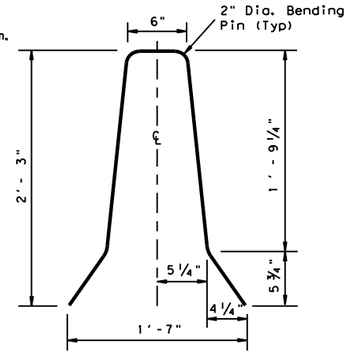
End View Precast Barrier

See sheet 2 of 3 for Joint connection Type X



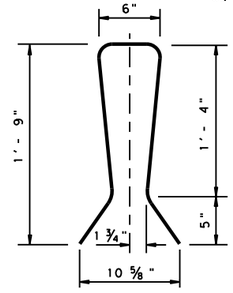
Reinforcement for Precast (CSB) Concrete Safety Barrier (Type 1)

Showing reinforcement for Joint Type X



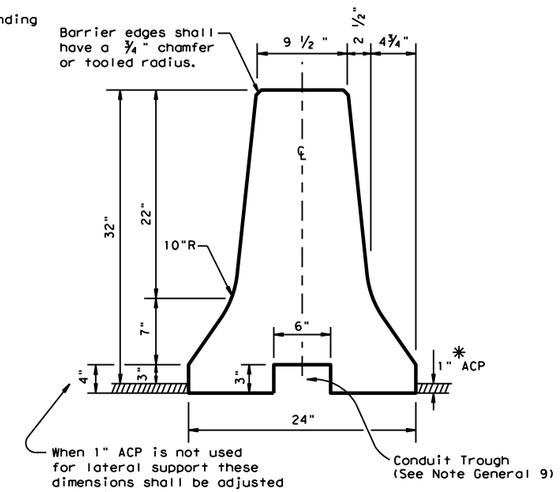
S3 Bar

#4 Bar



S1 Bar

#4 Bar (2) (Joint Type X)

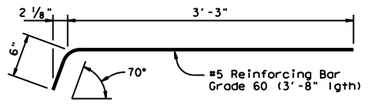


Concrete Safety Barrier

* When 1" ACP is "not" used as lateral support for permanent barrier placement. A permissible method of attaining the equivalent lateral support may be used, See CSB(6) sheet.

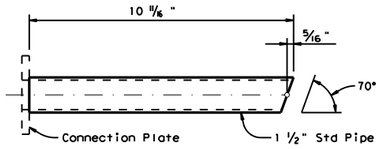
GENERAL NOTES

1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a ¾" chamfer or tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. All steel assemblies for joint shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
7. Regardless of the method of handling, barrier lifting points shall be approx. 7.5 feet from the ends of the barrier. Lifting devices and attachments to barrier sections shall be approved by the Engineer.
8. Surface finishing and grouting (where required) shall be two parts sand one part cement with enough water to make the mixture plastic. Grouting shall be done in a manner that will assure a smooth surface. Surface finishing shall be considered subsidiary to the various bid items involved.
9. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.



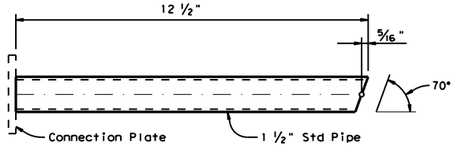
DEFORMED BAR ANCHOR DETAILS

Two (2) Bars required per assembly. Eight (8) required per Joint.



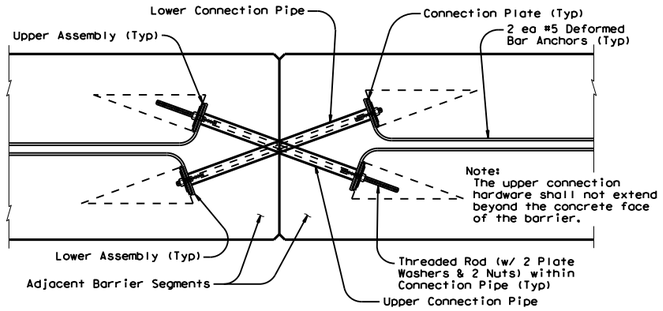
UPPER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Upper Assembly. Two (2) required per Joint.



LOWER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Lower Assembly. Two (2) required per Joint.



TYPE X JOINT INSTALLATION DETAIL

Barrier reinforcing and Type X Joint Leave-Out dimensions not shown for clarity.

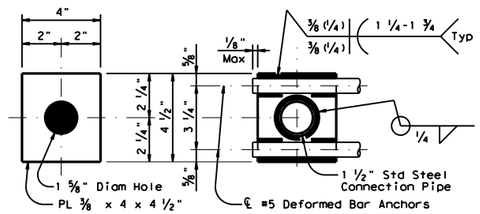
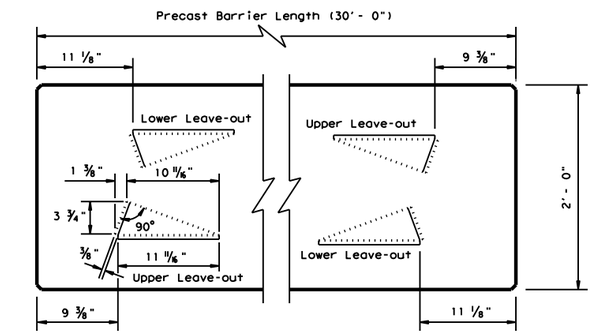


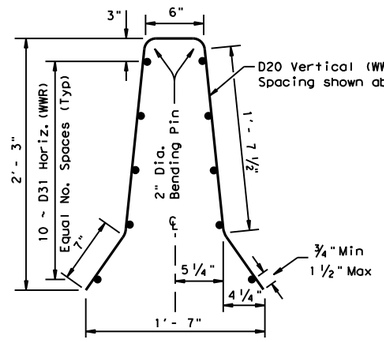
PLATE DIMENSIONS WELDING DETAILS

CONNECTION PLATE DETAILS

One (1) Plate required per assembly. Four (4) required per Joint. All steel fittings for joint Type X shall be galvanized after fabrication in accordance with Item 445.



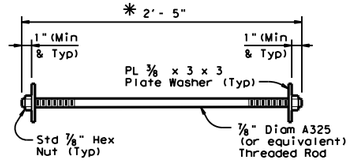
BARRIER PLAN AT END JOINTS



Welded Wire Reinforcement (WWR) Option for Bars R and S3

(WWR) General Notes

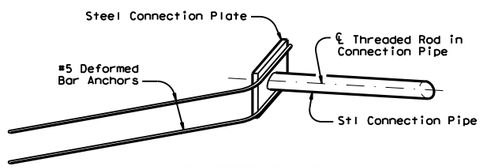
1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".



CONNECTION BOLT OR THREADED ROD DETAIL

Two (2) Threaded Rods (Or Equivalent Hex Hd. Bolts) (w/ Two (2) PL ⅜ x 3 x 3 Plate Washers & Two (2) Std Hex Nuts) required per Joint.

* The connection hardware shall not extend beyond the concrete face of the barrier. Hex head bolts may be provided. The proper length of all hardware should be verified.



ISOMETRIC OF TYPICAL WELDED ASSEMBLY

Four (4) [2 Upper & 2 Lower] Assemblies required per Joint.

Weight of one Precast 30 ft. (CSB) segment = Approx. 6.5 Tons or 440 lbs per ft.

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

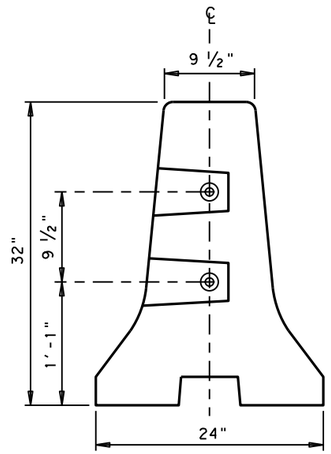
CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER (TYPE 1)

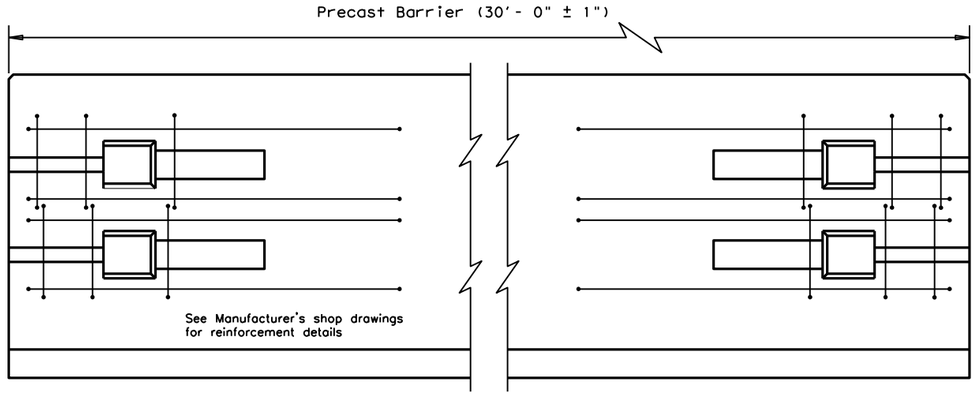
CSB(1)-10

FILE: csb110.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
© TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		37

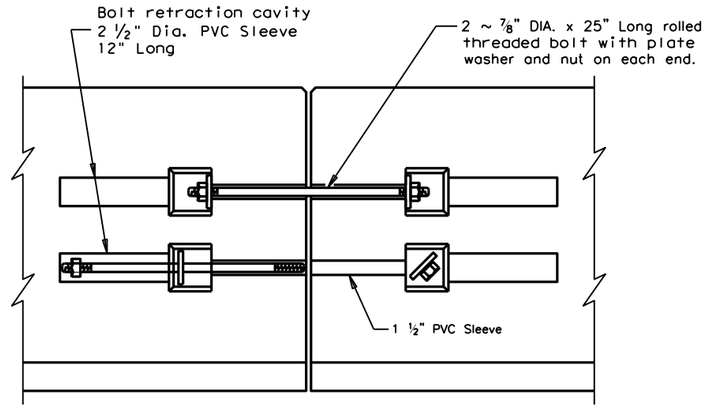
DATE:
FILE:



END VIEW (CSB) QUICK-BOLT
QUICK-BOLT POCKET LOCATIONS

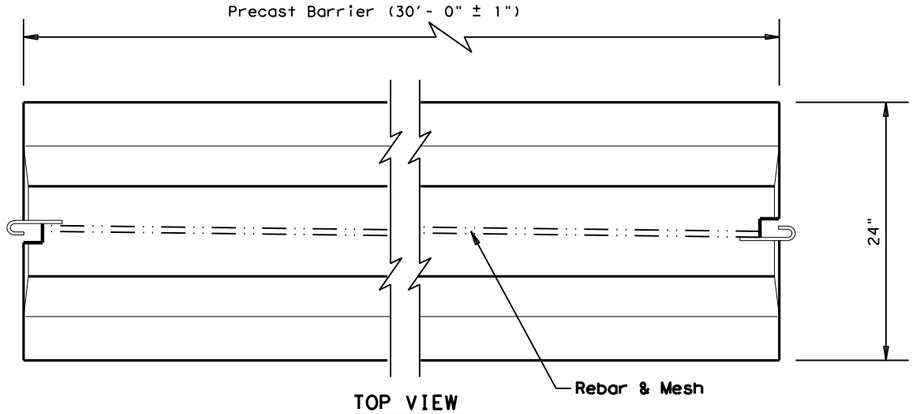


ELEVATION (CSB) QUICK-BOLT
See Manufacturer's shop drawing for additional details

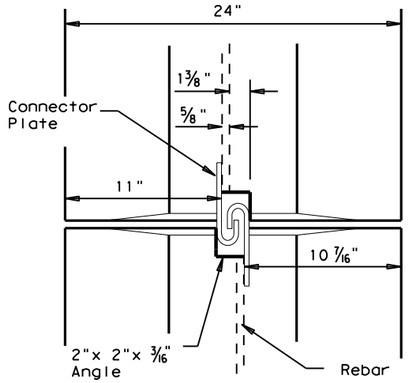


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

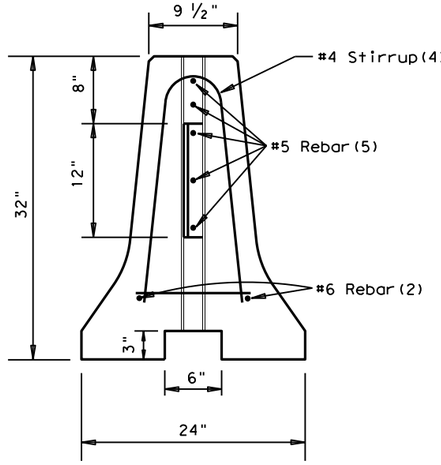
Joint Connection (Type Q)



TOP VIEW
PRECAST (CSB) WITH J-J HOOKS
See Manufacturer's shop drawing for additional details



VIEW FROM ABOVE
J-J HOOK CONNECTION



END VIEW
J-J HOOK CONNECTION

Joint Connection (Type J)

Proprietary Joint Connections (CSB)

Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

J-J Hooks by Easi-Set Industries, (800)547-4045
Quick-Bolt by Bexar Concrete, (210)497-3773

If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.

Texas Department of Transportation | Design Division Standard

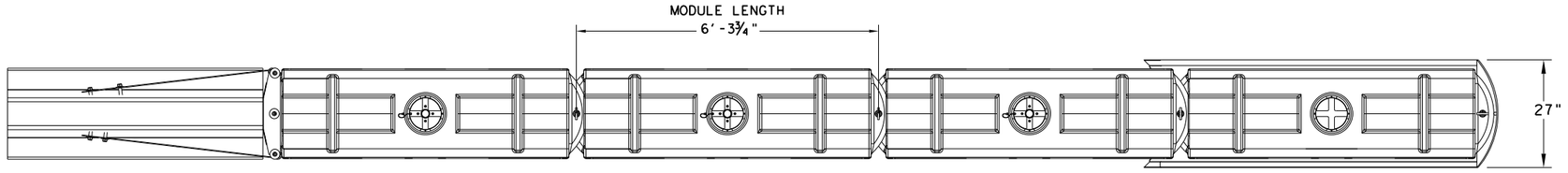
CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER
(TYPE 1)

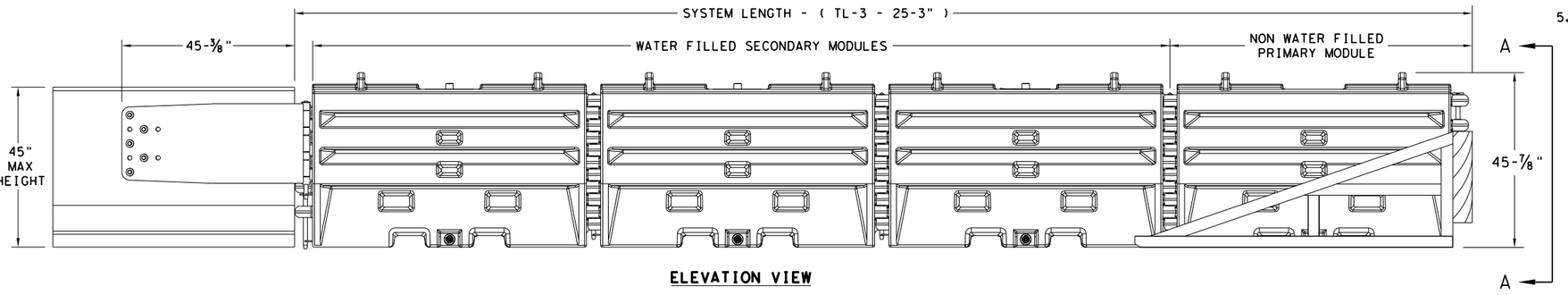
CSB(1)-10

FILE: csb110.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH20
	DIST	COUNTY		SHEET NO.
	06	REEVES		38

DATE:
FILE:



PLAN VIEW



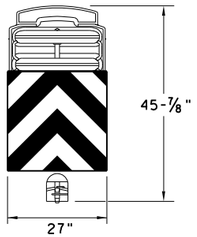
ELEVATION VIEW

GENERAL NOTES

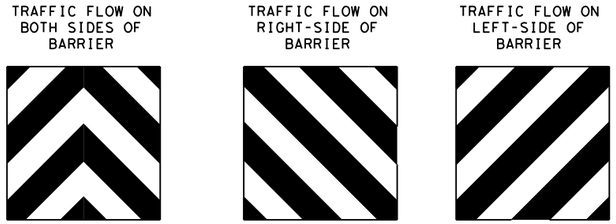
1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE,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

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

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



SECTION A-A

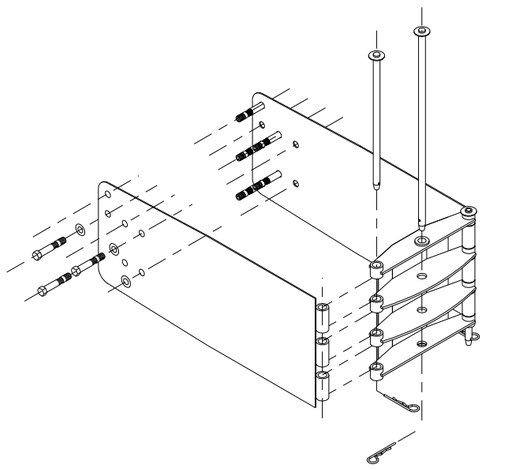


NOSE SHEETING PANEL DELINEATION

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

BILL OF MATERIAL

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



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

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

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

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

SACRIFICIAL

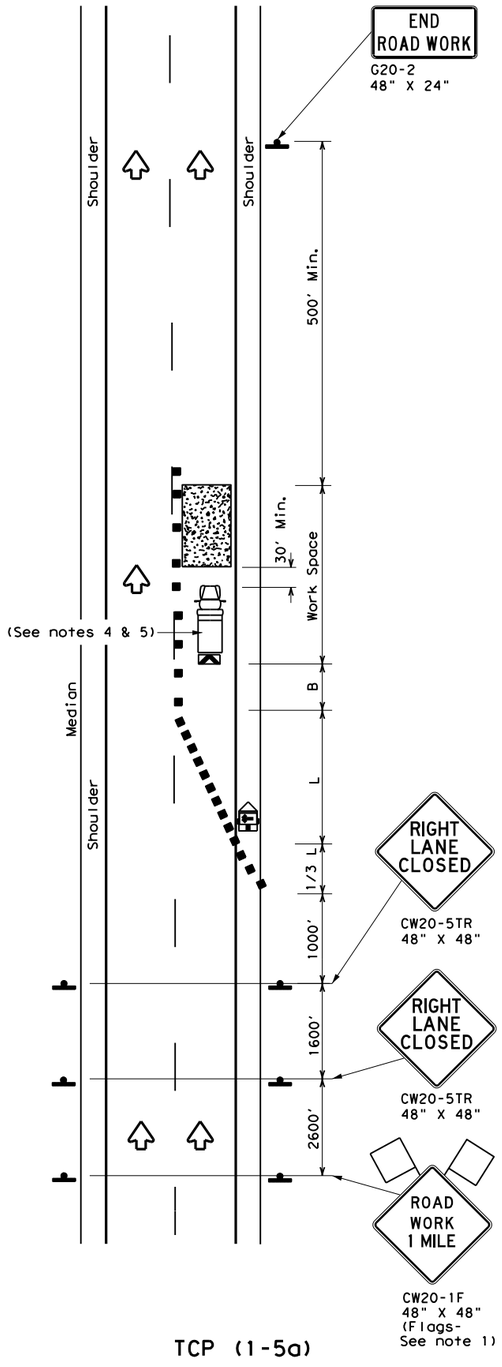
Texas Department of Transportation

Design Division Standard

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

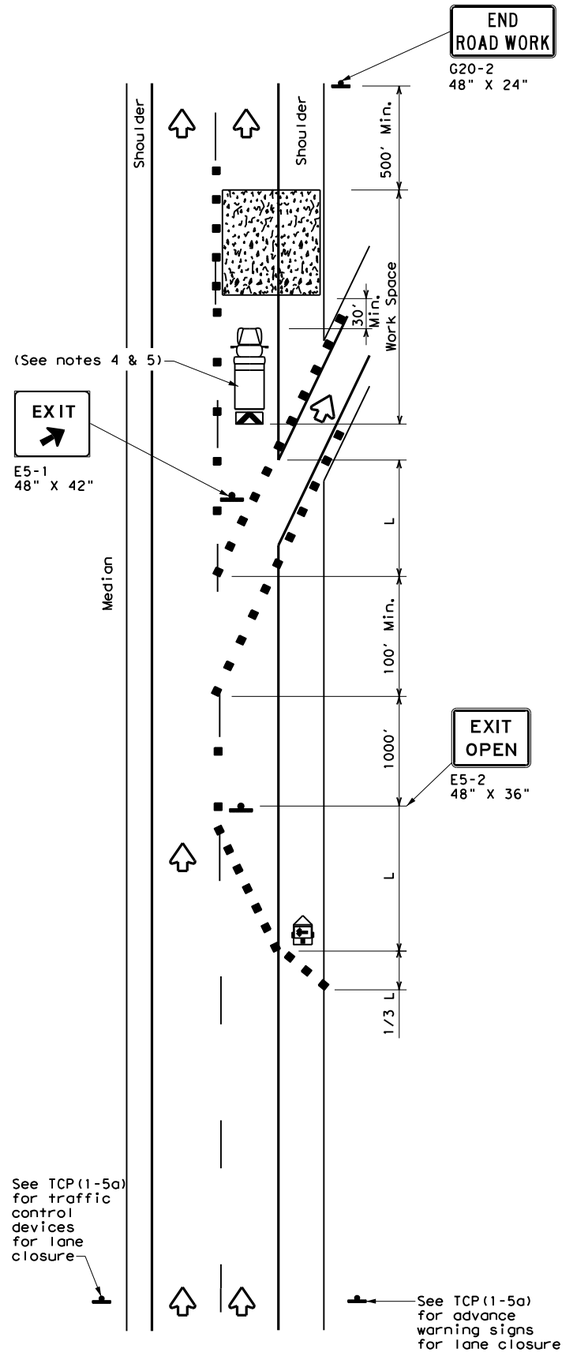
FILE: sled19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: __
©TxDOT: DECEMBER 2019__	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH20
	DIST	COUNTY		SHEET NO.
	06	REEVES		39

DATE:
FILE:



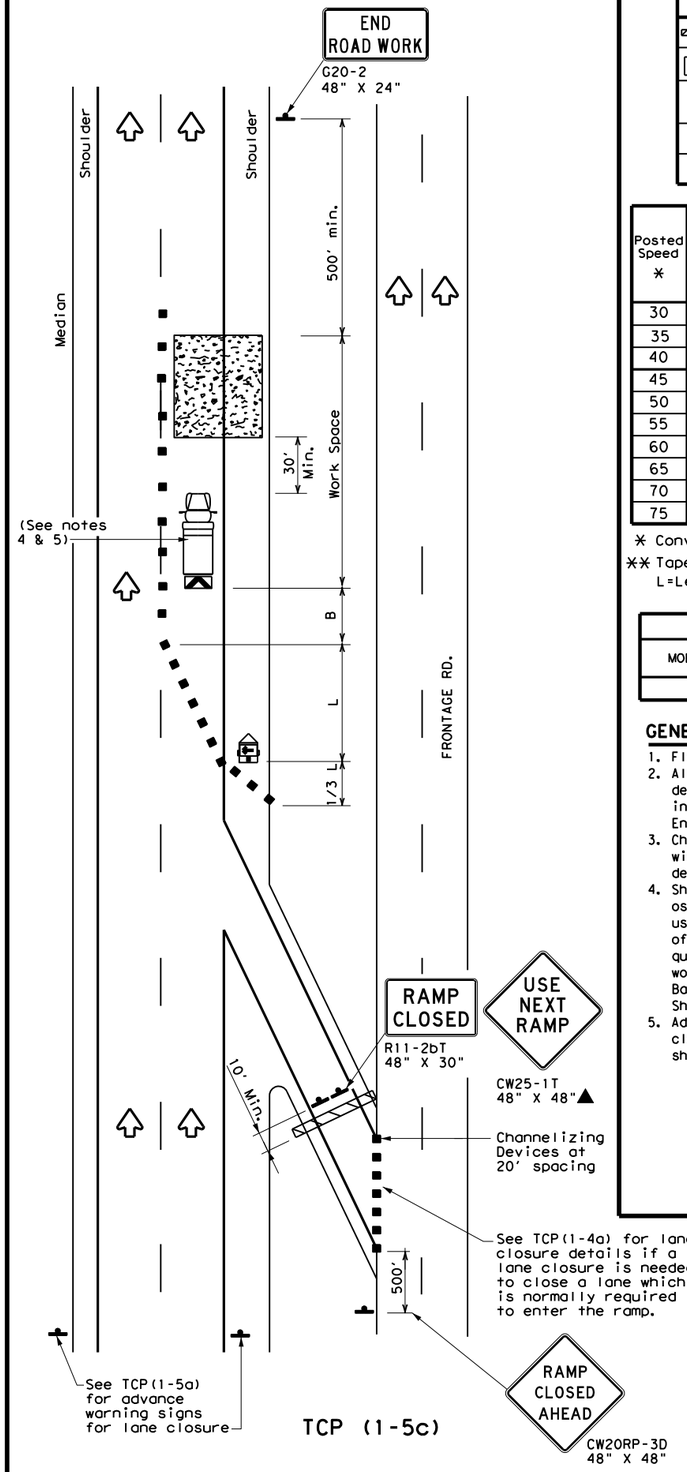
TCP (1-5a)

ONE LANE CLOSURE



TCP (1-5b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (1-5c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP(1-5)-18

FILE: tcp1-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	ODA	REEVES		40

DATE:
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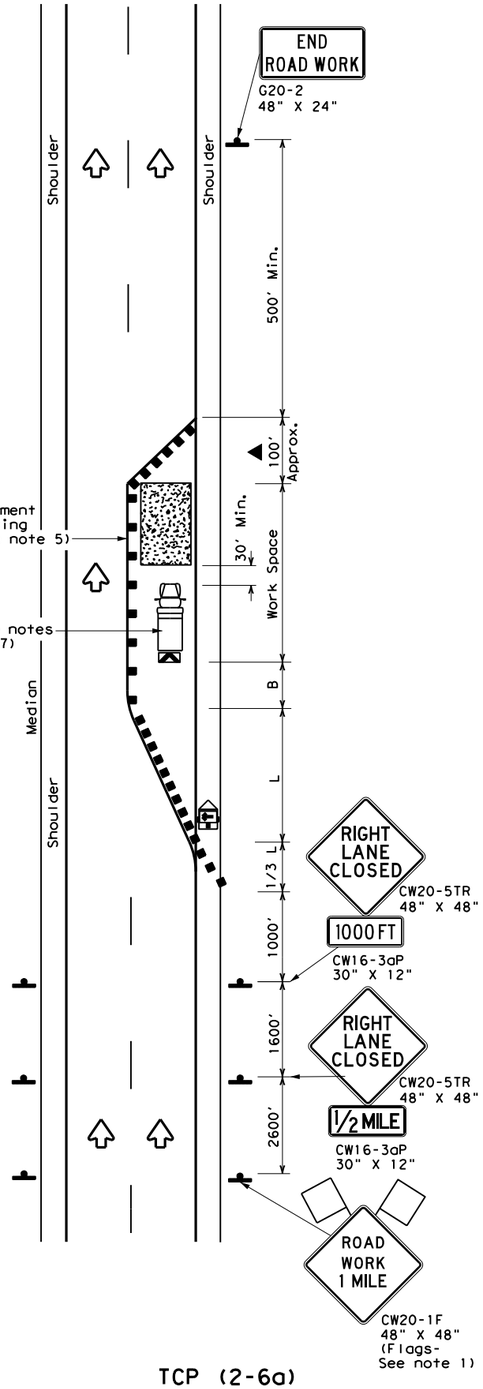
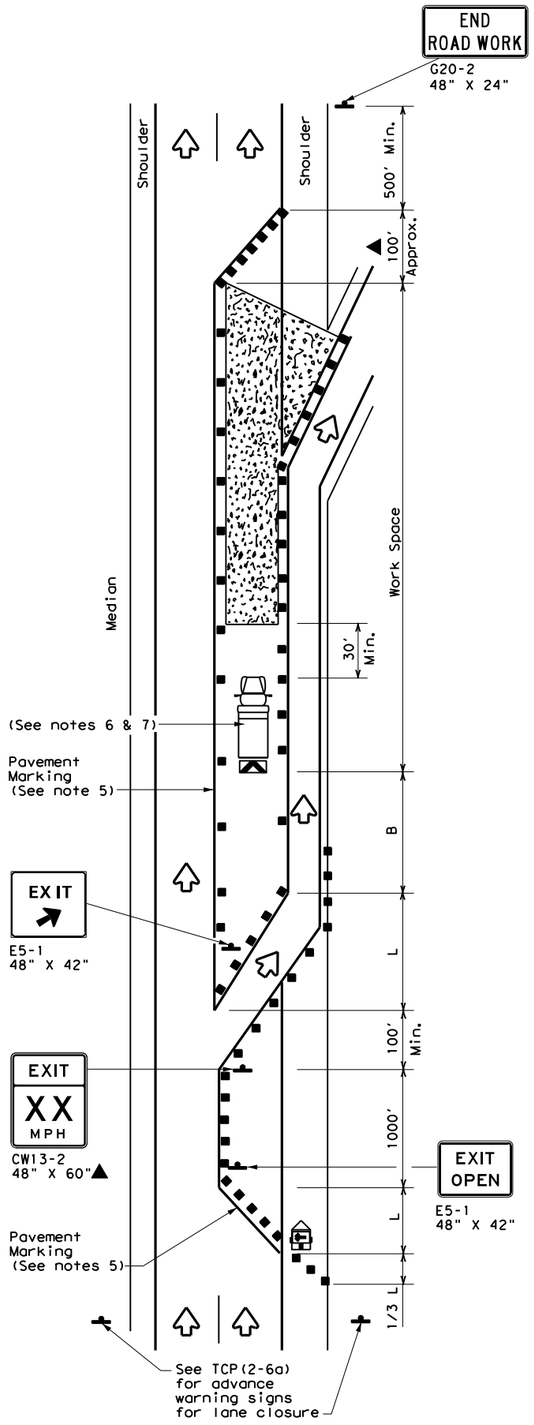


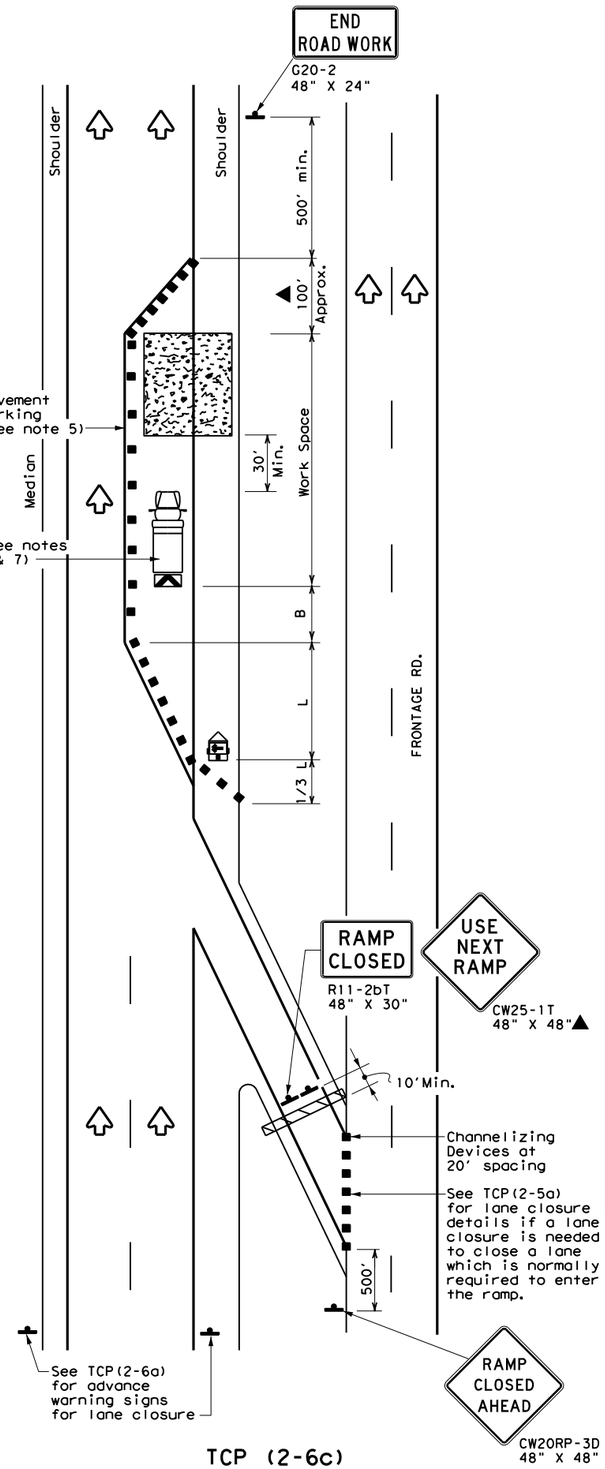
TCP (2-6a)

ONE LANE CLOSURE



TCP (2-6b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (2-6c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP(2-6)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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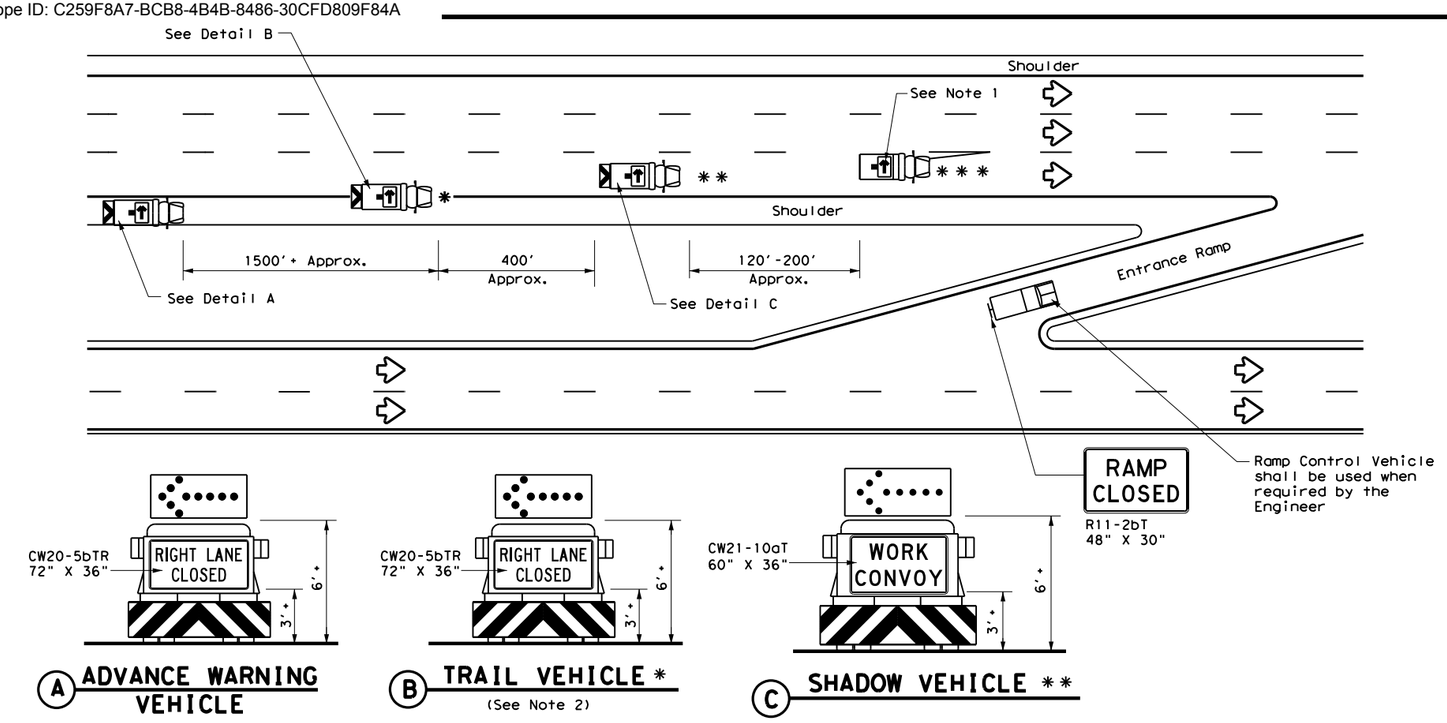
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	ODA	REEVES		41
1-97 2-18				

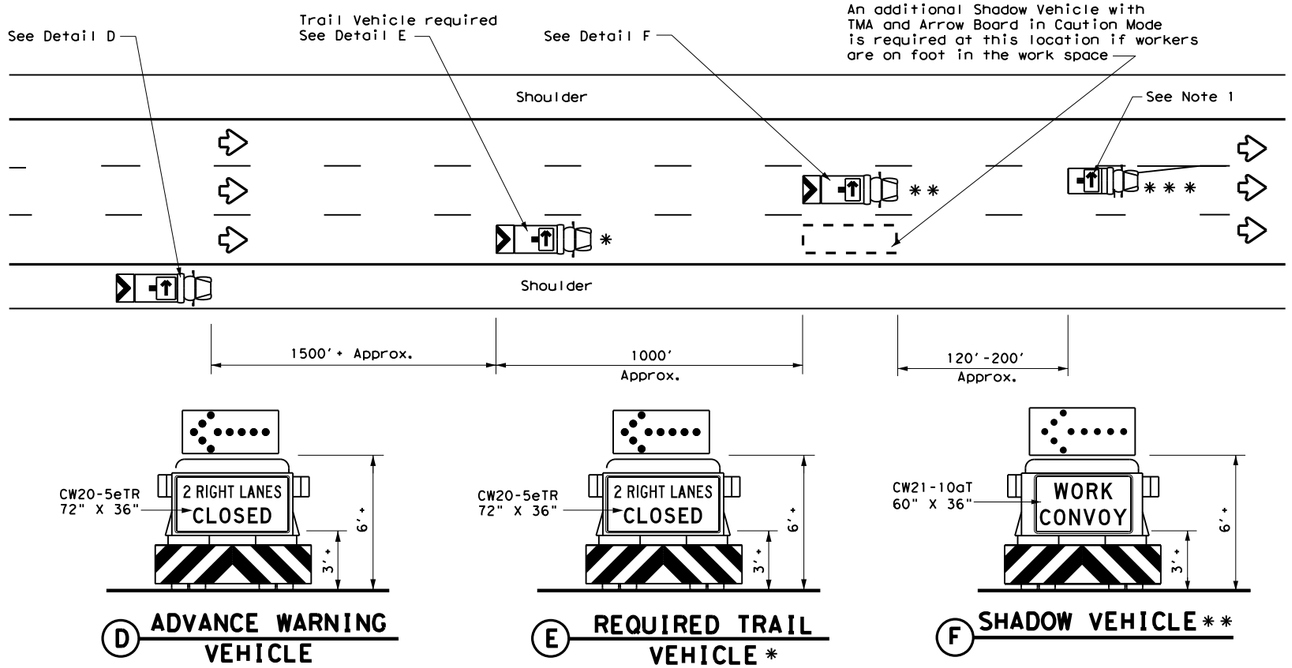


A ADVANCE WARNING VEHICLE

B TRAIL VEHICLE * (See Note 2)

C SHADOW VEHICLE **

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



D ADVANCE WARNING VEHICLE

E REQUIRED TRAIL VEHICLE *

F SHADOW VEHICLE **

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

DATE:
FILE:

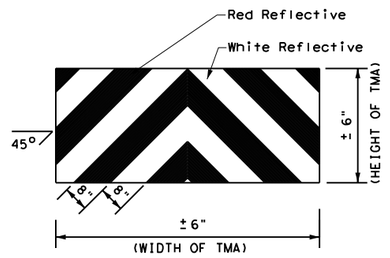
LEGEND

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

FILE: tcp3-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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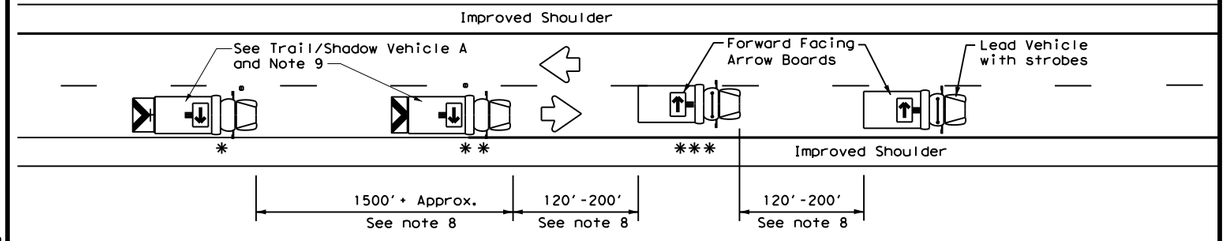
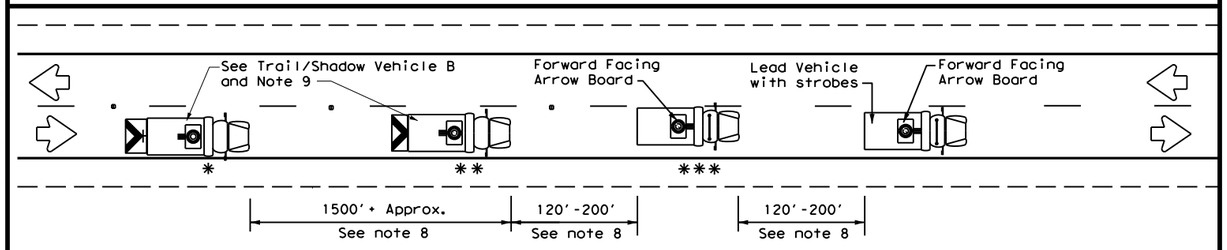
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	ODA	REEVES		42
1-97				

176



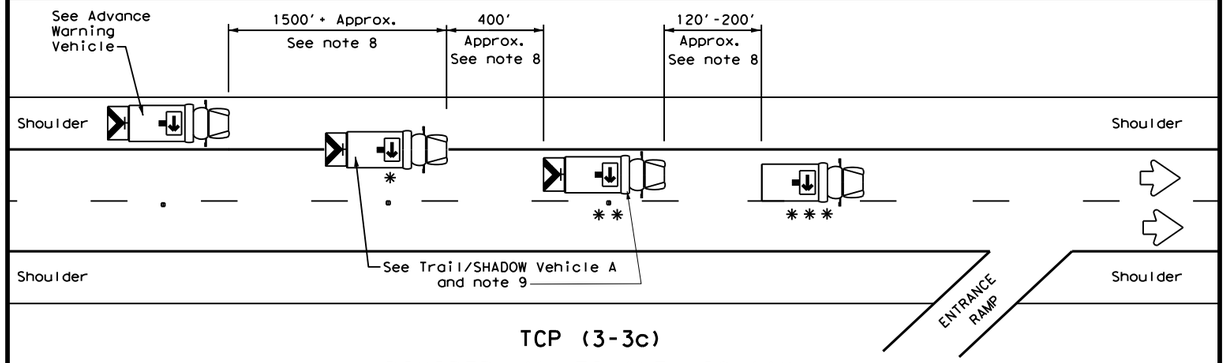
TCP (3-3a)

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



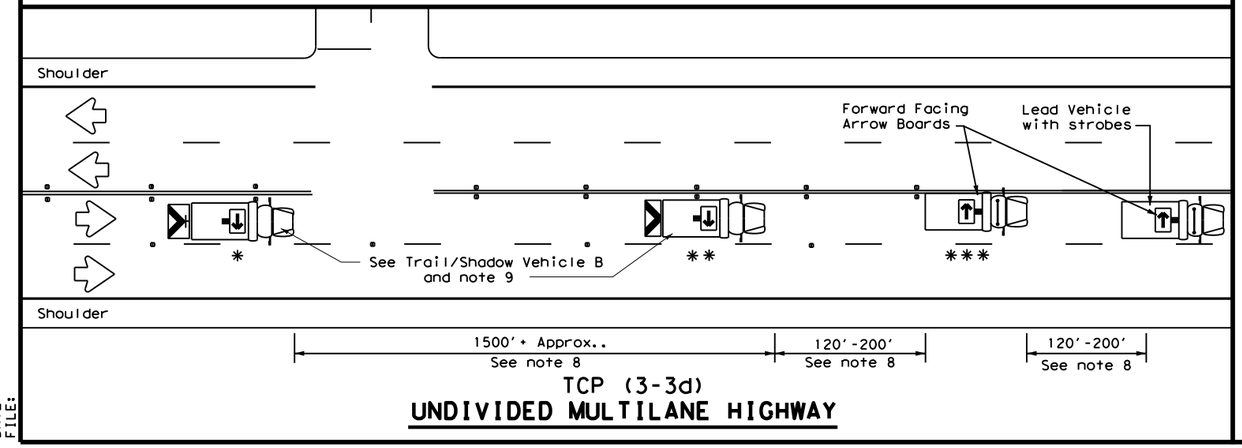
TCP (3-3b)

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



TCP (3-3c)

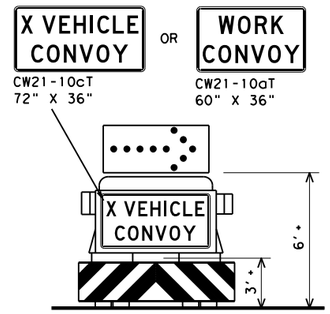
DIVIDED MULTILANE HIGHWAY



TCP (3-3d)

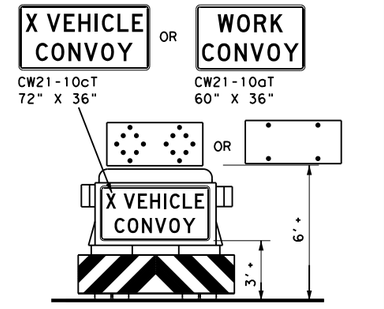
UNDIVIDED MULTILANE HIGHWAY

DATE:
FILE:



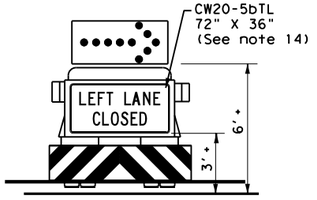
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

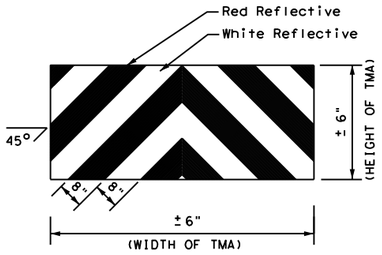


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

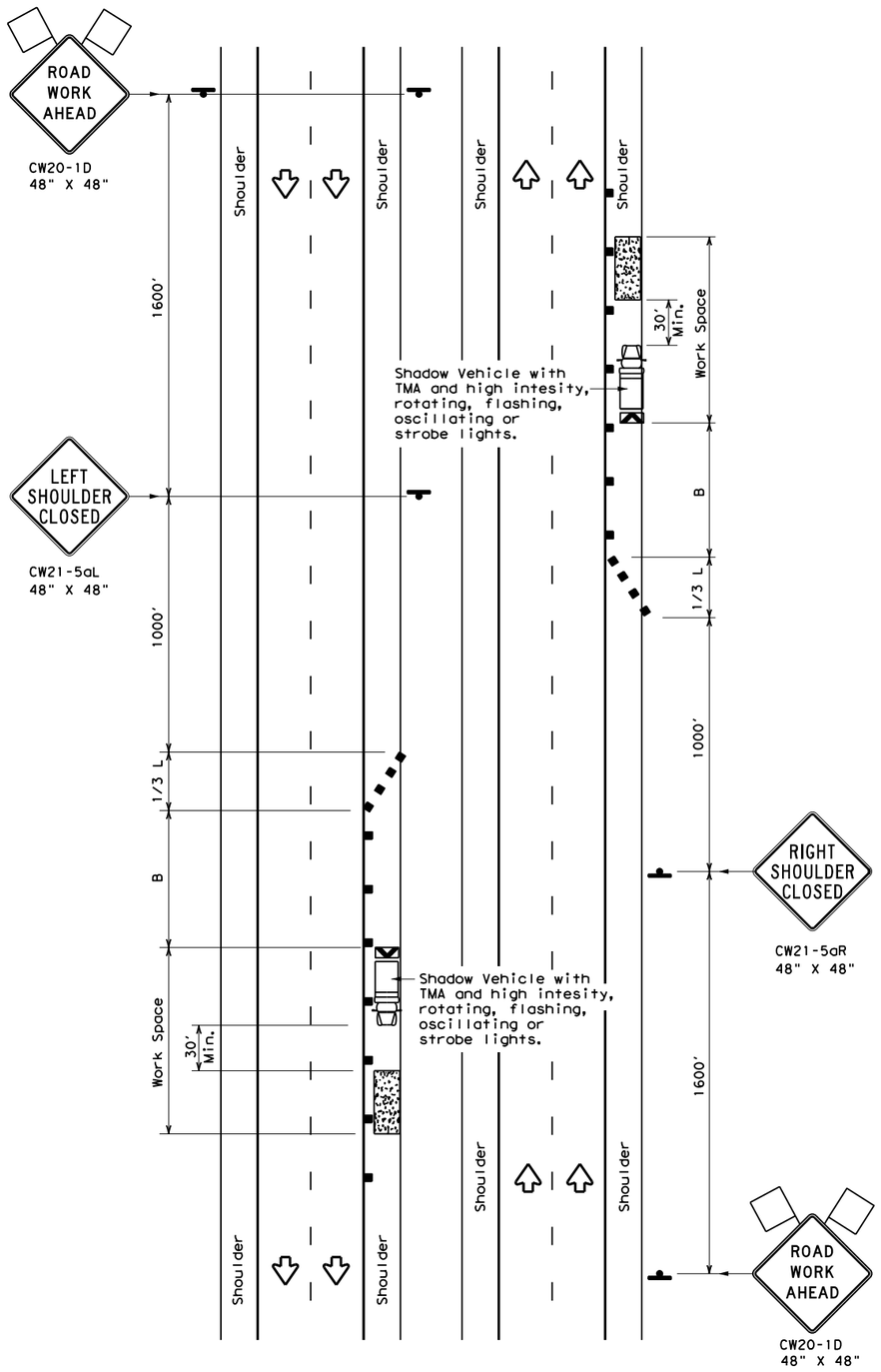
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

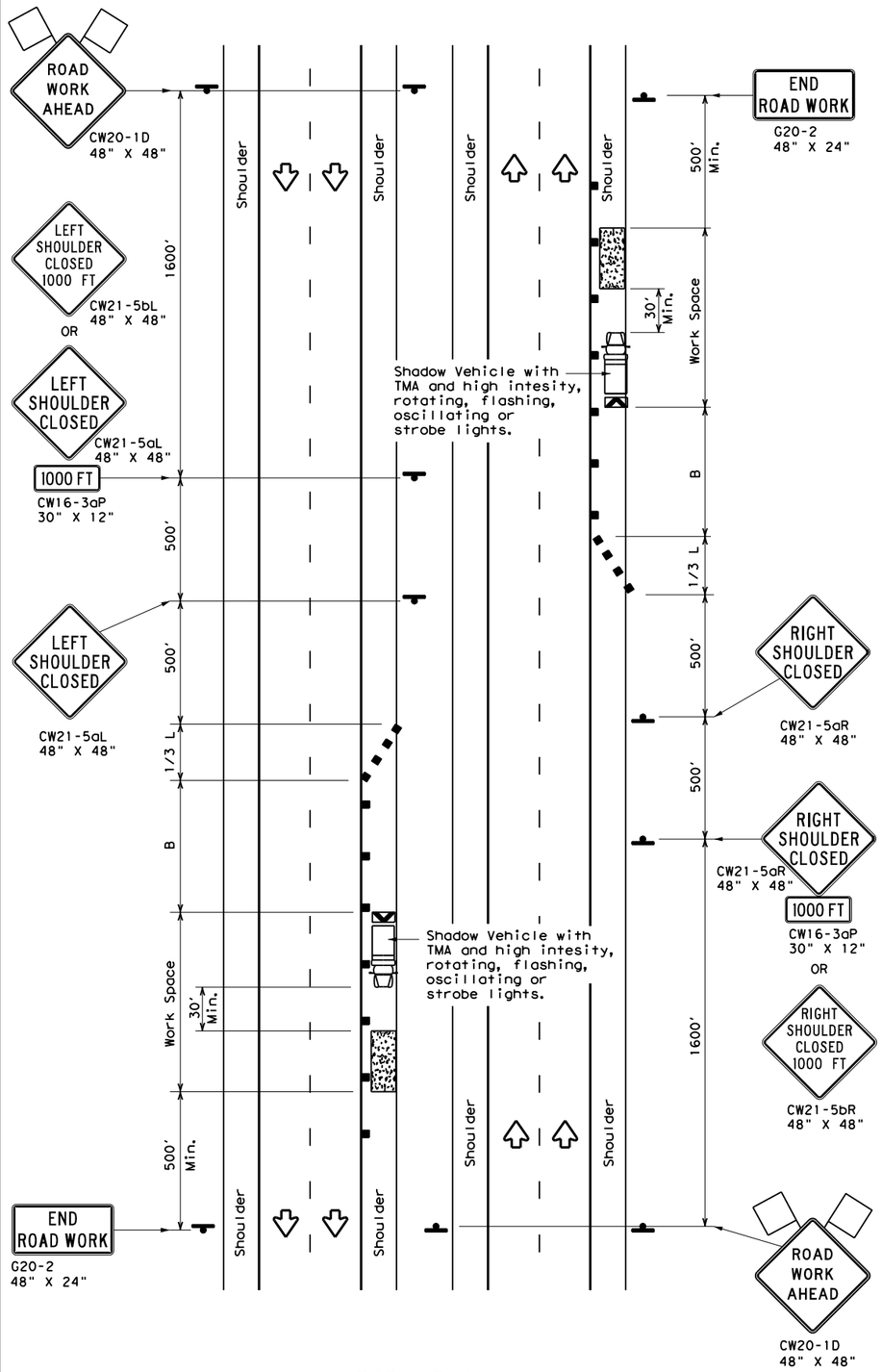
FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	ODA	REEVES		43
1-97 7-14				

DATE:
FILE:



TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

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

Texas Department of Transportation

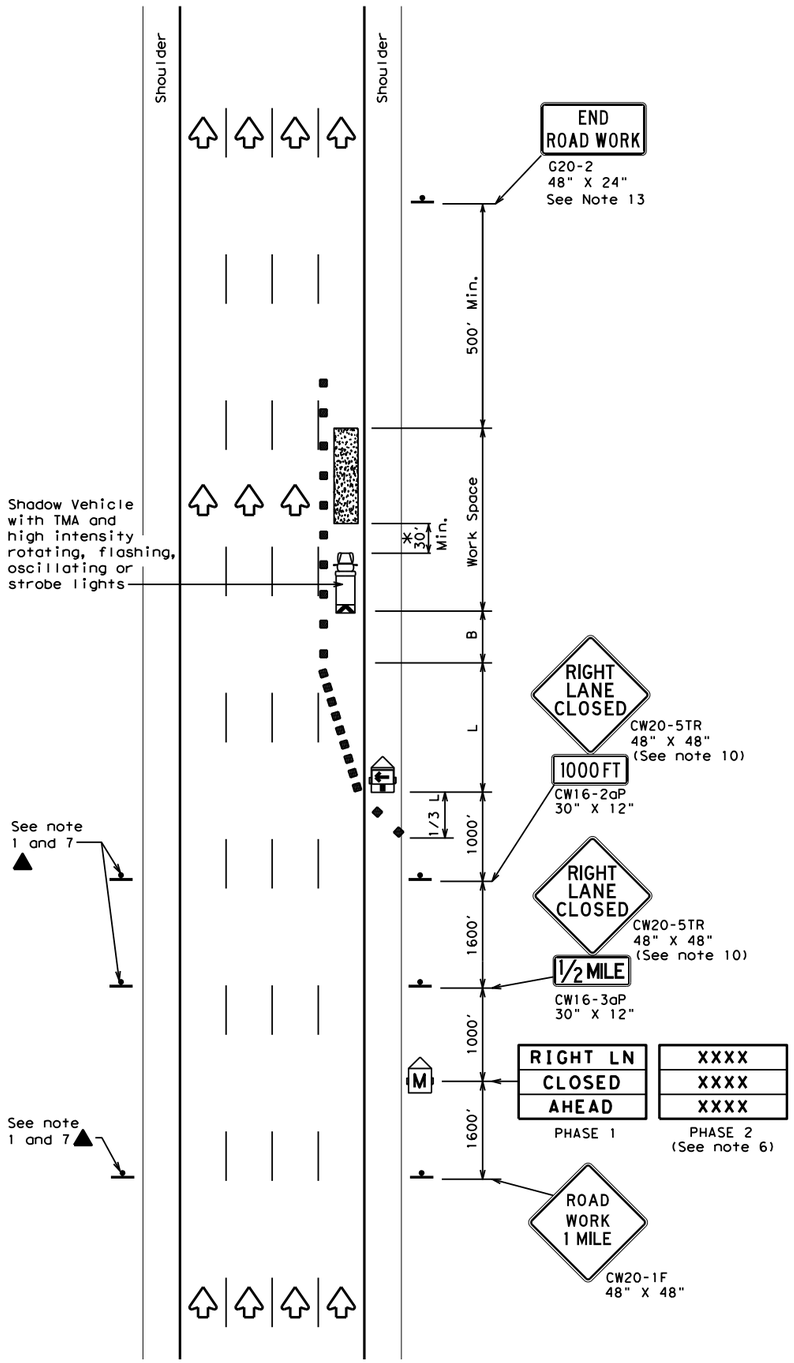
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

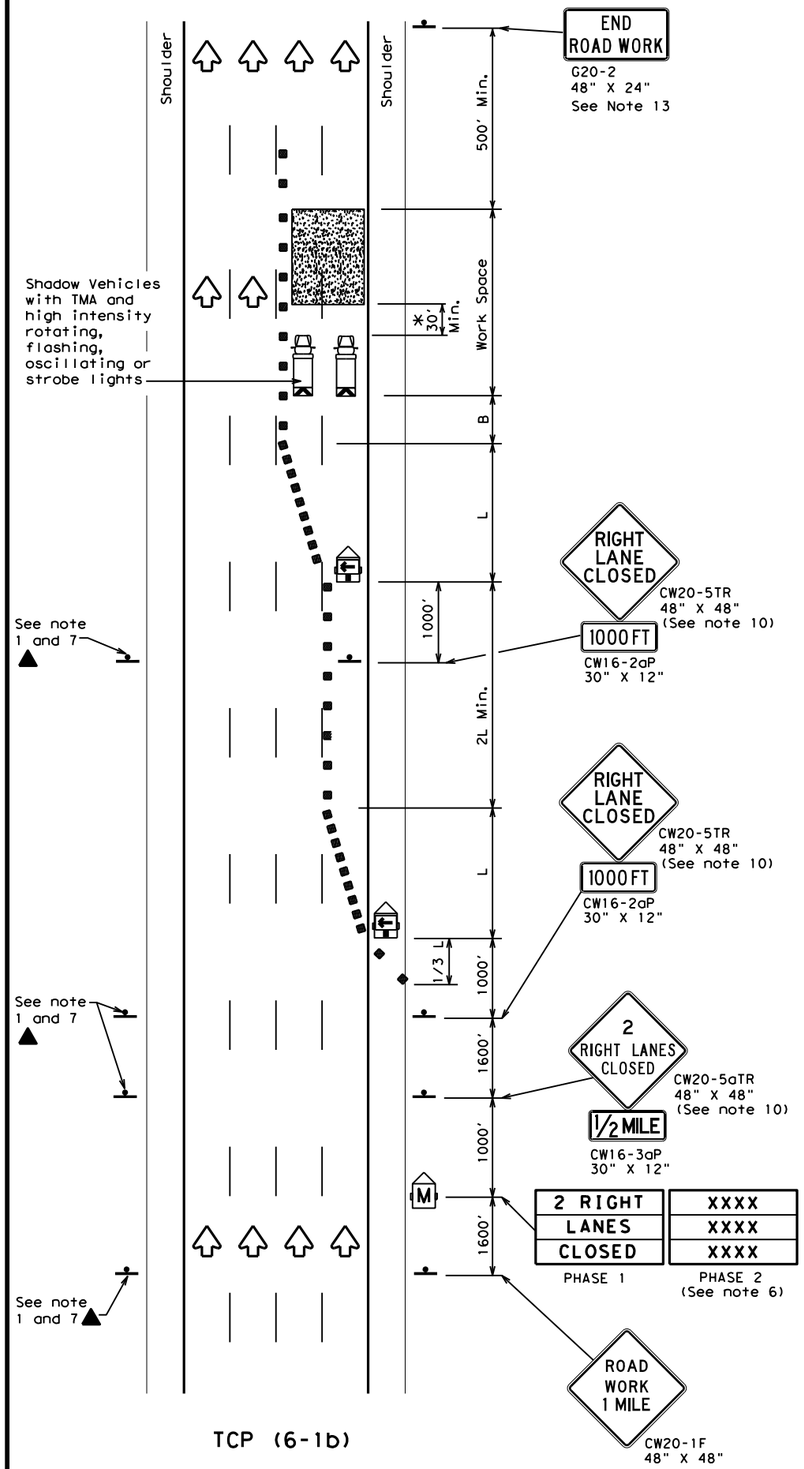
FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
2-18	DIST	COUNTY		SHEET NO.
	ODA	REEVES		44

DATE:
FILE:



TCP (6-1a)

TYPICAL FREEWAY ONE LANE CLOSURE



TCP (6-1b)

TYPICAL FREEWAY TWO LANE CLOSURE

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

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

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

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

GENERAL NOTES

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

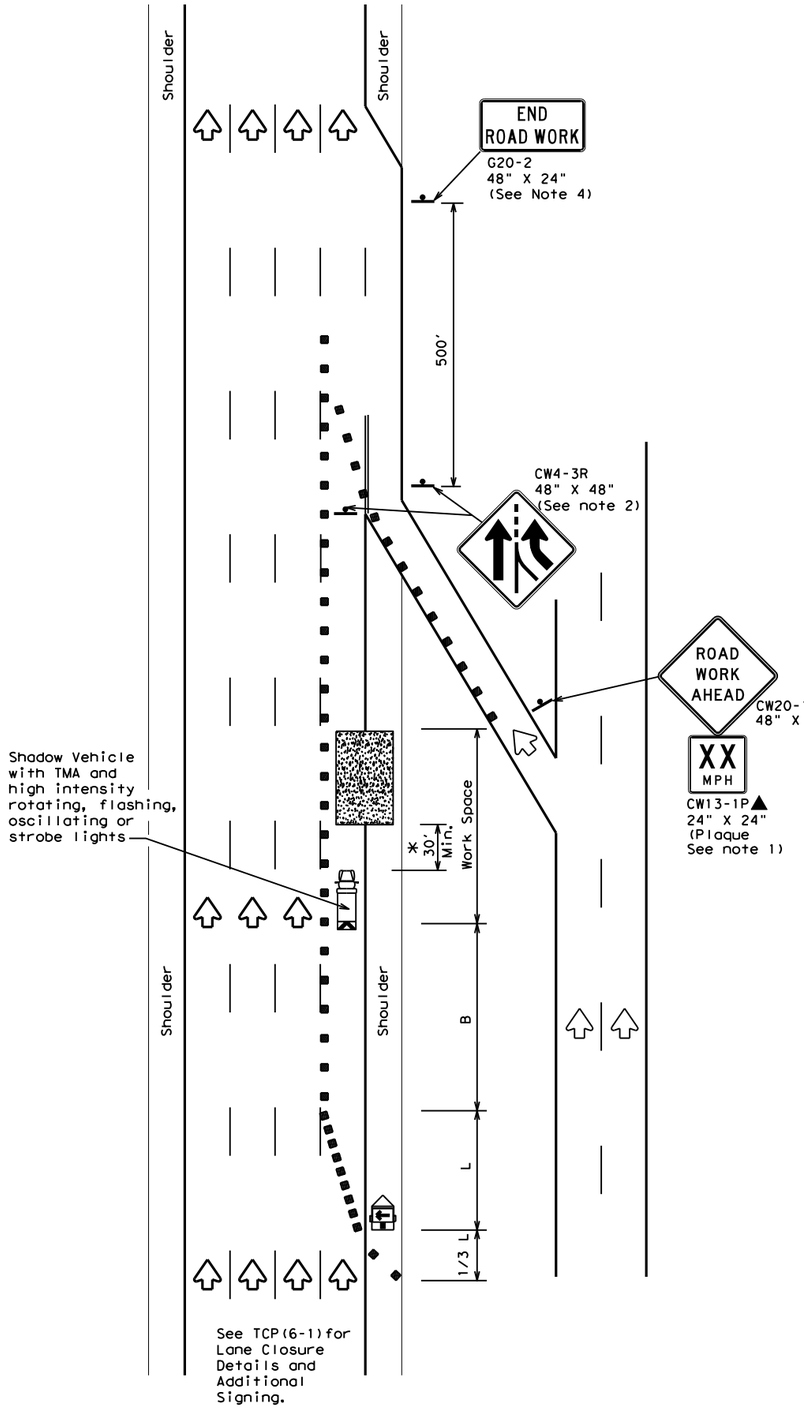
* A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

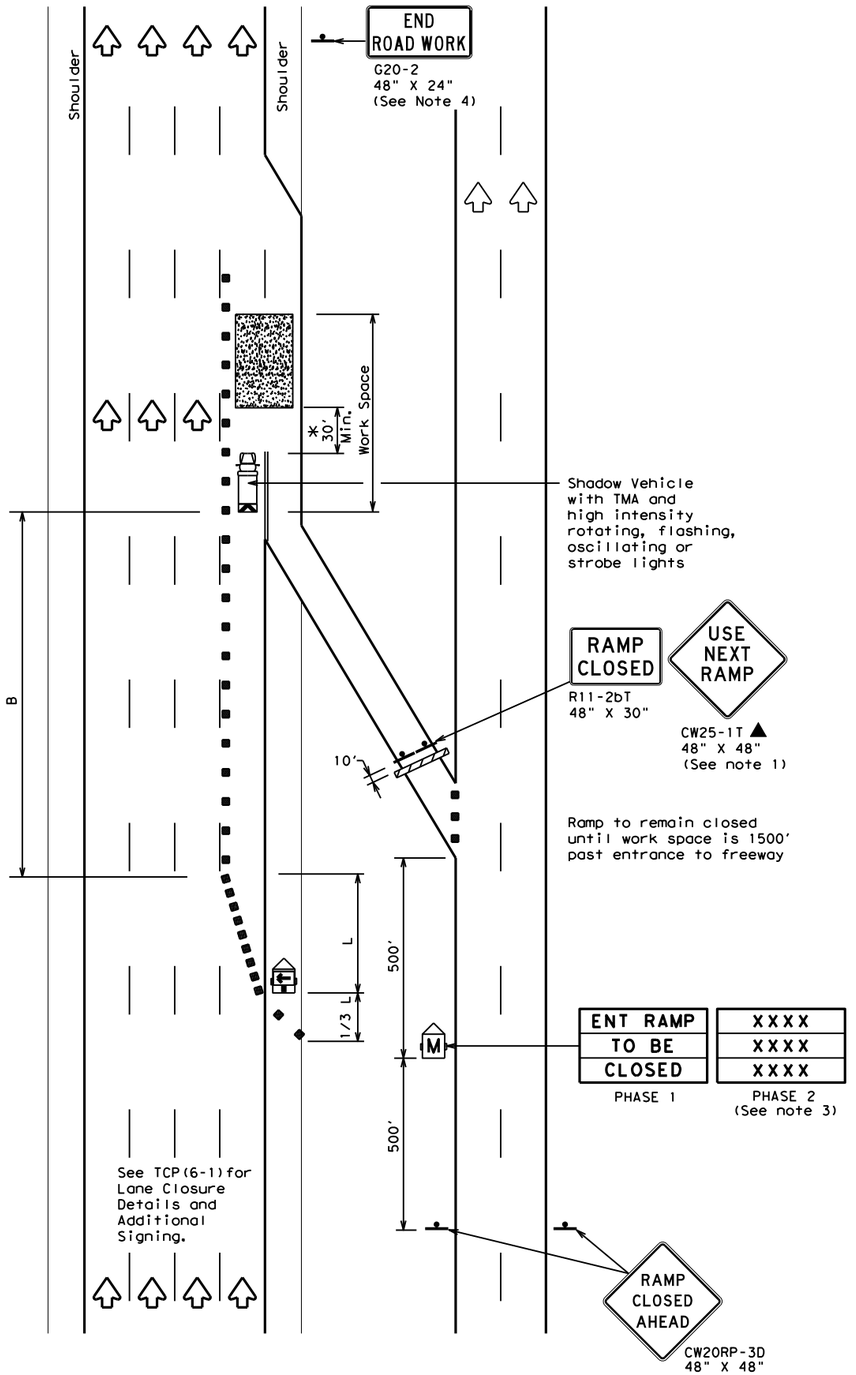
TCP(6-1)-12

FILE: tcp6-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-12	0003	06	103	IH 20
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		45



TCP (6-2a)

ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)

ENTRANCE RAMP CLOSED

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

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

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

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

GENERAL NOTES

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

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

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

Texas Department of Transportation
Traffic Operations Division Standard

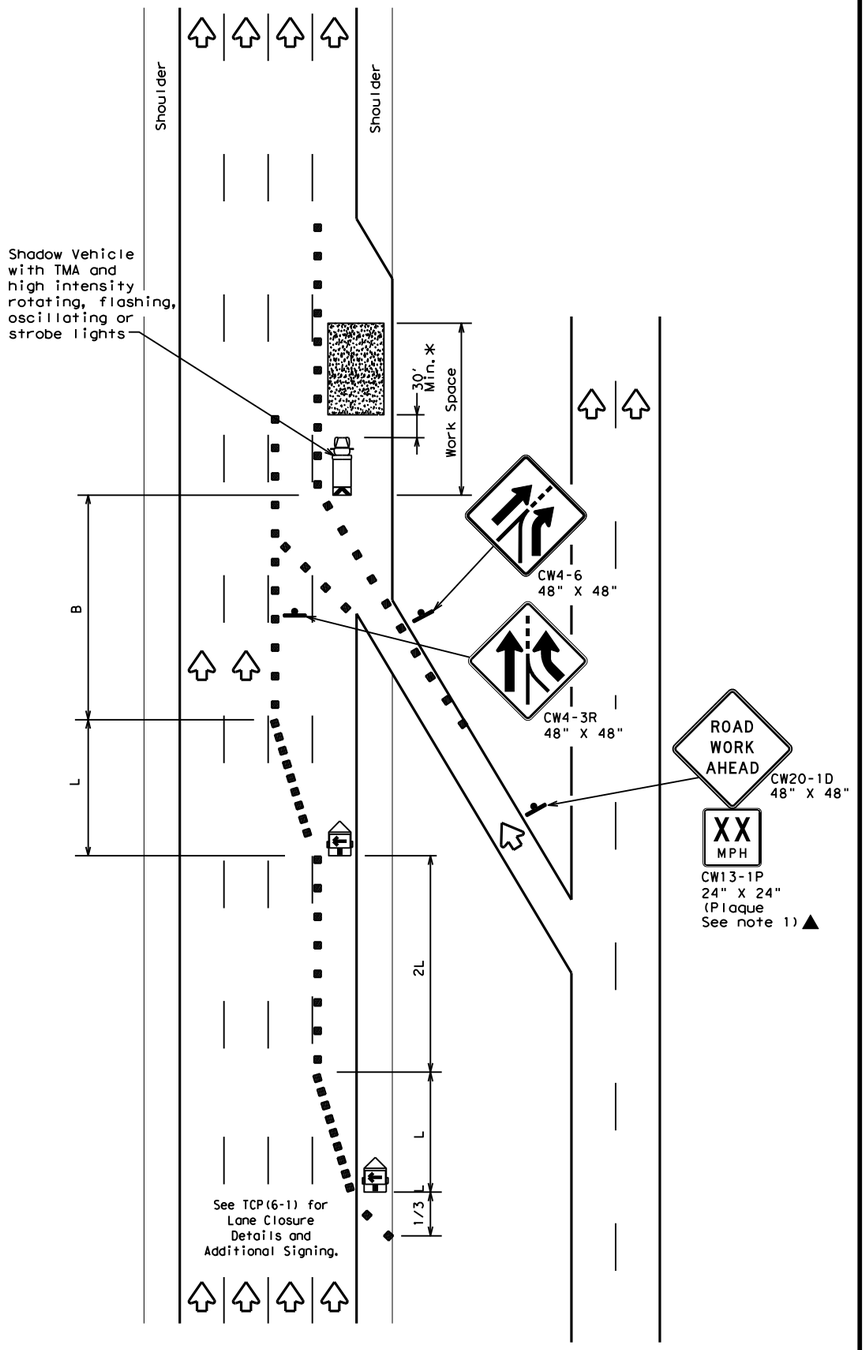
TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP(6-2)-12

FILE: tcp6-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	ODA	REEVES		46

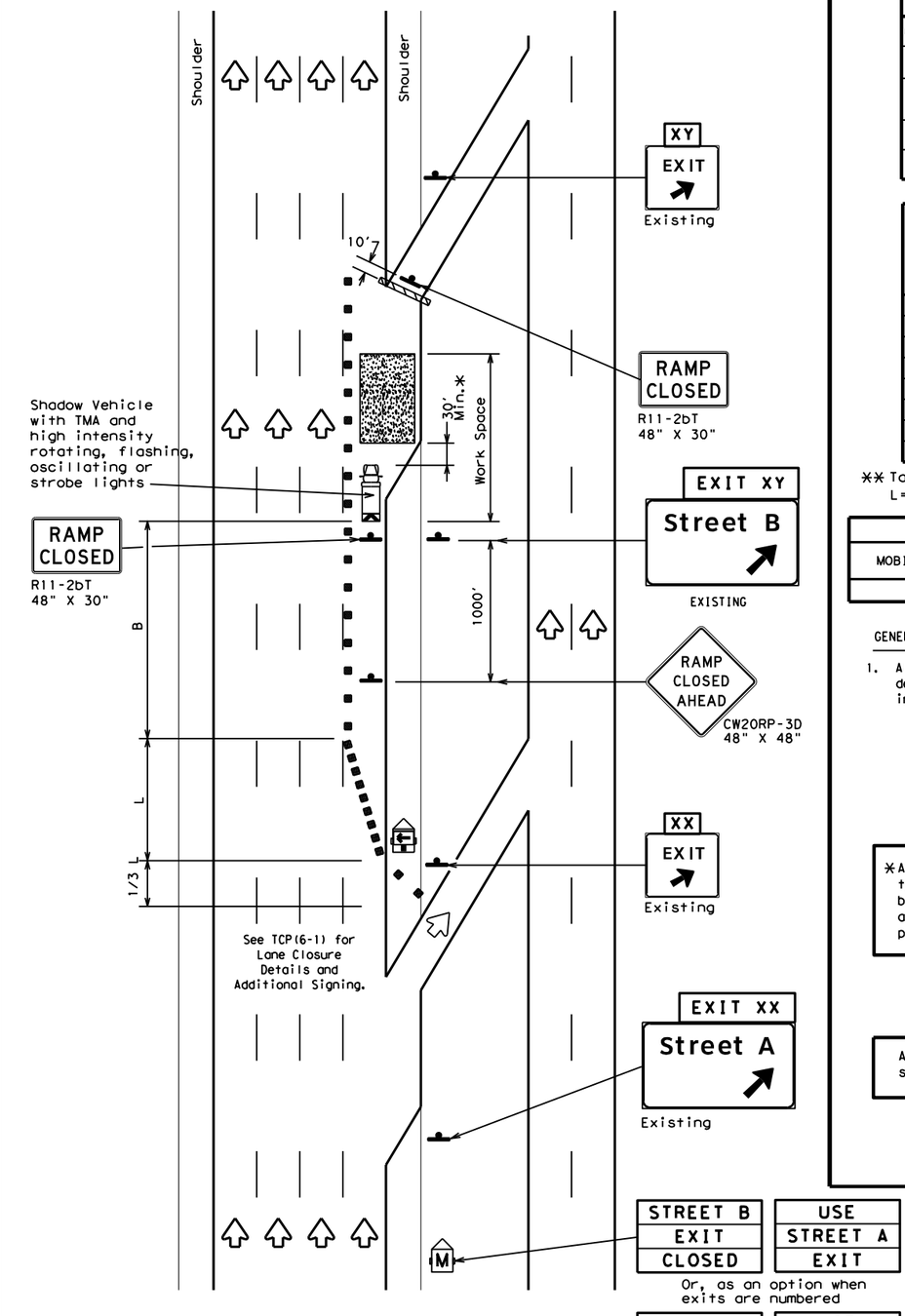
DATE:
FILE:

DATE:
FILE:



TCP (6-3a)

ENTRANCE RAMP OPEN



TCP (6-3b)

EXIT RAMP CLOSED

TRAFFIC EXITS PRIOR TO CLOSED RAMP

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

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

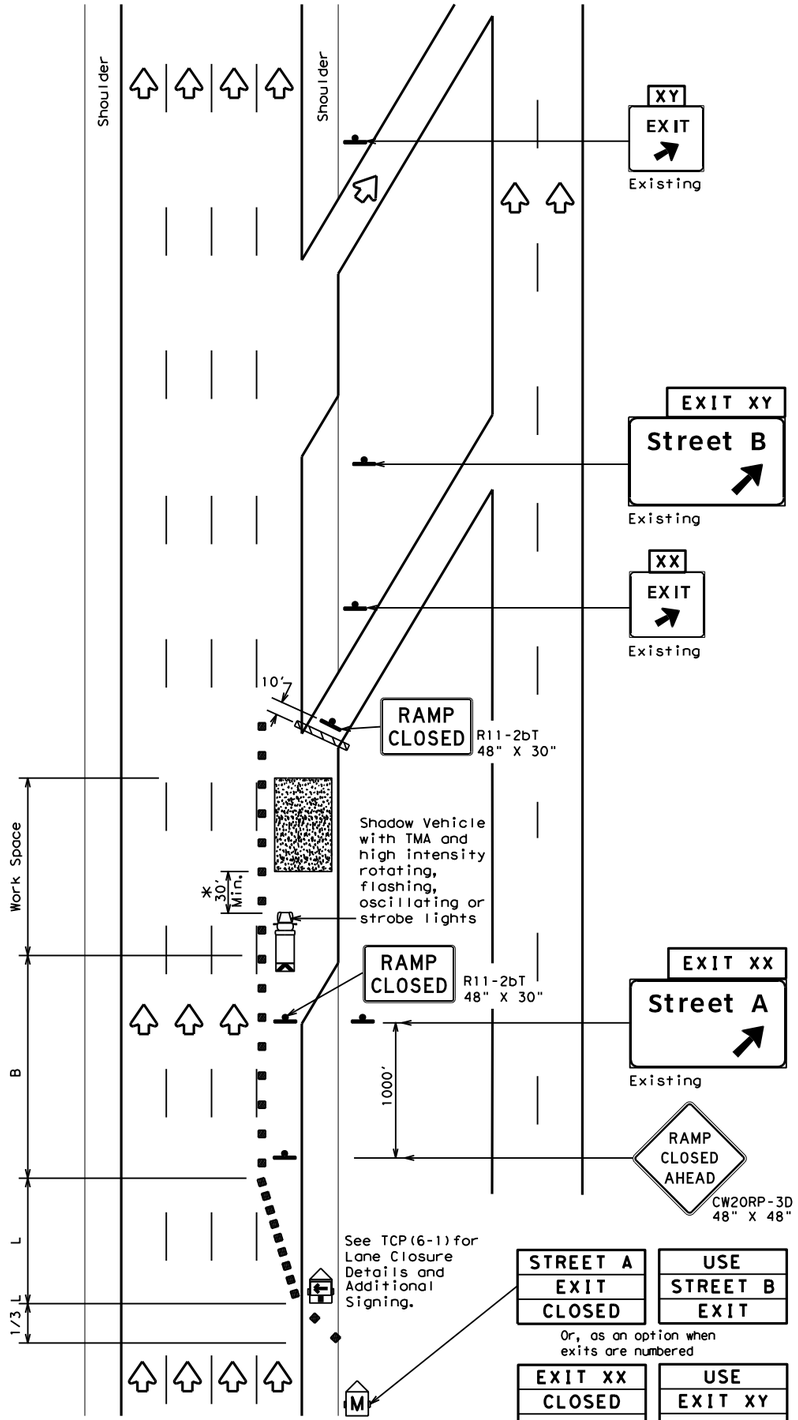
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

TCP(6-3)-12

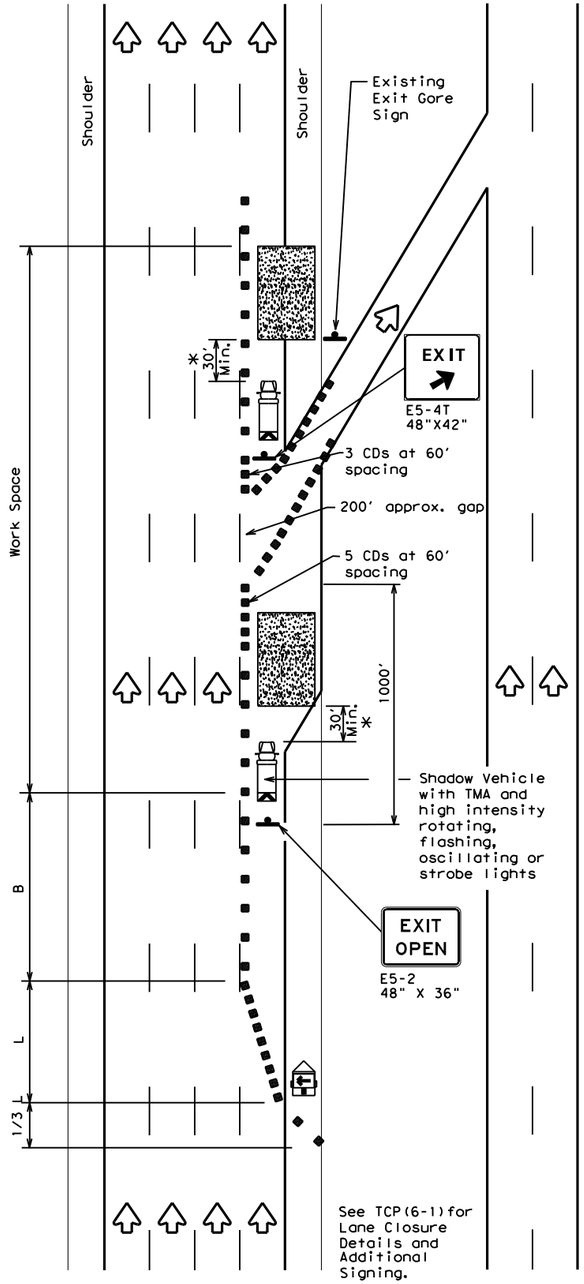
FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994 REVISIONS	CONT	SECT	JOB	HIGHWAY
1-97 8-98	0003	06	103	IH 20
4-98 8-12	DIST	COUNTY		SHEET NO.
	ODA	REEVES		47

DATE:
FILE:



TCP (6-4a)

EXIT RAMP CLOSED
TRAFFIC EXITS PAST CLOSED RAMP



TCP (6-4b)

EXIT RAMP OPEN

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

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

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

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

GENERAL NOTES

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

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

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

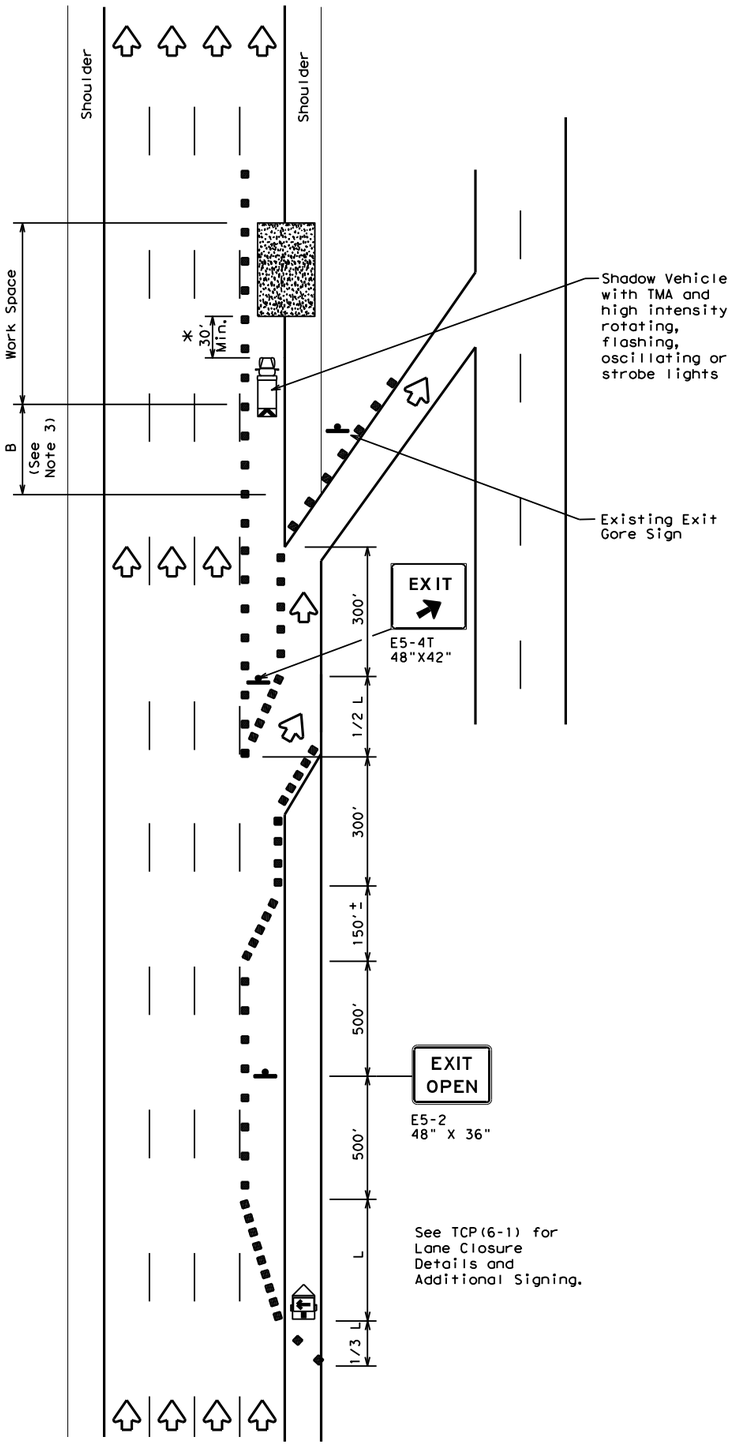
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

TCP(6-4)-12

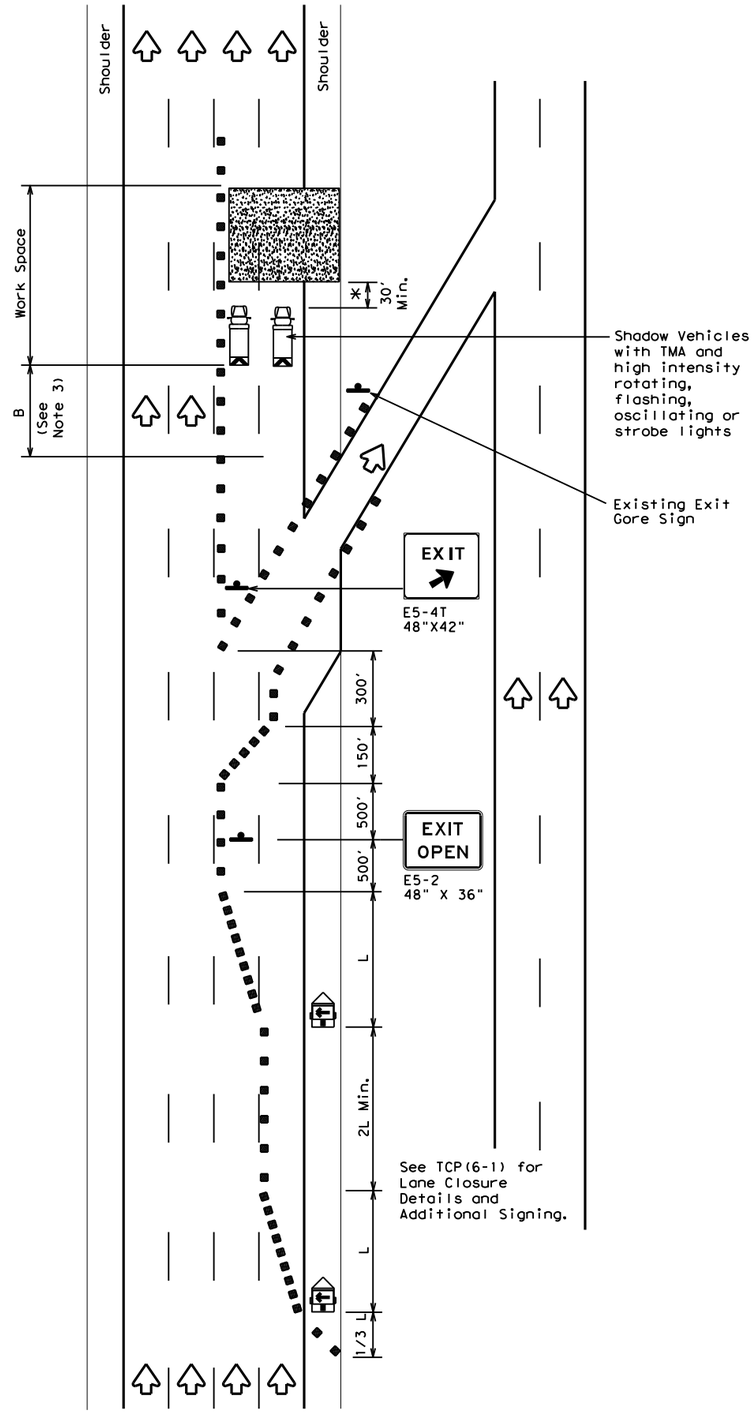
FILE: tcp6-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT Feburgry 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	ODA	REEVES		48

DATE:
FILE:



TCP (6-5a)

EXIT RAMP OPEN



TCP (6-5b)

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

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

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

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

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

GENERAL NOTES

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

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

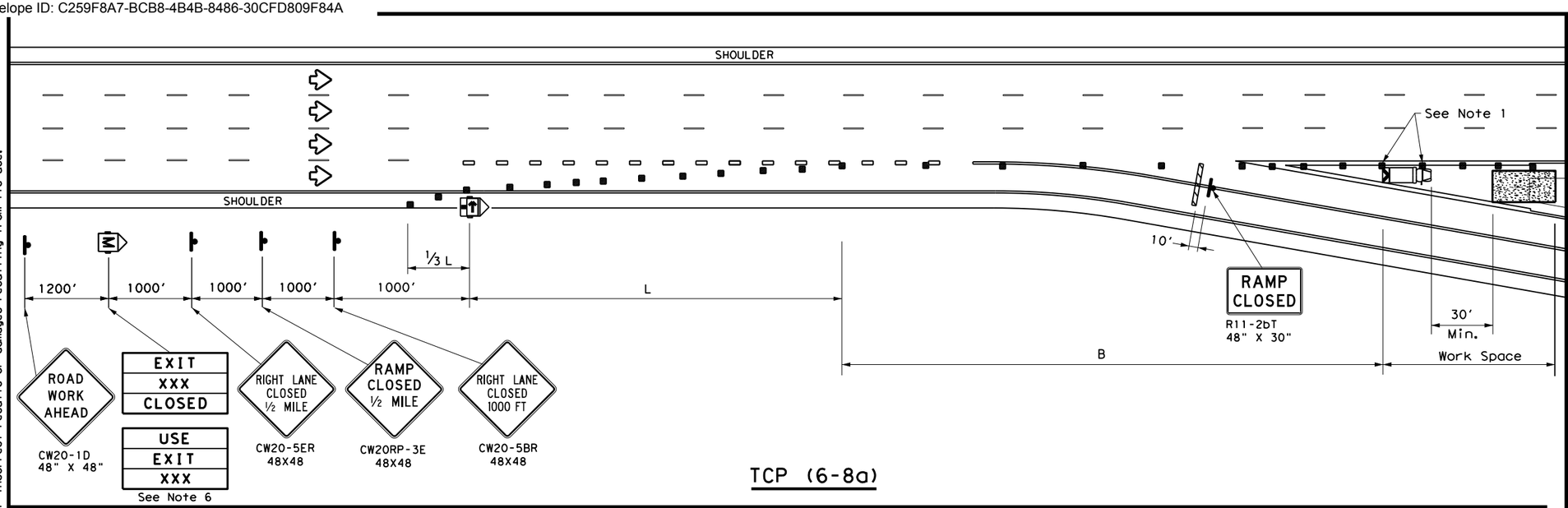
Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

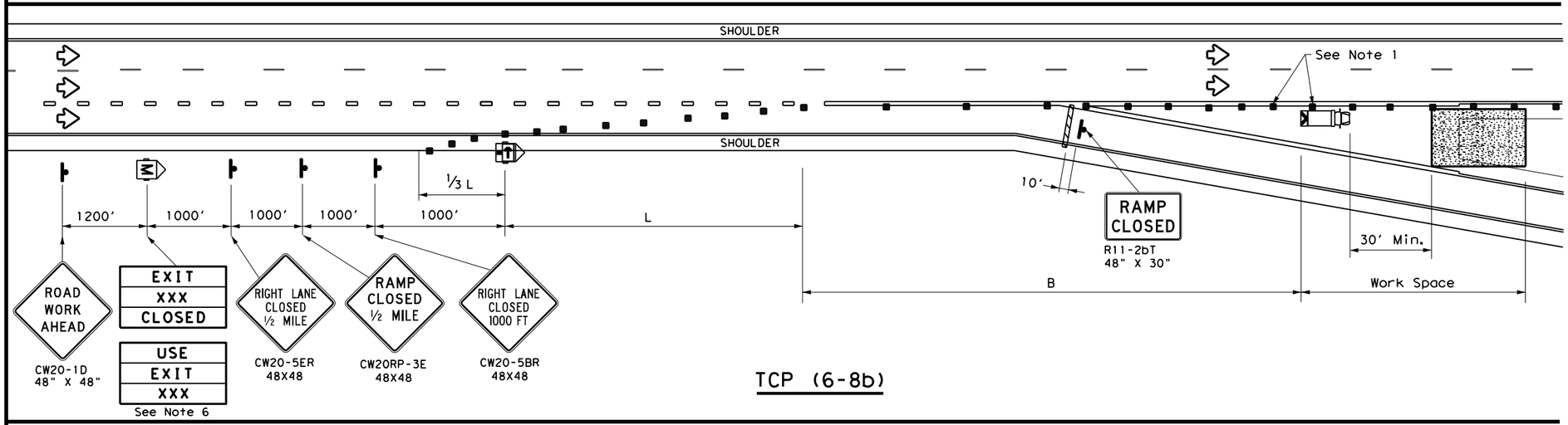
TRAFFIC CONTROL PLAN
WORK AREA BEYOND EXIT RAMP

TCP(6-5)-12

FILE: _tcp6-5.dgn_	DN: _TxDOT_	CK: TxDOT	DW: _TxDOT_	CK: TxDOT
©TxDOT Feburgry 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	ODA	REEVES		49



TCP (6-8a)



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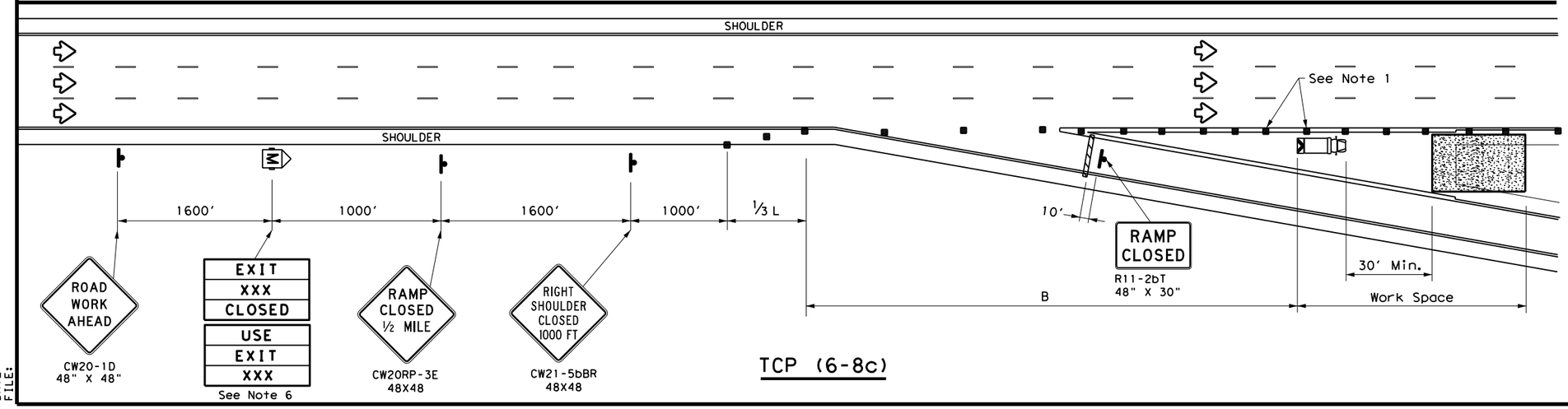

TCP (6-8c)

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LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

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

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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
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REVISIONS	0003	06	103	IH 20
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		50

DATE:
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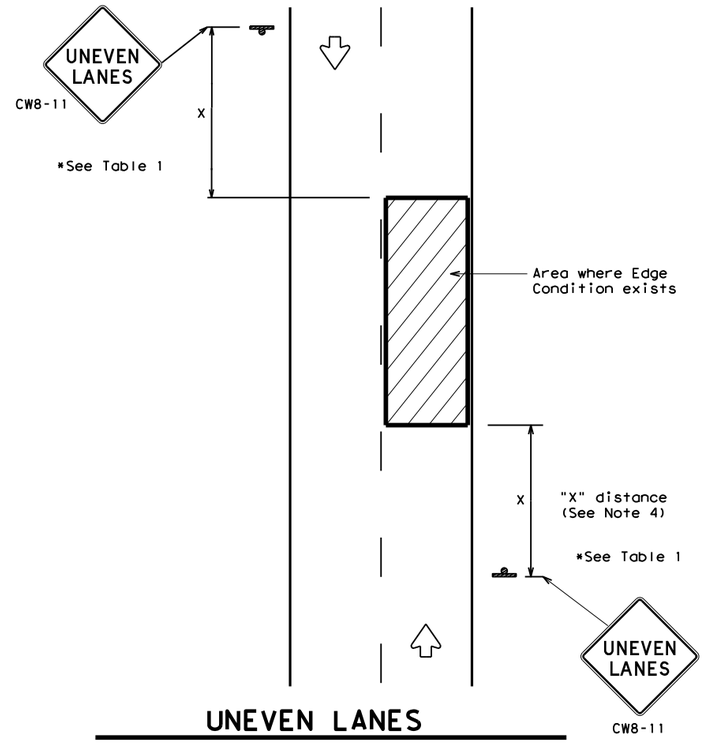
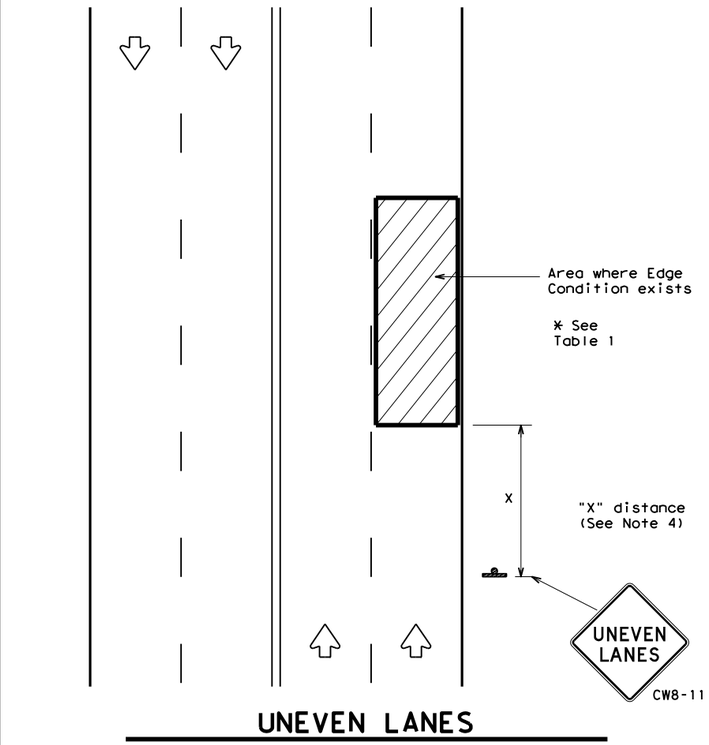
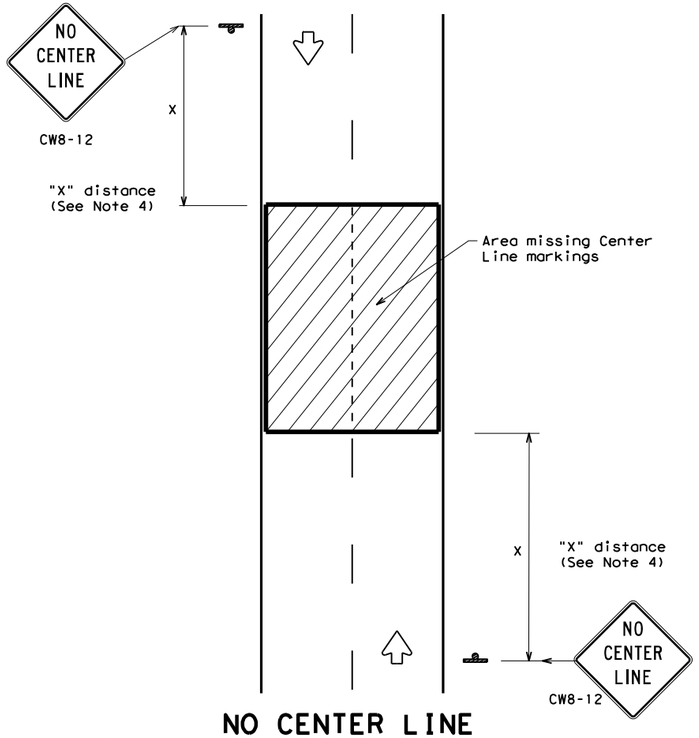


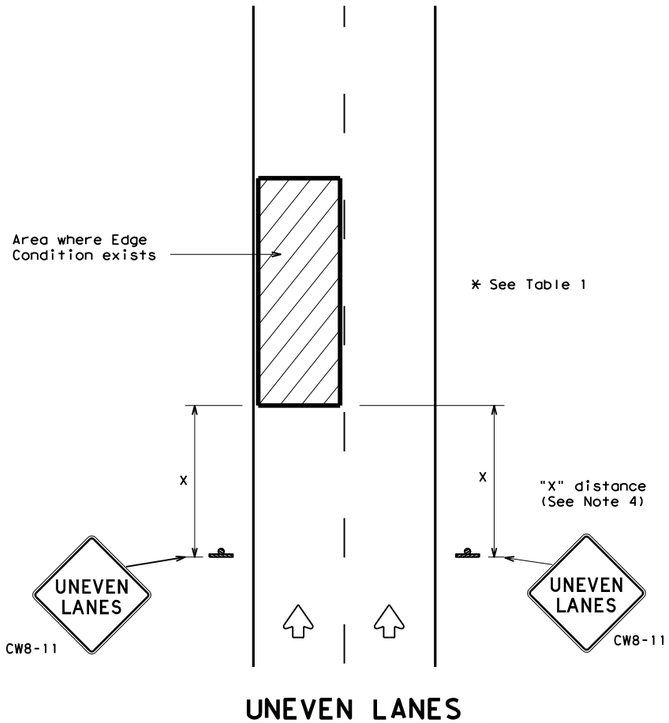
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

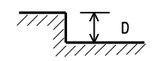
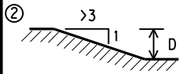
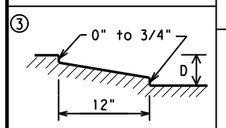
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

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SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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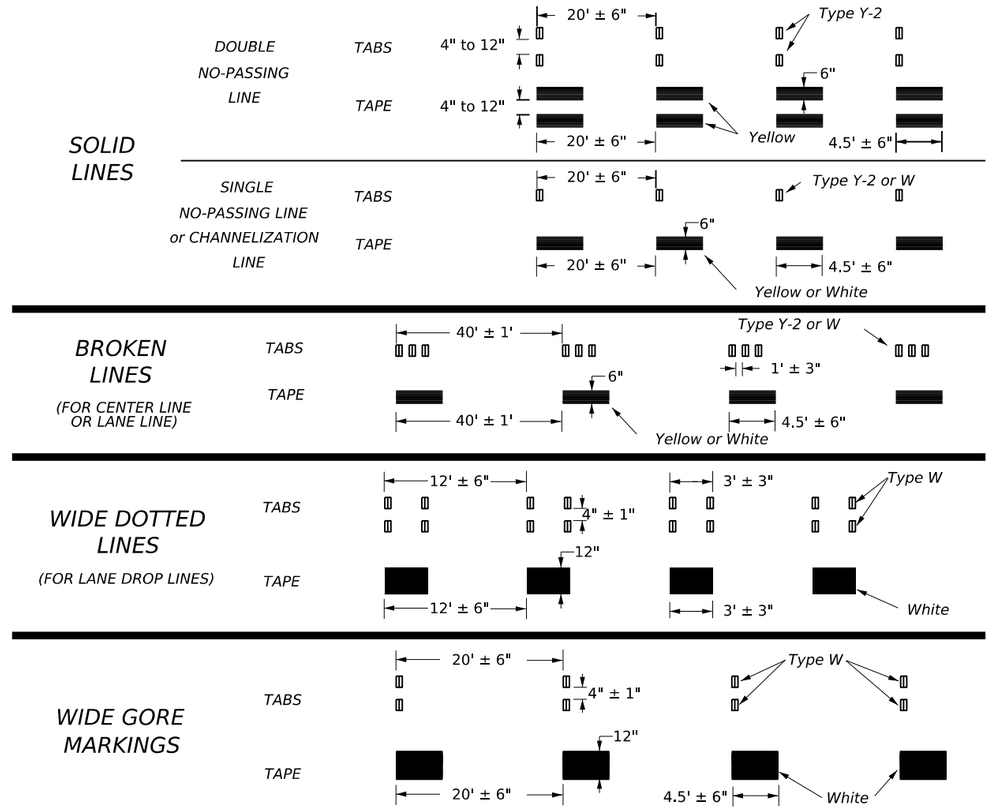
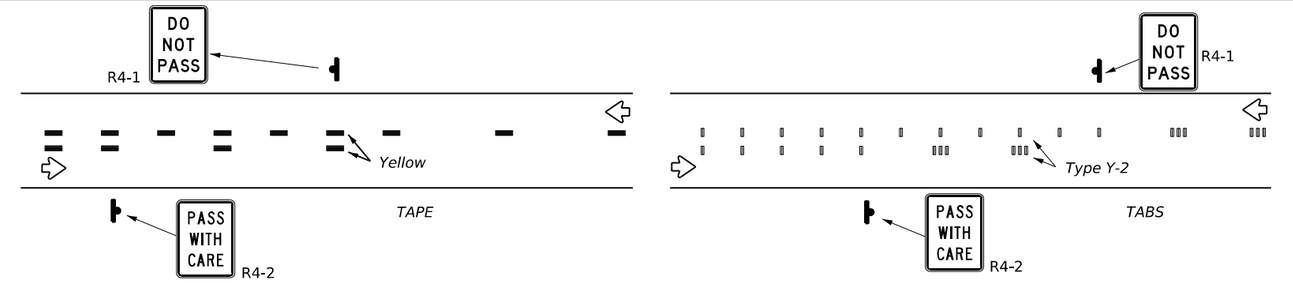
REVISIONS	0003	06	103	IH 20
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	ODA	REEVES		51

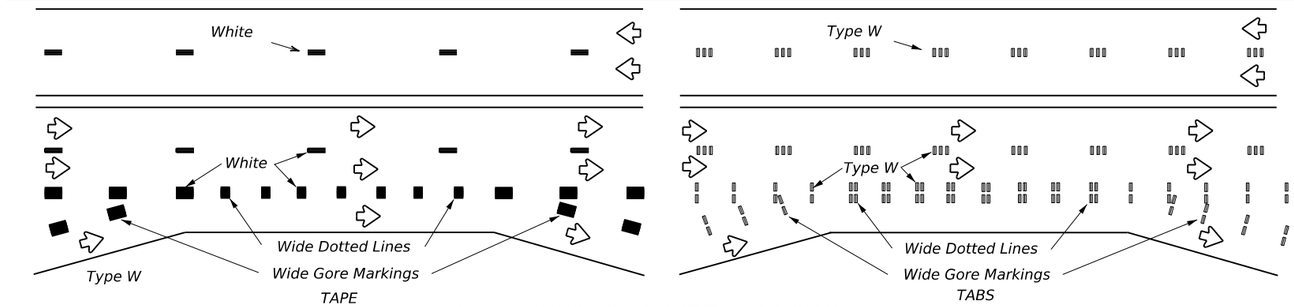
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



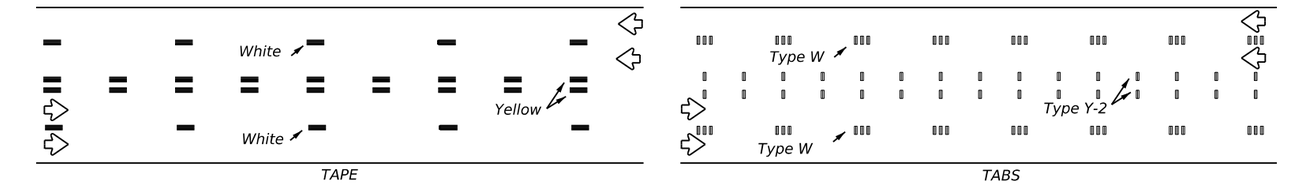
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



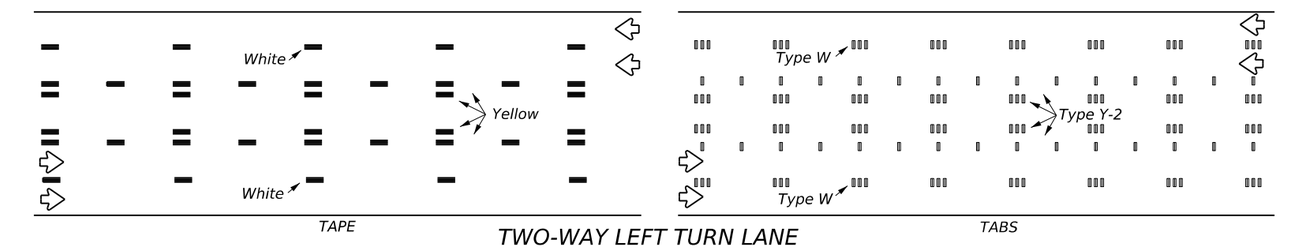
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



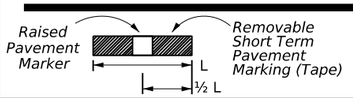
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

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

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WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

FILE: wzstpm-23.dgn	DN:	CK:	DW:	CK:
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REVISIONS	0003	06	103	IH 20
4-92 7-13	DIST	COUNTY		SHEET NO.
1-97 2-23	ODA	REEVES		52
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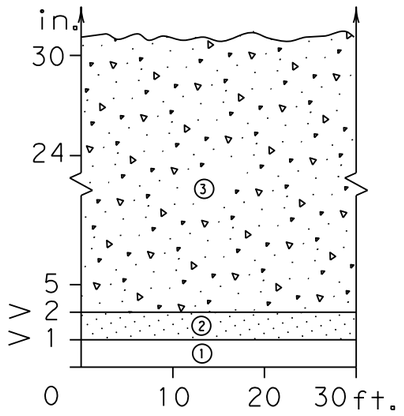
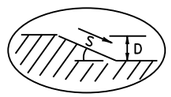
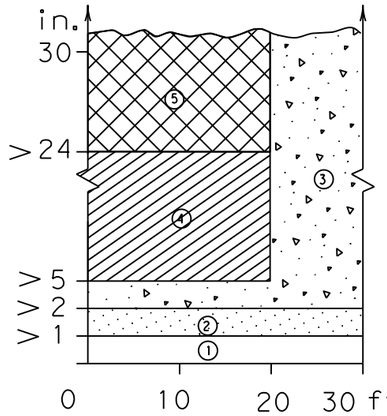
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

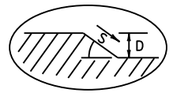


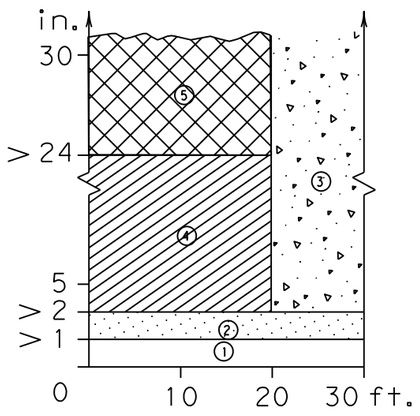
Edge Condition I
S = (3:1) (or flatter)



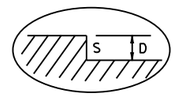


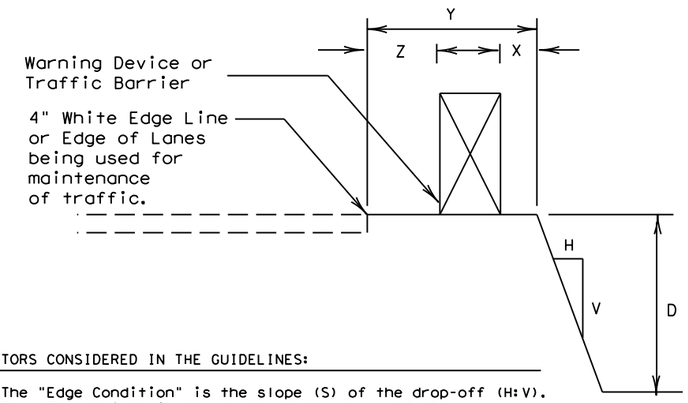
Edge Condition II
S = ((2.99):1) to (1:1)





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





FACTORS CONSIDERED IN THE GUIDELINES:

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

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

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

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

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

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

Edge Condition Notes:

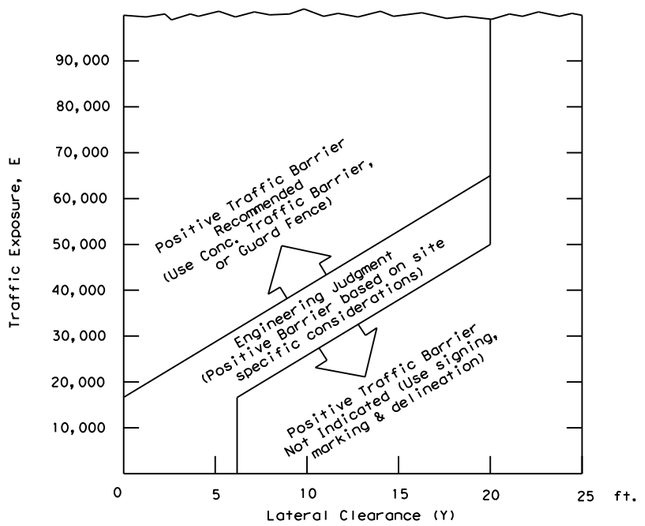
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

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

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

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



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

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

3 An approved end treatment should be provided for any positive barrier end located within a lateral offset of 20 feet from the edge of the travel lane.

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

Engineer's Seal

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Nestor Mendoza, P.E.
9104D8EB1809444...
8/30/2024

Texas Department of Transportation
Traffic Operations Division

TREATMENT FOR VARIOUS EDGE CONDITIONS

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
03-01	0003	06	103	IH 20
08-01 correct typos	DIST	COUNTY		SHEET NO.
	ODA	REEVES		53

Safety Appurtenances

This project meets the basic safety requirements of the 4R design criteria, guard fence (inlcuding connections to structures, post spacing and end treatments),signing, and pavement markings meet current standards, cross drainage box and pipe culverts, paralell and driveway culverts, mailbox supports, luminaire suports and sign supports within the required obstruction clearence of XX feet have been treted or upgraded to standard.

Existing and Proposed Horizontal Alignment and Superelevation

HORIZONTAL CURVES								
PC	PI	PT	DELTA	D	L(ft)	T(ft)	R(ft)	SUPERELEVATIONRATE(%)
1152+13.95	1159+35.25	1166+48.95	14°20'45"	01° 00'00"	1435.00	721.30	5729.60	4.6
1170+36.35	1177+67.85	1184+91.35	14°33'00"	01° 00'00"	1455.00	731.50	5729.60	5.8
1215+31.12	1222+11.92	1228+91.12	06°47'30"	00° 30'00"	1360.00	680.80	11459.20	3.1
1274+03.20	1276+38.30	1278+73.20	04°41'45"	01° 00'00"	470.00	253.00	5729.60	5.5
1366+17.04	1368+60.45	1371+02.75	09°37'00"	01° 00'00"	961.60	482.00	2898.79	5.6
67+24.20	72+35.7	77+46.52	05°06'41.7"	00°30'00.0"	1022.32	511.50	11459.20	5.6

Existing and Proposed Vertical Alignment

VERTICAL CURVES							CREST OR SAG	Roadway Classification
PI	ELEVATION	LENGTH	G1%	G2%	G2-G1	K		
1028+00.00	2981.9	400	-0.8500	-0.3650	0.4850	210	CREST	RURAL (DESIGN SPEED 70)
1038+00.00	2978.25	-	-0.3650	0.0000	0.3650	-	-	
1053+00.00	2978.25	400	0.0000	-1.0000	-1.0000	247	CREST	
1068+00.00	2963.25	400	-1.0000	-0.5500	0.4500	210	SAG	
1088+00.00	2952.25	-	-0.5500	-0.4000	0.1500	-	-	
1113+00.00	2942.25	-	-0.4000	-0.2500	0.1500	-	-	
1133+00.00	2937.25	400	-0.2500	-0.5000	-0.2500	247	CREST	
1151+00.00	2928.25	-	-0.5000	-0.3000	0.2000	-	-	
1181+00.00	2919.25	400	-0.3000	2.2826	2.5826	181	SAG	
1190+00.00	2940.35	1440	2.2826	-3.0000	-5.2826	247	CREST	
1200+00.00	2910.85	400	-3.0000	-0.5758	2.4242	181	SAG	
1233+00.00	2891.85	400	-0.5758	-0.2000	0.3758	210	SAG	
1253+00.00	2887.85	-	-0.2000	-0.4000	-0.2000	-	-	
1295+00.00	2871.05	-	-0.4000	-0.3000	0.1000	-	-	
1315+00.00	2865.05	-	-0.3000	-0.2000	0.1000	-	-	
1325+00.00	2863.05	400	-0.2000	0.1000	0.3000	210	SAG	
1337+00.00	2864.25	400	0.1000	-0.2000	-0.3000	247	CREST	
1357+00.00	2860.25	400	-0.2000	0.2000	0.4000	210	SAG	
1367+00.00	2862.25	800	0.2000	-1.4550	-1.6550	210	CREST	
1383+00.00	2838.97	400	-1.4550	-0.4288	1.0262	181	SAG	
1408+00.00	2828.25	400	-0.4288	0.2000	0.6288	181	SAG	
1415+00.00	2829.65	400	0.2000	-0.9996	-1.1996	247	CREST	
1422+32.00	2822.33	-	-0.9996		0.9996	-	-	

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 CS 0003-06-085 & 0003-06-047.

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
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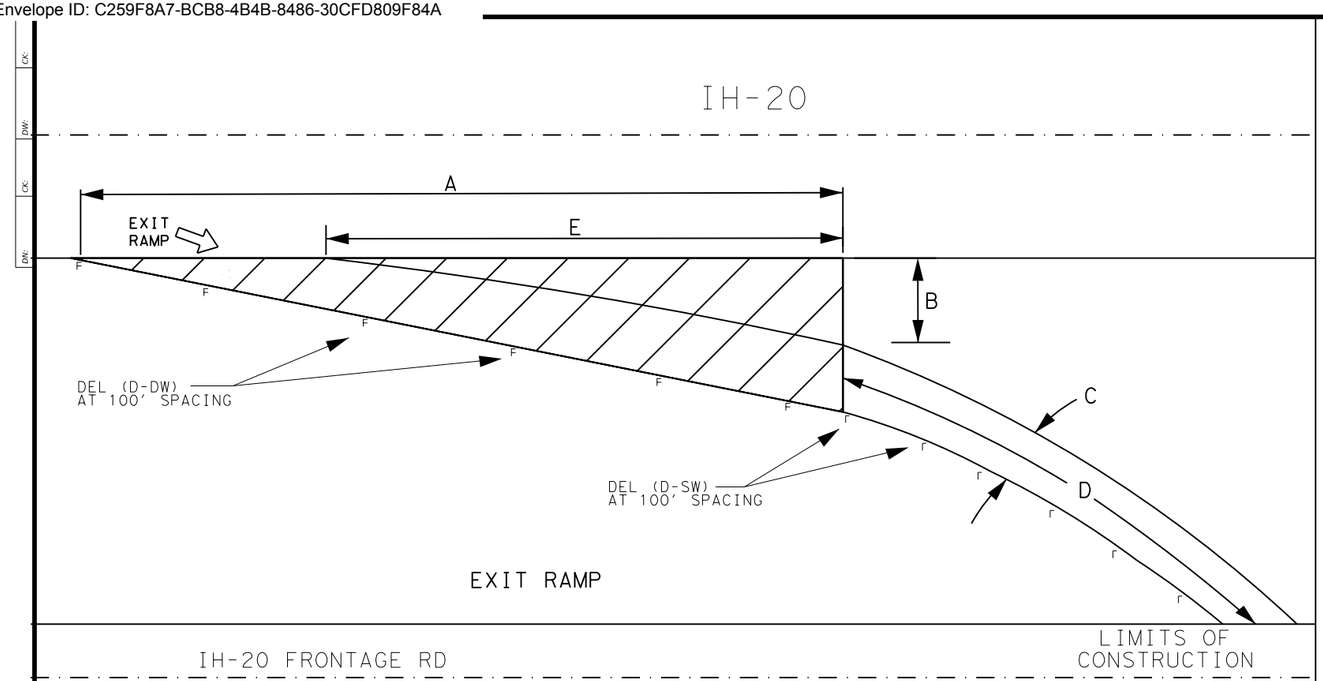
8/30/2024

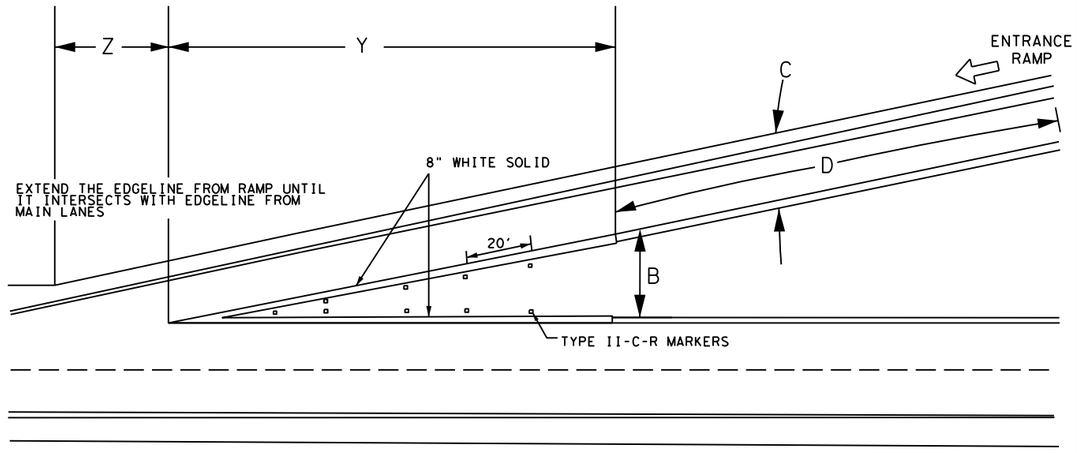
ALIGNMENT DATA SHEET

SHEET 1 OF 1

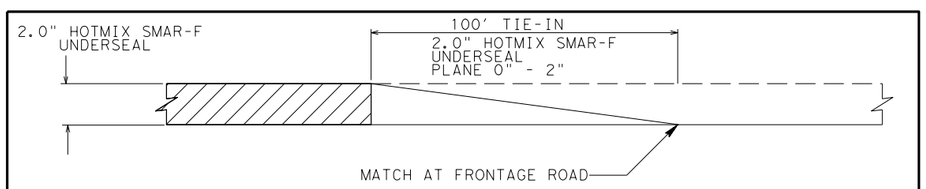
Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			54
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

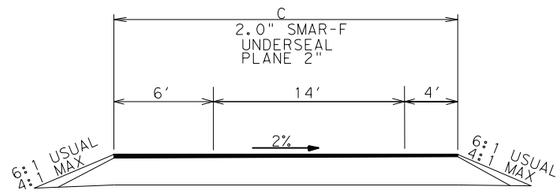




RAMP	*A	*B	*C	*D	*E	*Y	*Z	* FILLET AREA	*TOTAL AREA
	FT	FT	FT	FT	FT	FT	FT	FT^2	SY
FM2903 EB EXIT RAMP	685	13	25	683	290			858	3,439
FM2903 EB ENTRANCE RAMP		39	28	395		272	441	921	1,331
PICNIC AREA EB EXIT RAMP	127	18	20	280	337			3,075	1,232
PICNIC AREA EB ENTRANCE RAMP		20	20	424		503	700	1,983	1,163
SHAW RD EB EXIT RAMP	238	16	24	347	280			1,686	1,642
SHAW RD EB ENTRANCE RAMP		29	19	502		301	100	4,494	1,559
FM2903 WB EXIT RAMP	162	17	25	472	321			3,677	2,098
FM2903 WB ENTRANCE RAMP		16	24	622		128	81	2,709	1,960
PICNIC AREA WB EXIT RAMP	168	18	20	304	321			1,023	1,144
PICNIC AREA WB ENTRANCE RAMP		16	21	437		602	628	1,720	1,211
SHAW RD WB EXIT RAMP	160	13	24	475				3,371	1,970
SHAW RD WB ENTRANCE RAMP		24	26	699		126	347	32,989	5,685



TYPICAL TIE-IN DETAIL OVERLAY TO EXISTING



PROPOSED RAMP
TYPICAL SECTION

N.T.S

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

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RAMP DETAILS

SHEET 1 OF 1

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	06	103	IH 20

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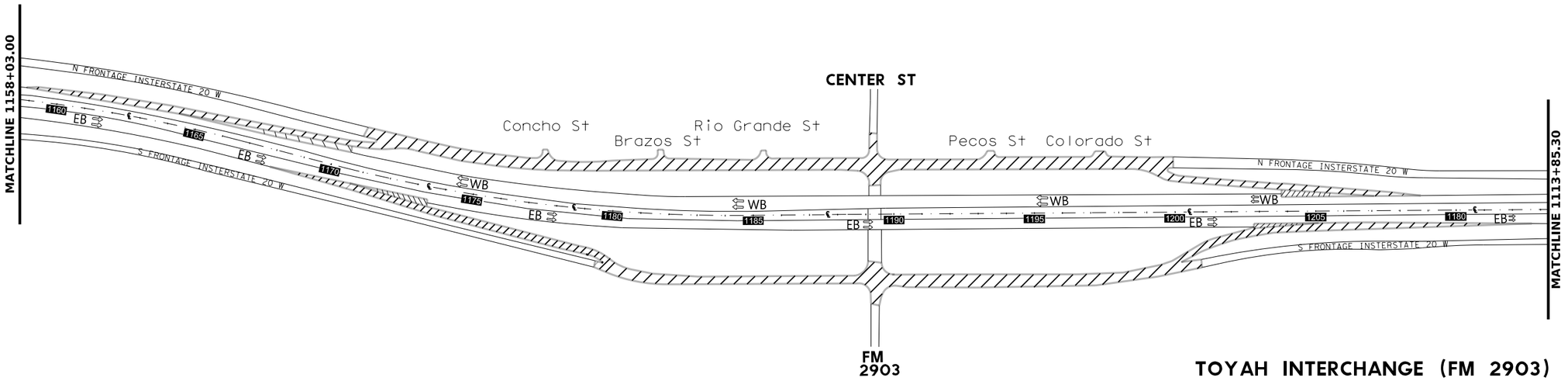
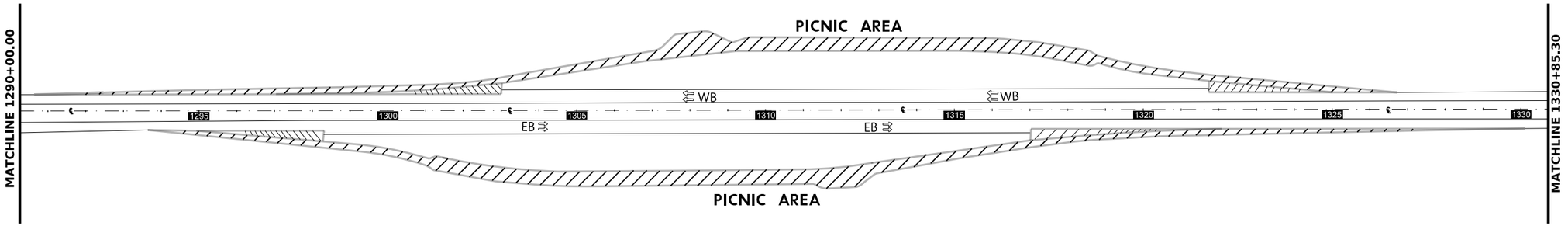
FILE: $FILE$

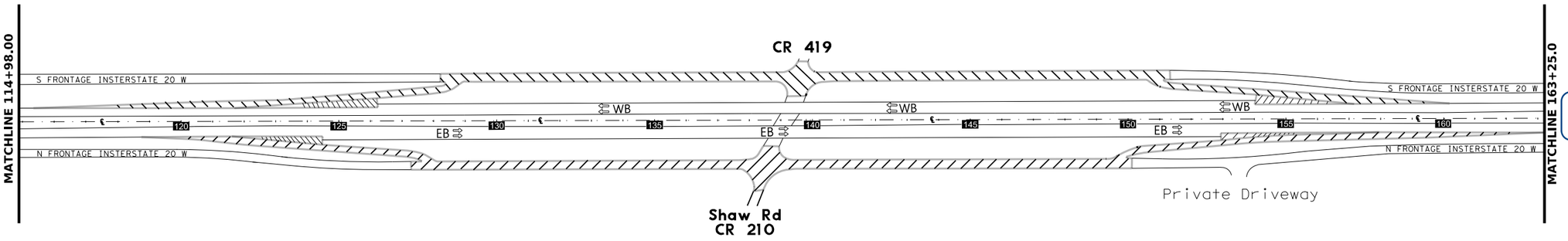
PLAN ver. 2013.04.05
x:\engdata\filename.dgn



TOYAH INTERCHANGE (FM 2903)



PICNIC AREA



SHAW ROAD (CR 419)

N

N. T. S.

RAMP WORK AREA

STATE OF TEXAS
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8/30/2024

RAMP DETAILS LAYOUT

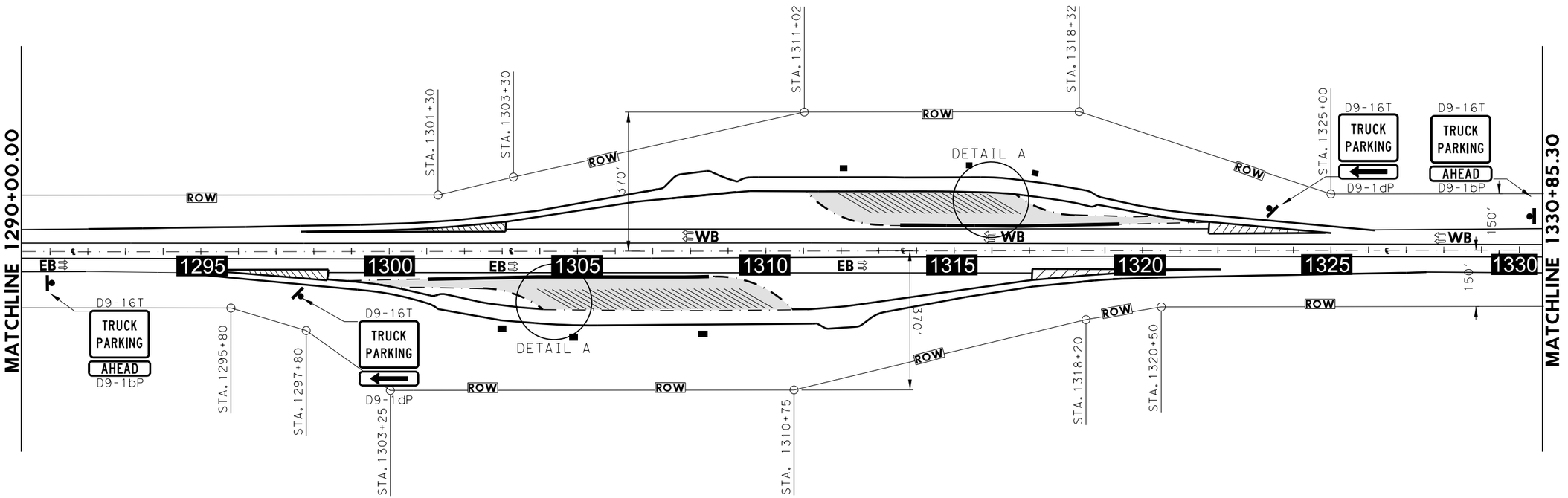
SHEET 1 OF 1

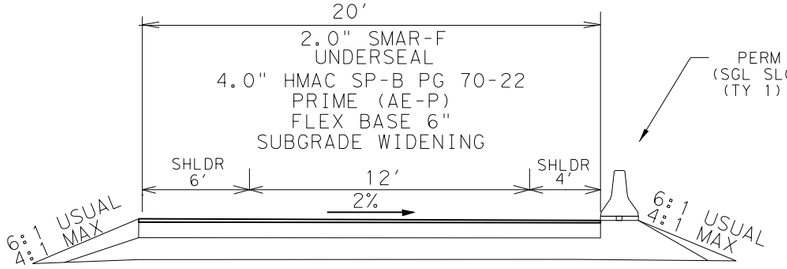
Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			56

STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

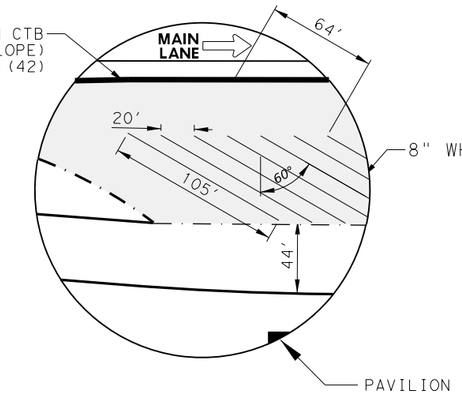
PLAN ver. 2013.04.05
x:\engdata\filename.dgn



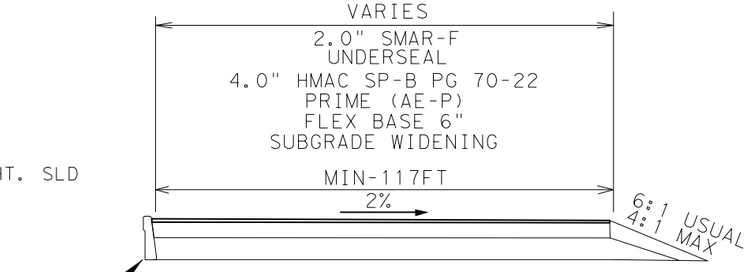


PROPOSED TRUCK RAMP TYPICAL SECTION

N.T.S



Detail A



PROPOSED TRUCK PARKING TYPICAL SECTION

N.T.S

N.T.S.

NOTE: FHWA GUIDE FOR HERRINGBONE DRIVE-THROUGH (HDT) PARKING BLOCK WITH AN ANGLE OF 60°

*	PROPOSED TRUCK RAMP SHLDRS 6" WHT SLD. STRIPING
	PROPOSED TRUCK PARKING
	SIGN POSTS TO BE INSTALLED
	REST AREA PAVILLION

LOC. NO.	LOCATION	STA.	TO	STA.	Route	SSCB LF	Permanent Feature
1	EB PICNIC AREA	1313+85.00		1319+55.00	EB	570	X
2	WB PICNIC AREA	1300+95.00		1308+65.00	WB	770	X

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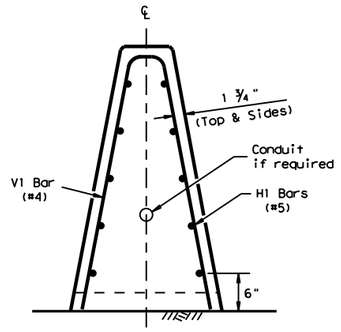
TRUCK PARKING DETAILS

SHEET 1 OF 1

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	06	103	IH 20

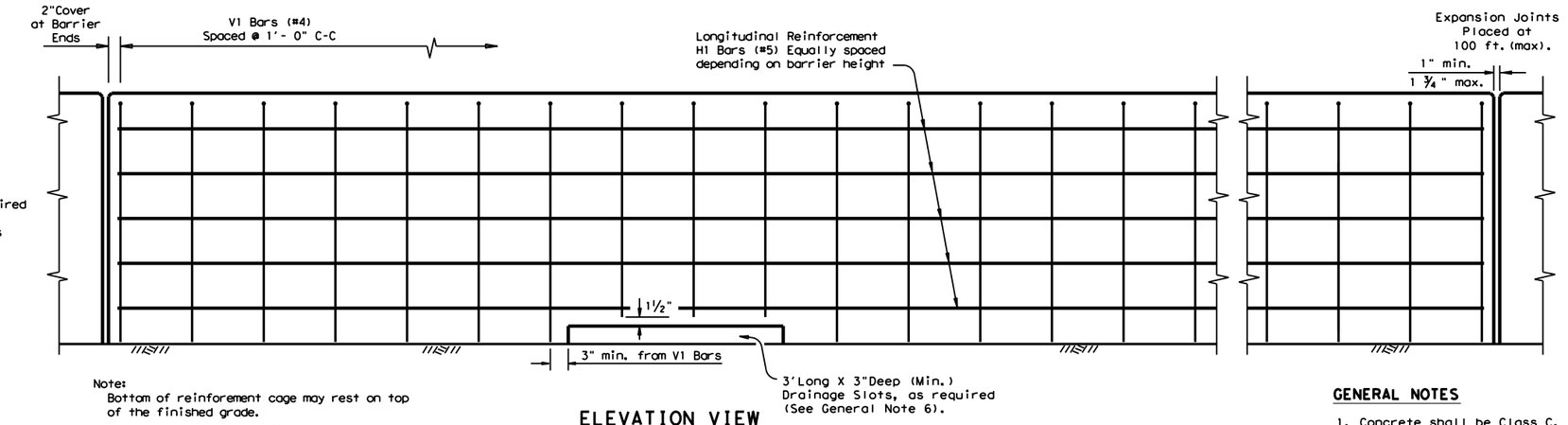
DATE:
FILE:



END VIEW

CAST-IN-PLACE (CIP) BARRIER

Barrier is Symmetrical About the Center Line

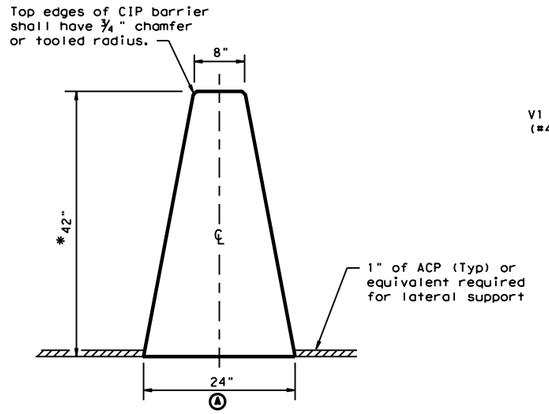


Note:
Bottom of reinforcement cage may rest on top of the finished grade.

Reinforcement around the drainage slots may be cut or bent to accommodate the edge and top clearances.

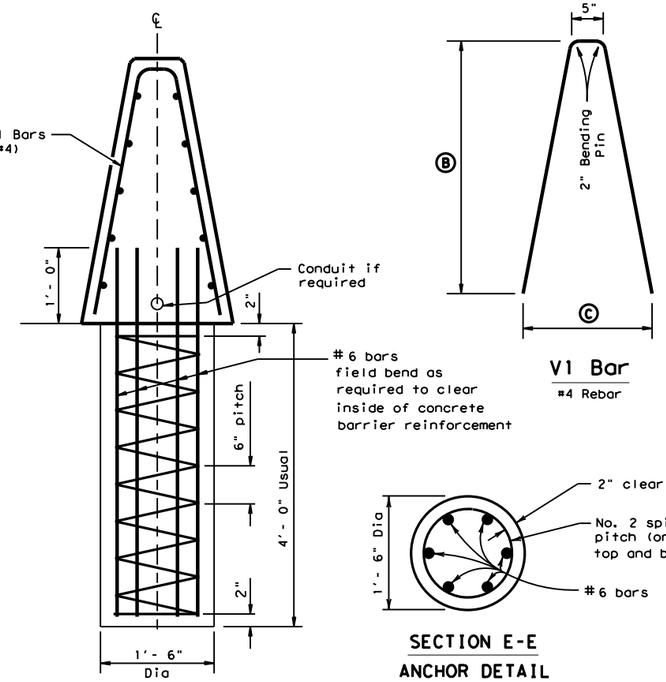
ELEVATION VIEW

Cast-in-Place (SSCB)(Type 2)on Roadway



SINGLE SLOPE CONCRETE BARRIER

(SSCB)(42")



SECTION D-D

ANCHOR DETAIL

V1 Bar

#4 Rebar

BARRIER HEIGHT (IN.)	* DIMENSIONS (IN.)		
	Ⓐ	Ⓑ	Ⓒ
42	24	40 ¼	20 ½
48	26 ¼	46 ¼	22 ¾
54	28 ½	52 ¼	25 ⅛

*(SSCB)(42") Barrier height may be increased to 48" or 54". This would increase the barrier and reinforcement dimensions accordingly.

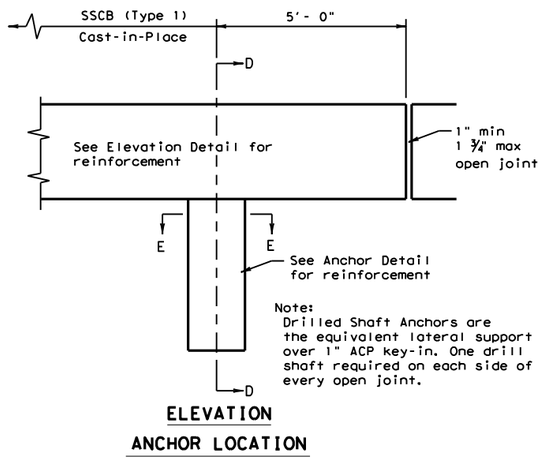
GENERAL NOTES

1. Concrete shall be Class C. Unless otherwise specified in the plans.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. These details cover barrier per Item 514, "Permanent Concrete Traffic Barrier".
4. The Anchorage shown is considered subsidiary to the bid item.
5. Top edges of CIP barrier shall have a ¾" chamfer or tooled radius.
6. Drainage slot locations (12'- 0", C-C Min. Spacing) are shown elsewhere, or as directed by the Engineer. Drainage slot heights on the SSCB may be increased to a maximum of 5 inches, without geometric changes to the barrier face.
7. Cast-in-place barrier may be slip formed. Bracing may be tied or tack welded to the reinforcement cage to provide cage stability. Do not weld to anchorage.
8. For locations where lighting is required, see the SSCB(4) sheet for the proper reinforcement and anchorage.

Cast-In-Place (CIP) or Slip-Formed (SSCB)

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

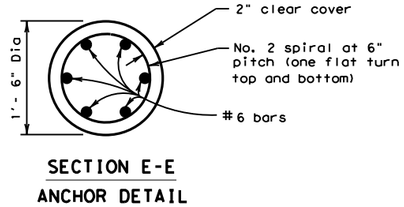
The weight of Cast-in-Place (SSCB)42" is approx. 717 lbs per ft.



Note:
Drilled Shaft Anchors are the equivalent lateral support over 1" ACP key-in. One drill shaft required on each side of every open joint.

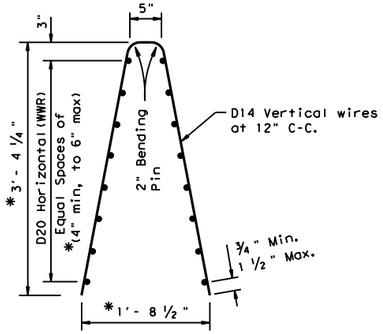
ELEVATION

ANCHOR LOCATION



SECTION E-E

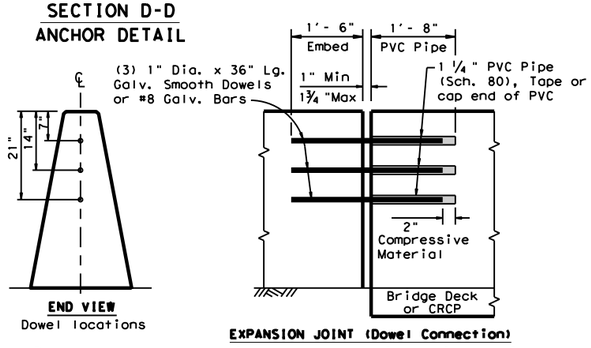
ANCHOR DETAIL



Welded Wire Reinforcement (WWR) Option for Bars V1 and H1

(WWR) General Notes

1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut and bent to accommodate the drainage slots, as directed by the Engineer.
3. Weled wire spilce locations shall have a "minimum" splice lap length of 12".
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".



END VIEW
Dowel locations

EXPANSION JOINT (Dowel Connection)

Dowels may be used, as directed by the Engineer, in locations where the barrier could be laterally displaced.

Texas Department of Transportation

Design Division Standard

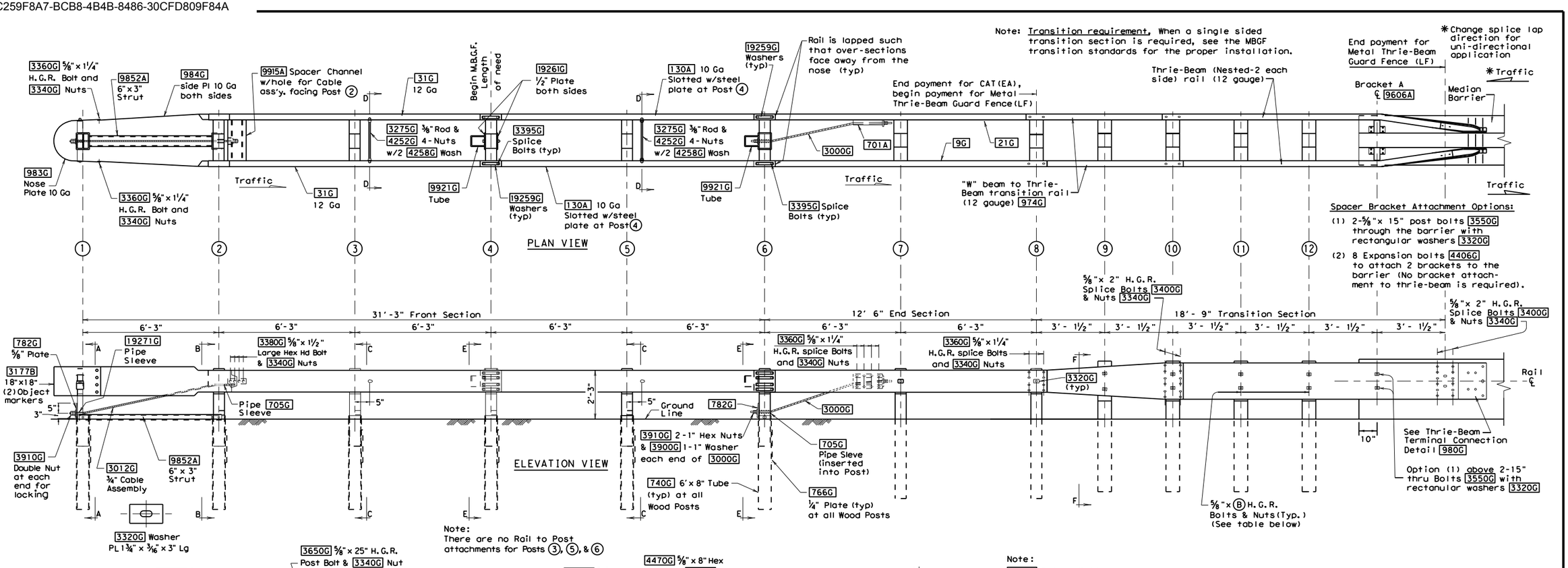
SINGLE SLOPE CONCRETE BARRIER

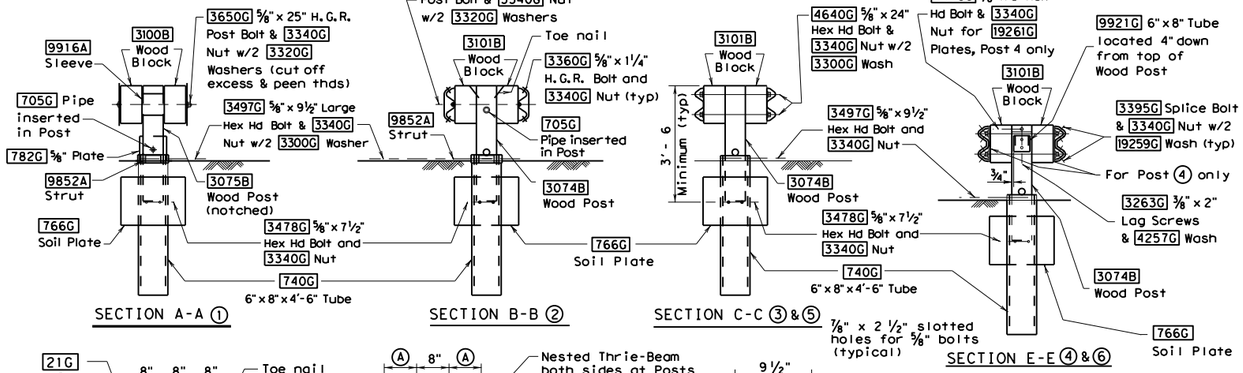
CAST-IN-PLACE
(TYPE 1)
(FLEXIBLE PAVEMENT)

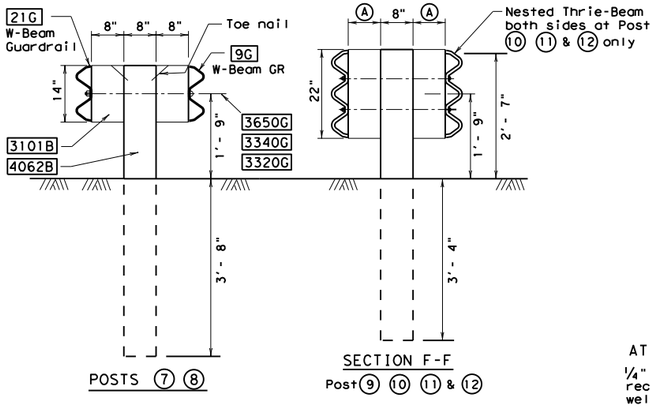
SSCB(1F)-10

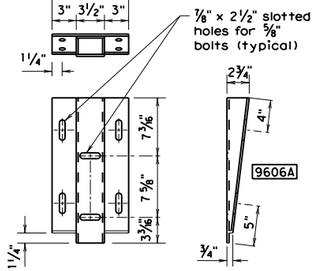
FILE: sscb1f10.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
	DIST	COUNTY		SHEET NO.
	06	REEVES		58

DATE:
FILE:

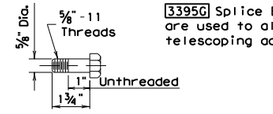






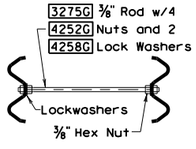


¼" steel plate or section of rectangular tubing with flanges welded on to the satisfaction of the Engineer

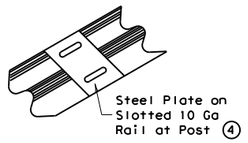


3395G SPLICE BOLT

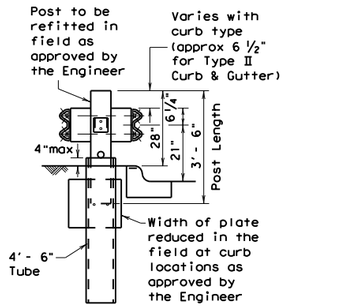
Note: 3395G Splice Bolts are used to allow telescoping action



SECTION D-D



DETAIL 1



TYPICAL CURB PLACEMENT

Post	Ⓐ Block Width	Product Code	Ⓑ Post Bolt Length	Product Code
9	6 ½"	3409B	24"	3640G
10	5 ½"	3408B	22"	3620G
11	4 ½"	3407B	20"	3600G
12	3 ½"	3406B	18"	3580G

** Modifications (as approved by the Engineer) in bracket design will be required for other barrier configurations.

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION CRASH CUSHION (CONCRETE BARRIER)

CATCB(1)-17

FILE: catcb17.dgn	DN: TxDOT	CK: KM	DW: BD	CK: VP
©TxDOT: 1997	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 03,2016 VP REVISED 03,2017 KM	0003	06	103	IH 20
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		59

SACRIFICIAL

DATE:
FILE:

CATCB FRONT SECTION (POSTS 1 THRU 6)

BILL OF MATERIAL

Mfr Code #	QTY	DESCRIPTION
983G	1	Nose Plate (10 Ga)
984G	2	Side Plate (10 Ga)
31G	2	"W" Beam 12 Ga x 13'-6 1/2"
130A	2	"W" Beam 10 Ga x 13'-6 1/2"
9852A	1	Channel Strut x 6'-6"
740G	6	Steel Foundation Tube
766G	6	Soil Plate 18"x 24"
3075B	1	Wood Post 5 1/2" x 7 1/2" (Notched) (Post 1)
3074B	5	Wood Post 5 1/2" x 7 1/2"(Post 2-6)
3100B	2	Wood Block 5 1/2" x 7 1/2"(Post 1)
3101B	10	Wood Block 5 1/2" x 7 1/2"(Post 2-6)
9916A	1	Sleeve (Post 1)
9915A	1	Spacer Channel (Post 2)
9921G	2	Steel Tube (Posts 4 & 6)
19271G	1	Pipe Sleeve (Post 1)
705G	1	Pipe Sleeve (Post 2)
19261G	2	Post Plate (Post 4)
782G	1	Bearing Plate (Post 1)
3012G	1	Cable Assembly(Posts 1 to 2)
3275G	2	3/8" Restraint Rod(Post 3 & 5)
19259G	32	Plate Washer (Posts 4 & 6)

HARDWARE

3263G	4	3/8" x 2" Lg Lag Screw
4252G	8	3/8" Hex Nut
4258G	4	3/8" Lock Washer
4257G	4	3/8" Flat Washer
3320G	4	Rectangular Washer
3395G	32	5/8" x 1 3/4" H.H. Splice Bolt
3650G	2	5/8" x 25" Lg H.G.R. Bolt
4640G	8	5/8" x 24" Lg H.H. Bolt
3478G	13	5/8" x 7 1/2" Lg H.H. Bolt
3380G	8	5/8" x 1 1/2" Lg H.H. Bolt
3360G	16	5/8" x 1 1/4" Lg H.G.R. Bolt
3340G	85	5/8" H.G.R. Nut
3300G	8	5/8" Flat Washer
3497G	6	5/8" x 9 1/2" Lg H.H. Bolt
3910G	4	1" Hex Nut
3900G	2	1" Flat Washer

CATCB GUARDRAIL TERMINAL END SECTION (POSTS 7 & 8)

BILL OF MATERIAL

Mfr Code #	QTY	DESCRIPTION
4064B	2	Wood Post 5 1/2" x 7 1/2" x 6'
3101B	4	Wood Block 5 1/2" x 7 1/2"
21G	1	"W" Beam Guard Rail (12 Ga)
9G	1	"W" Beam Guard Rail (12 Ga)
701A	1	Bracket
782G	1	Bearing Plate
705G	1	Pipe Sleve
3000G	1	Cable Assembly
3320G	2	Rectangular Washer

HARDWARE

3360G	24	5/8" x 1 1/4" H.G.R. Splice Bolt
3400G	4	5/8" x 25" H.G.R. Post Bolt
3380G	8	5/8" x 1 1/2" Hex Hd Bolt
3340G	28	5/8" H.G.R. Nut
3300G	8	5/8" Washer
3910G	4	1" Hex Nut
3900G	2	1" Washer

CATCB TRANSITION SECTION (POST 9 THRU END SHOE)

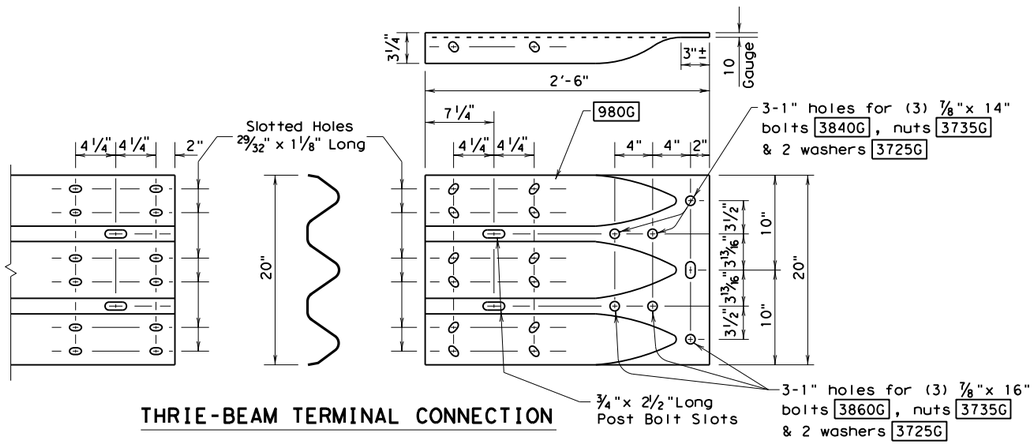
BILL OF MATERIAL

Mfr Code #	QTY	DESCRIPTION
211G	4	Thrie beam 12'-6"(12 Ga)
974G	2	Trans panel 6'-3"(12 Ga)
980G	2	Special Thrie beam end shoe
3078B	3	Wood Post 6"x 8"x 6', (Posts11&12)
3320G	20	Rectangular Washer
3340G	62	5/8" H.G.R. Nut
3400G	52	5/8" x 2" Splice Bolt
3406B	2	22 1/2" Block 6"x 3 1/2" (Post 12)
3407B	2	22 1/2" Block 6"x 4 1/2" (Post 11)
3408B	2	22 1/2" Block 6"x 5 1/2" (Post 10)
3409B	2	22 1/2" Block 6"x 6 1/2" (Post 9)
3412B	1	Wood Post 6"x 8"x 6', (Posts 9)
* 3560G	2	5/8" x 16" Bolt
* 4406G	8	5/8" x 3 3/4" Expansion Bolts w/Nuts
3580G	2	5/8" x 18"Post Bolt (Post 12)
3600G	2	5/8" x 20"Post Bolt (Post 11)
3620G	2	5/8" x 22"Post Bolt (Post 10)
3640G	2	5/8" x 24"Post Bolt (Post 9)
3725G	12	7/8" Washer (End Shoe Bolts)
3735G	6	7/8" Hex Nuts (End Shoe Bolts)
3840G	3	7/8" x 14" Hex Bolt (End Shoe)
3860G	3	7/8" x 16" Hex Bolt (End Shoe)
9606A	2	Spacer Bracket
Delineation		
3177B	2	Object Marker 18"x 18" (Cut to fit)
Optional Hardware for Single Slope Barrier-42"		
3640G	2	5/8" x 24" Bolt
4896G	6	7/8" x 24" Hex Bolt (End Shoe)

* Expansion or through bolts may be used with optional bracket installation.

GENERAL NOTES

1. For specific information regarding installation and technical guidance of the system, contact: Trinity Highway at 1(888)323-6374. 70 W. Madison St. Suite 2350. Chicago, IL 60602
2. Crown will be widened to accommodate the CAT system. The crown should extend at least 3 feet beyond the inside face of rail. The ground line at posts should be an extension of the roadway surface crown.
3. All bolts, nuts, washers, cable assemblies, cable anchors, post tubes, backup plates, and soil plates shall be galvanized.
4. The exposed end segment of an "End Section" should be evaluated as a potential obstacle in the determination of the need of MBGF for the opposing direction of traffic.
5. For placement at curb sections, the height from gutter pan to post bolt will be 21", and the front section shall be flared (See Detail 2).
6. The wood blockouts shall be "toe nailed" to the rectangular wood posts to prevent them from turning when the wood shrinks.
7. Either 6"- 8" or 5 1/2"x 7 1/2" wood blocks may be used at posts 1 thru 8 as supplied by the manufacturer.
8. If a "single sided" transition section is required for the attachment to a rigid concrete rail, see the MBGF transition standards for the proper installation.
9. Object markers shall be installed on the front of the terminal as detailed on the D&OM(VIA).



THRIE-BEAM TERMINAL CONNECTION

SACRIFICIAL

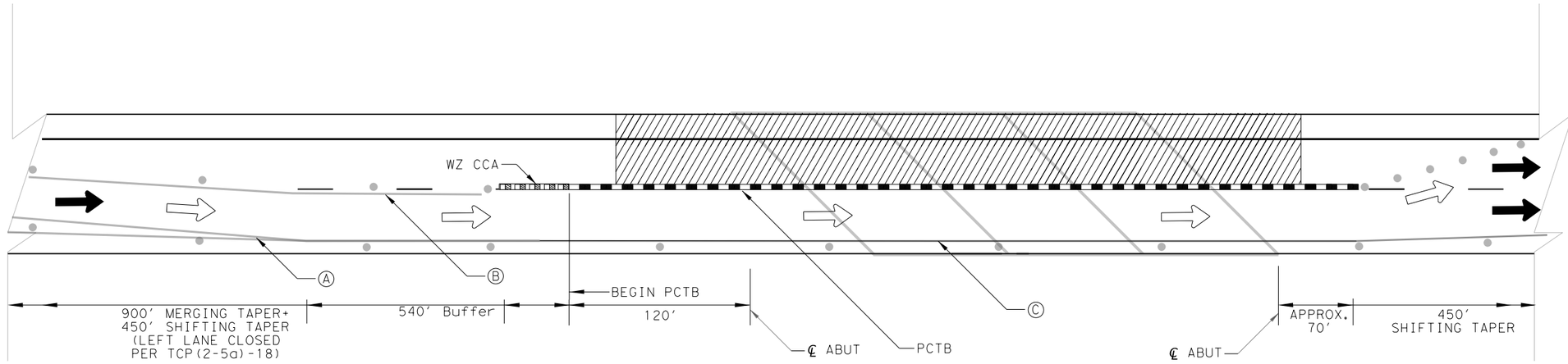
Texas Department of Transportation

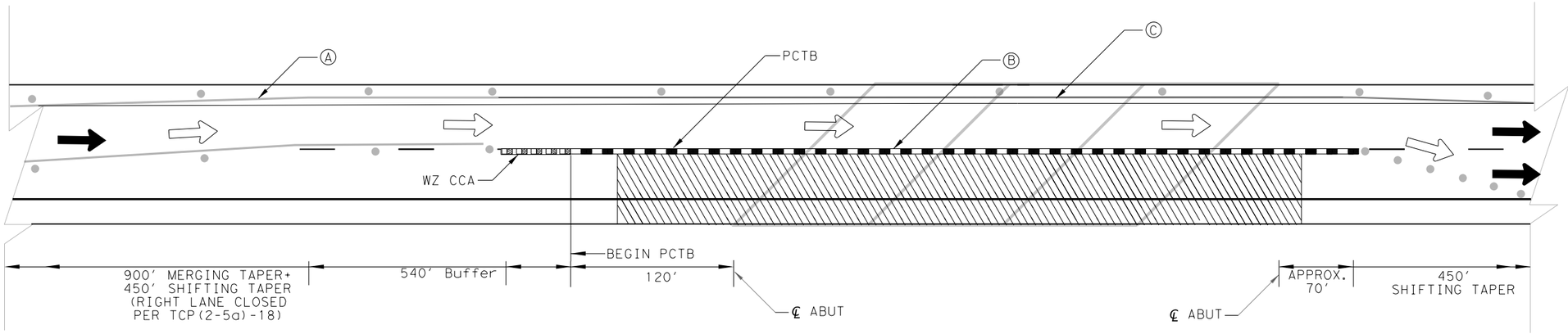
Design Division Standard

TRINITY HIGHWAY ENERGY ABSORPTION CRASH CUSHION (CONCRETE BARRIER)

CATCB(1)-17

FILE: catcb17.dgn	DN: TxDOT	CK: KM	DW: BD	CK: VP
© TxDOT: 1997	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED 03,2016 VP REVISED 03,2017 KM	0003	06	103	IH 20
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		60





LEGEND	
	EXISTING DIRECTION OF TRAVEL
	PROPOSED DIRECTION OF TRAVEL
Ⓐ	WK ZN PAV MRK NONREMOV (W)6"(SLD)
Ⓑ	WK ZN PAV MRK NONREMOV (Y)6"(SLD)
Ⓒ	WK ZN PAV MRK SHT TERM (TAB) TY W
	DRUM (CHANNELIZER)
	PORTABLE CONCRETE TRAFFIC BARRIER
	WORK ZONE CRASH CUSHION ATTENUATOR
	BRIDGE DECK

N. T. S.

LOC. NO.	StructureNBI #	STA.	TO	STA.	Route	PTCB LF	FeatureCrossing
3	61-950-0-003-06-146	1047+80.78		1050+20.78	EB	430	Moody Draw
4	61-950-0-003-06-147	1047+39.22		1049+79.22	WB	430	Moody Draw
5	61-950-0-003-06-150	1248+29.22		1250+69.22	EB	430	BillingsledDraw
6	06-195-0-0003-06-151	1248+70.78		1251+10.78	WB	430	BillingsledDraw
7	61-950-0-003-06-148	1188+72.50		1190+42.50	EB	360	FM2903
8	06-195-0-0003-06-149	1188+72.50		1190+42.50	WB	360	FM2903
9	06-195-0-0003-06-075	4+52.92		13+57.75	WB	1023	Salt Draw
10	61-950-0-003-06-076	137+94.74		140+40.74	EB	370	Shaw Rd
11	06-195-0-0003-06-077	32+00.00		63+00.00	WB	370	Shaw Rd

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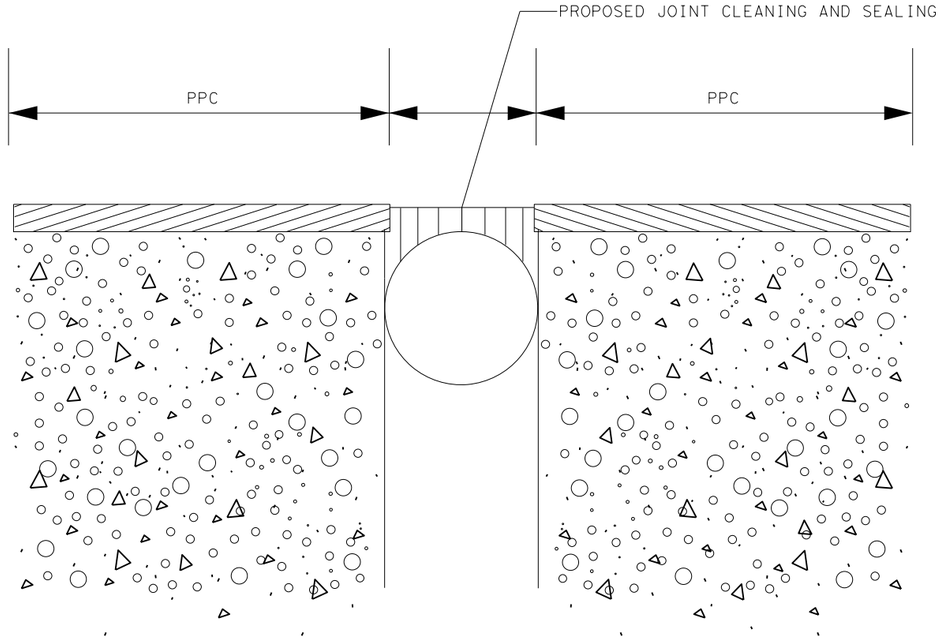
BRIDGE TRAFFIC CONTROL DETAILS

SHEET 1 OF 1

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			61
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20



*PROPOSED CLEANING AND SEALING ITEM

BRIDGE JOINT SUMMARY

BRIDGE	NUMBER OF BRIDGE JOINTS EA	JOINT LENGTH FT	DEPTH OF OVERLAY IN	0454 7010 JOINT SEALANT LF	438 7001 CLEANING AND SEALING EXISTING JOINTS LF
MOODY DRAW					
EAST BOUND	5	48	2"	240	240
WEST BOUND	5	48	2"	240	240
TOYAH INTERCHANGE (FM2903)					
EAST BOUND	6	42	2"	252	252
WEST BOUND	6	42	2"	252	252
BILLINGSLEA					
EAST BOUND	6	48	2"	988	988
WEST BOUND	7	48	2"	1040	1040
SALT DRAW					
EAST BOUND	19	52	2"	988	988
SHAW RD					
EAST BOUND	6	47	2"	282	282
WEST BOUND	6	46	2"	276	276
PROJECT TOTALS				4558	4558

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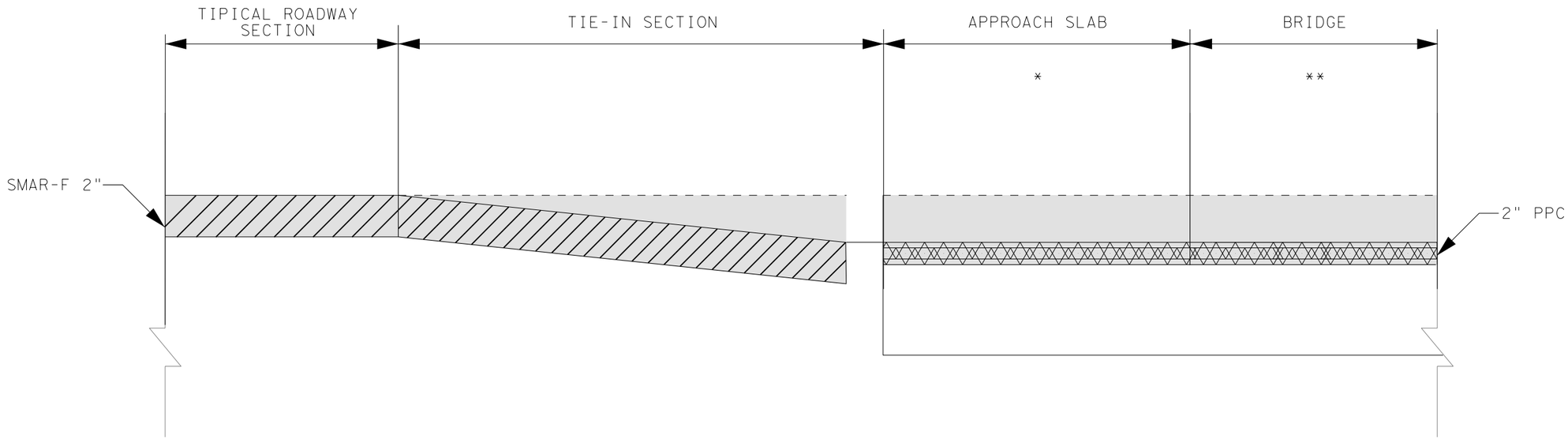
BRIDGE JOINT DETAILS

SHEET 1 OF 1

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			62
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20



PAVEMENT TRANSITION DETAIL (ELEVATION VIEW)

	BRIDGE		APPROACH SLAB *		(FT)	**PLANE (APPROX)
EASTBOUND	MOODY DRAW	1047+47.63		1047+80.	33	1.5"
	NBI: 61-950-0-003-06-147	1050+20.78		1050+53.	33	
	TOYAH INTERCHANGE (FM2903)	1188+52.50		1188+70.	18	2"
	NBI: 06-195-0-0003-06-149	1190+42.50		1190+62.	20	
	BILLINGSLEA DRAW	1247+96.07		1248+29.	33	1.5"
	NBI: 06-195-0-0003-06-151	1250+69.22		1251+02.	33	
	SALT DRAW	3+76.26		4+52.92	77	2"
	NBI: 06-195-0-0003-06-075	13+57.75		13+97.82	40	
	SHAW ROAD	137+35.60		137+94.7	59	4"
	NBI: 06-195-0-0003-06-077	140+40.74		140+79.0	38	
WESTBOUND	MOODY DRAW	1047+06.07		1047+39.	33	1.5"
	NBI: 61-950-0-003-06-146	1049+79.22		1050+12.	33	
	TOYAH INTERCHANGE (FM2903)	1188+52.50		1188+72.	20	2"
	NBI: 61-950-0-003-06-148	1190+42.50		1190+62.	20	
	BILLINGSLEA DRAW	1248+37.63		1248+70.	33	1.5"
	NBI: 61-950-0-003-06-150	1251+10.78		1251+43.	33	
	SHAW ROAD	137+72		138+34	62	4"
	NBI: 61-950-0-003-06-076	140+80		141+04.2	24	

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BRIDGE TIE-IN TYPICAL SECTION

SHEET 1 OF 1

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			63
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

DATE: $DATE$ $TIME$
FILE: $FILE$

POLYESTER POLYMER CONCRETE(PPC) OVERLAY NOTES:

Perform work in accordance with Special Specification 4106 and below instructions. A technical representative of the overlay manufacturer should be present at the pre-construction meeting and execution of all work associated with the overlay installation.

1. Plane asphalt from bridge deck per Item 354, "Planing and Texturing Pavement." The thickness of the existing ACP is approximate, see plans. Take care not to remove any concrete during the asphalt planing process.

2. Inspect the bridge deck for any potential deck repairs or delaminated concrete. Perform partial and/or full depth bridge deck repairs in accordance with Item 429, 7/32 Concrete Structure Repair 9/32 and Chapter 3, Section 4 of TxDOT Concrete Repair Manual. Cure repairs in accordance with Manufacturer 5/32 s recommendations unless approved otherwise. This work will be paid for in accordance with Item 429, 7/32 Concrete Structure Repair. 9/32

3. Prepare the deck surface by shot blasting and cleaning with high pressure air. Remove all oil and other contaminants. This work is subsidiary to Special Specification 4106.

4. Mask existing joints and deck drains. Saw cutting of joints after overlay installation is prohibited.

5. Identify moisture in the deck per ASTM D4263 or other approved methods. Do not begin the overlay installation until the deck is properly dry.

6. Conduct one or more trial applications on the prepared substrate to demonstrate proper initial set time and the effectiveness of the surface preparation, mixing, placing, and finishing equipment proposed.

7. Perform bond strength test 24 hours after placement of the trial application in accordance with ASTM C 1583. Do not proceed with overlay installation until the minimum bond strength is achieved and approved by the Engineer.

8. Install 2" inch Polyester Polymer Concrete Overlay per Special Specification 4106.

9. The Contractor is responsible for the ride quality of the finished surface. See Article 422.4.10, "Defective Work" for acceptance criteria to be enforced for this work.

11. Install pavement markings as shown on plans.

12. Seal all the expansion joints. See elsewhere in plans for joint details.

BRIDGE		NBI:
SHAW RD	WB	61-950-0-003-06-076
BILLINGSLEA DRAW	WB	61-950-0-003-06-150
FM 2903	WB	61-950-0-003-06-148
MOODY DRAW	WB	61-950-0-003-06-146
MOODY DRAW	EB	61-950-0-003-06-147
FM2903	EB	06-195-0-0003-06-149
BILLINGSLEA DRAW	EB	06-195-0-0003-06-151
SALT DRAW	EB	06-195-0-0003-06-075
SHAW RD	EB	06-195-0-0003-06-077

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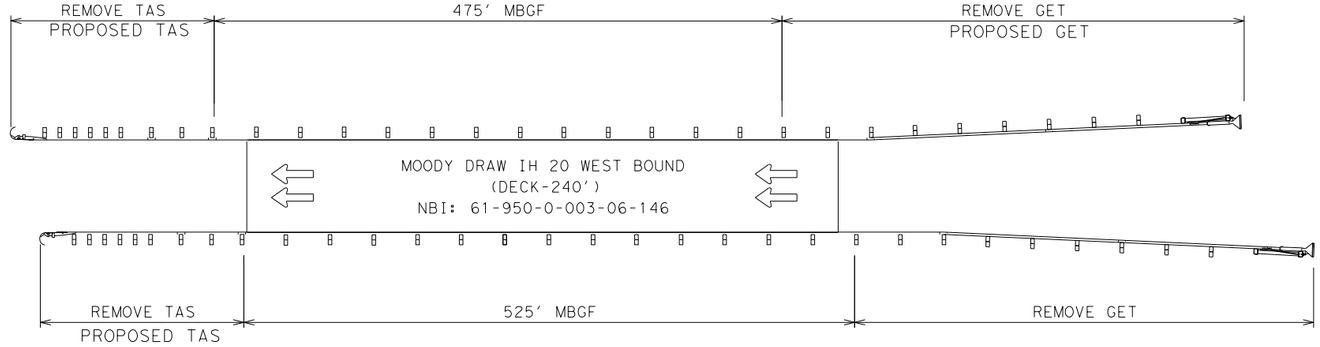
BRIDGE DECK OVERLAY NOTES

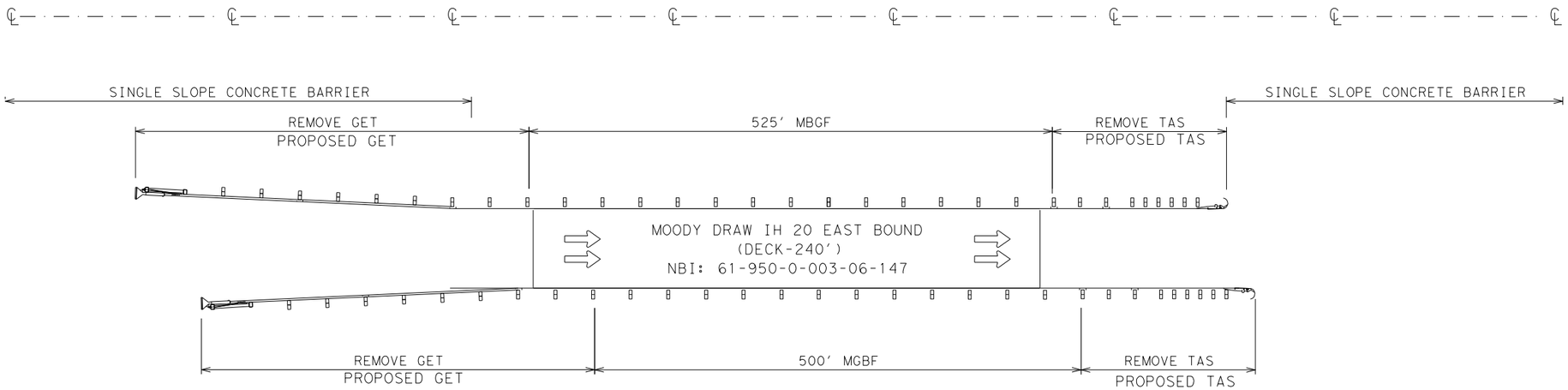
SHEET 1 OF 1

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			64
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

CK:
DW:
CK:
DW:





N. T. S.

LEGEND

	GUARDRAIL END TREATMENT
	TERMINAL ANCHOR SECTION
	MBGF
	DIRECTION OF TRAVEL

MBGF SUMMARY

	542 7001 REMOVE METAL BEAM GUARD FENCE LF	544 7003 GUARDRAIL END TREATMENT (REMOVE) EA	542 7002 REMOVE TERMINAL ANCHOR SECTION EA	658 7078 REMOVE DELIN & OBJECT MARKER ASSMS EA	540 7002 MTL W-BEAM GD FEN (STEEL POST) LF	540 7041 TERMINAL ANCHOR SECTION EA	544 7001 GUARDRAIL END TREATMENT (INSTALL) EA	658 7036 INSTL DEL ASSM (D-SY) SZ1(BRF) GF2 EA	658 7018 INSTL DEL ASSM (D-SW) SZ1(BRF) GF2 EA	658 7058 INSTL OM ASSM (OM-2Z)(W FLX)GND EA	432 7013 RIPRAP (MOW STRIP)(4 IN) CY
								PLACE ON INNER MBGF AT 100' SPACING	PLACE ON OUTER MBGF AT 100' SPACING		
								CANDLESTICK	CANDLESTICK		
IH 20 WB MOODY DRAW	1000	2	2	20	1000	2	2	8	8	2	19
IH 20 EB MOODY DRAW	1025	2	2	20	1025	2	2	8	8	2	19
SHEET TOTAL	2025	4	4	40	2025	4	4	16	16	4	38

DATE: $DATE$ $TIME$
FILE: $FILE$

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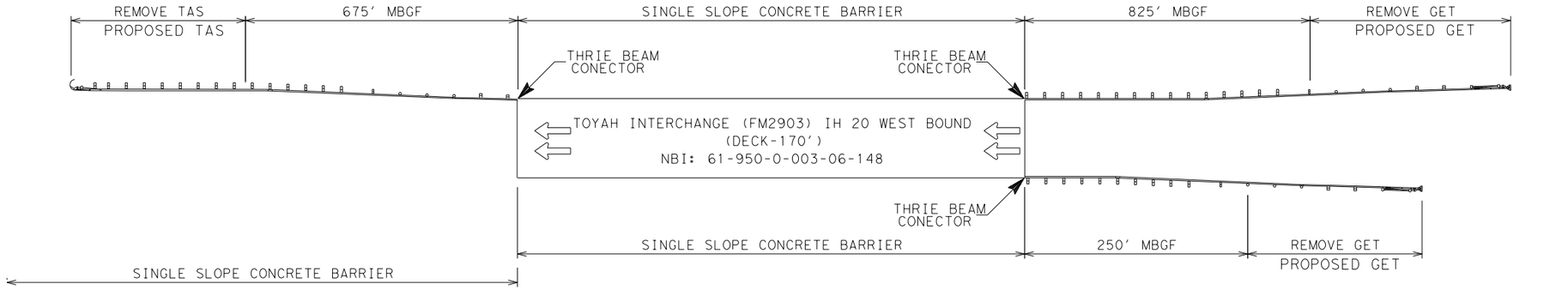
MBGF DETAILS

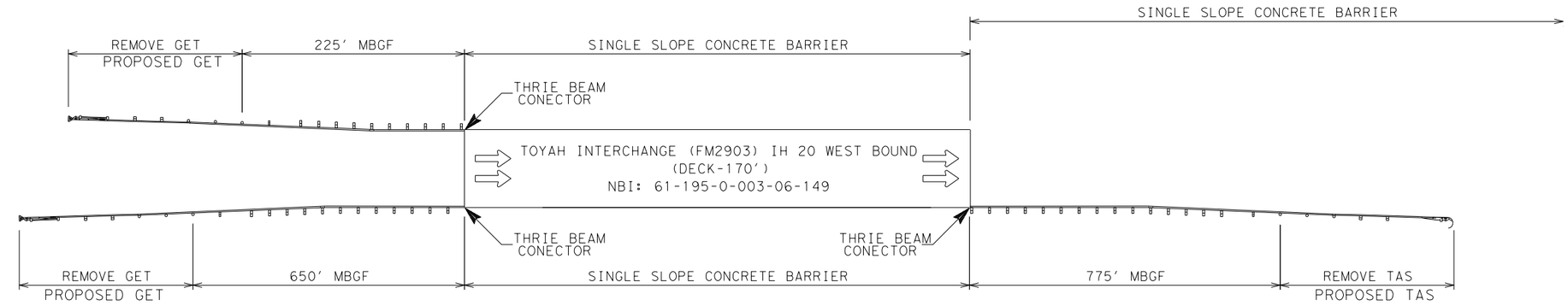
SHEET 1 OF 5

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			65
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

LEGEND	
	GUARDRAIL END TREATMENT
	TERMINAL ANCHOR SECTION
	MBGF
	DIRECTION OF TRAVEL





N. T. S.

MBGF SUMMARY

	REMOVE					PROPOSED									
	542	544	542	658	542	544	540	540	540	658	658	658	658	658	432
	7001	7003	7002	7078	7004	7001	7002	7041	7005	7036	7018	7014	7033	7058	7013
	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (REMOVE)	REMOVE TERMINAL ANCHOR SECTION	REMOVE DELIN & OBJECT MARKER ASSMS	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	MTL W-BEAM GD FEN (STEEL POST)	TERMINAL ANCHOR SECTION	MTL BM GD FEN TRANS (THRIE-BM)	INSTL DEL ASSM (D-SY)SZ1(BRF)GF2	INSTL DEL ASSM (D-SW)SZ1(BRF)GF2	INSTL DEL ASSM (D-SY)SZ(BRF)CTB(BR)	INSTL DEL ASSM (D-SW)SZ(BRF)CTB(BR)	INSTL OM ASSM (OM-2Z)(WFLX)GND	RIPRAP (MOW STRIP)(4 IN)
	LF	EA	EA	EA	EA	EA	LF	EA	EA	EA	EA	EA	EA	EA	CY
										PLACE ON INNER MBGF AT 100' SPACING	PLACE ON OUTER MBGF AT 100' SPACING	PLACE ALONG INNER BRIDGE RAILING/ CONCRETE	PLACE ALONG OUTER BRIDGE RAILING CONCRETE BARRIER		
										CANDLESTICK	CANDLESTICK	CUP-MOUNTED	CUP-MOUNTED		
IH 20 WB TOYAH INT.	1750	2	1	34	3	2	1750	1	3	16	16	4	4	2	32
IH 20 EB TOYAH INT.	1650	2	1	32	3	2	1650	1	3	16	16	4	4	2	31
SHEET TOTAL	3400	4	2	66	6	4	3400	2	6	32	32	8	8	4	63

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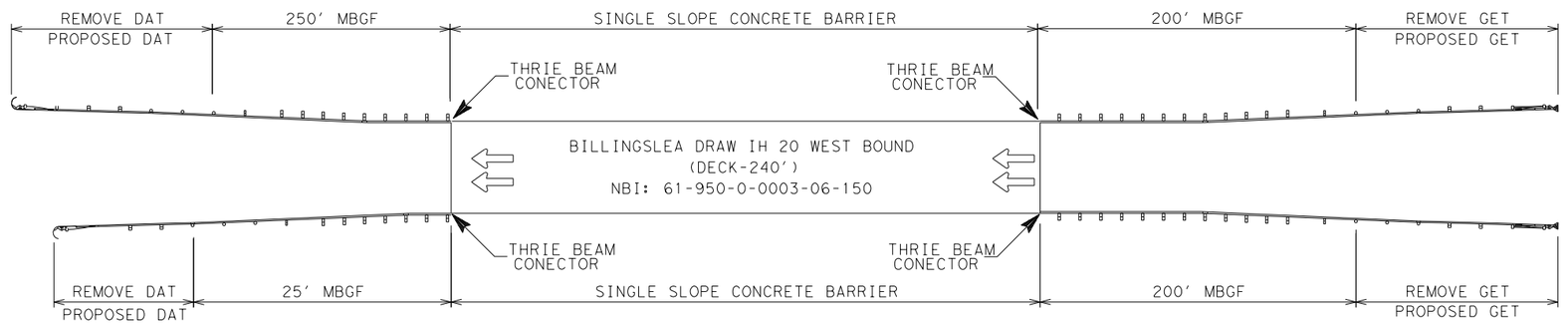
MBGF DETAILS

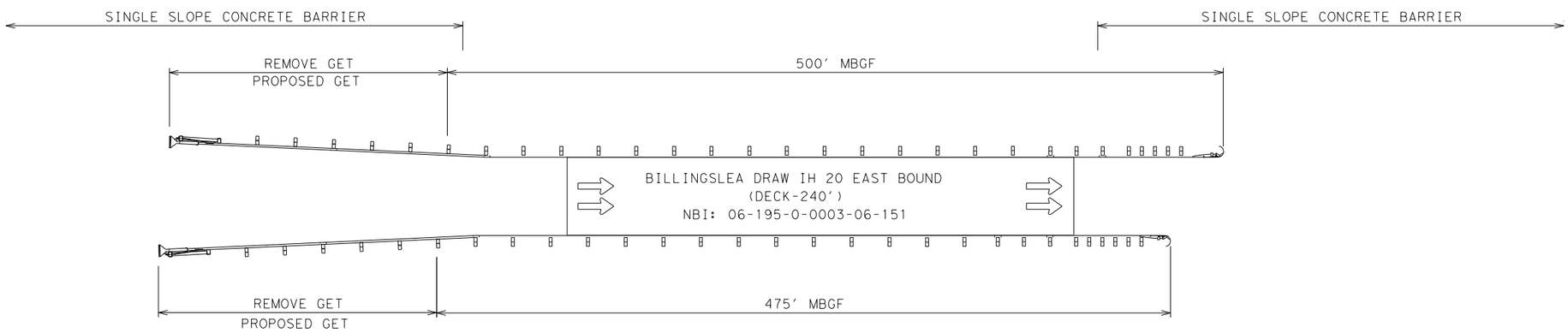
SHEET 2 OF 5

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			66
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

DATE: $DATE$ $TIME$
FILE: $FILE$





LEGEND

	GUARDRAIL END TREATMENT
	TERMINAL ANCHOR SECTION
	MBGF
	DIRECTION OF TRAVEL

	ROMOVE						PROPOSED										
	542	544	542	658	542	542	540	544	540	540	540	658	658	658	658	658	432
	7001	7003	7002	7078	7004	7003	7015	7001	7002	7041	7005	7036	7018	7014	7033	7058	7013
	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (REMOVE)	REMOVE TERMINAL ANCHOR SECTION	REMOVE DEL IN & OBJECT MARKER ASSMS	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	REMOVE DOWNSTRM ANCHOR TERMINAL	DOWNSTRM ANCHOR TERMINAL SECTION	GUARDRAIL END TREATMENT (INSTALL)	MTLW-BEAM GD FEN (STEEL POST)	TERMINAL ANCHOR SECTION	MTLBEAMGD FENTRANS (THRIE-BEAM)	INSTL DEL ASSM(D-SY) SZ1(BRF) GF2	INSTL DEL ASSM(D-SW) SZ1(BRF) GF2	INSTL DEL ASSM (D-SY)SZ (BRF)CTB (BR)	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BR)	INSTL OM ASSM (OM-2Z) WFLX)GND	RIPRAP (MOW (STRIP) (4 IN)
	LF	EA	EA	EA	EA	EA	EA	EA	LF	EA	EA	EA	EA	EA	EA	EA	CY
												PLACE ON INNERMBGF AT 100' SPACING	PLACE ON OUTERMBGF AT 100' SPACING	PLACE ALONG INNER BRIDGE RAILING/ CONCRETE	PLACE ALONG OUTER BRIDGE RAILING CONCRETE BARRIER		
												CANDLESTICK	CANDLESTICK	CUP-MOUNTED	CUP-MOUNTED		
IH 20 WB BILLINGSLEA DRAW	675	2	0	12	4	2	2	2	675	0	4	8	8	4	4	2	13
IH 20 EB BILLINGSLEA DRAW	975	2	2	20	0	0	0	2	975	2	0	5	5	4	4	2	20
SHEETTOTAL	1650	4	2	32	4	2	2	4	1650	2	4	13	13	8	8	4	33

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8/30/2024

MBGF DETAILS

SHEET 3 OF 5

Texas Department of Transportation

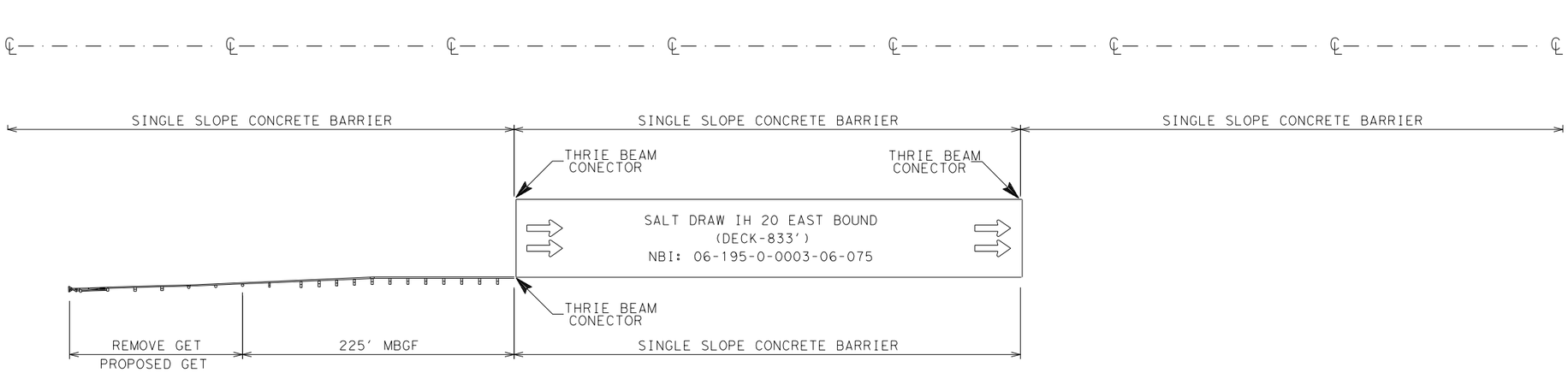
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			67
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

DATE: $DATE$ $TIME$
FILE: $FILE$

CK:
DW:
CK:
DW:

LEGEND

	GUARDRAIL END TREATMENT
	MBGF
	DIRECTION OF TRAVEL



	REMOVE				PROPOSED								
	542	544	658	542	544	540	540	658	658	658	658	658	432
	7001	7003	7078	7004	7001	7002	7005	7036	7018	7033	7014	7058	7013
	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (REMOVE)	REMOVE DELIN & OBJECT MARKER ASSMS	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	MTL W-BEAM GD FEN (STEEL POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	INSTL DEL ASSM (D-SY)SZ1(BRF)GF2	INSTL DEL ASSM (D-SW)SZ1(BRF)GF2	INSTL DEL ASSM (D-SY)SZ(BRF)CTB (BR)	INSTL DEL ASSM (D-SW)SZ(BRF) CTB (BR)	INSTL OM ASSM (OM-2Z)(WFLX)GND	RIPRAP (MOW STRIP)(4 IN)
	LF	EA	EA	EA	EA	LF	EA	EA	EA	EA	EA	EA	CY
								PLACE ON INNER MBGF AT 100' SPACING	PLACE ON OUTER MBGF AT 100' SPACING	PLACE ALONG INNER BRIDGE RAILING/ CONCRETE	PLACE ALONG OUTER BRIDGE RAILING CONCRETE		
								CANDLESTICK	CANDLESTICK	CUP-MOUNTED	CUP-MOUNTED		
IH 20 EB SALT DRAW	225	1	2	3	1	225	3	2	2	8	8	2	4
SHEET TOTAL	225	1	2	3	1	225	3	2	2	8	8	2	4

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...

8/30/2024

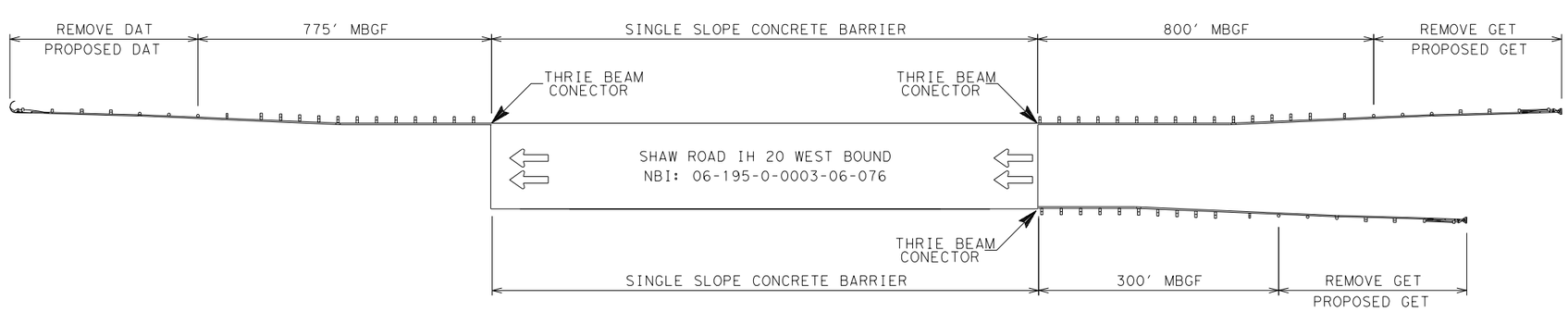
MBGF DETAILS

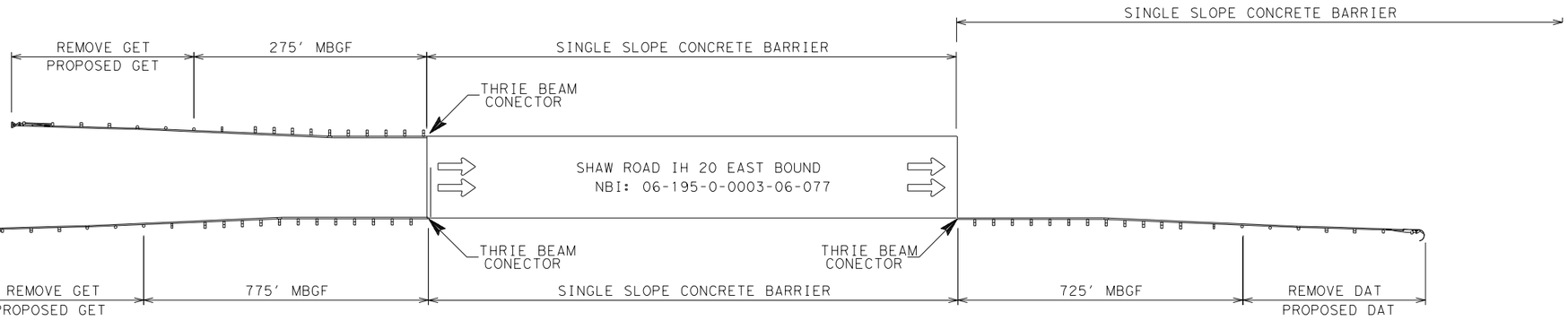
SHEET 4 OF 5

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			68
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

DATE: $DATE$ $TIME$
FILE: $FILE$





LEGEND

- GUARDRAIL END TREATMENT
- TERMINAL ANCHOR SECTION
- MBGF
- DIRECTION OF TRAVEL

	REMOVE					PROPOSED									
	542	544	542	658	542	544	540	540	540	658	658	658	658	658	432
	7001	7003	7003	7078	7004	7001	7002	7005	7041	7036	7018	7033	7014	7058	7013
	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (REMOVE)	REMOVE DOWNSTREAM ANCHOR TERMINAL	REMOVE DELIN & OBJECT MARKER ASSMS	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	MTL W-BEAM GD FEN (STEEL POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	TERMINAL ANCHOR SECTION	INSTL DEL ASSM (D-SY)SZ1(BRF)GF2	INSTL DEL ASSM (D-SW)SZ1(BRF)GF2	INSTL DEL ASSM (D-SY)SZ(BRF)CTB(BR)	INSTL DEL ASSM (D-SW)SZ(BRF)CTB(BR)	INSTL OM ASSM (OM-2Z)(WFLX)GND	RIPRAP (MOW STRIP) (4 IN)
	LF	EA	EA	EA	EA	EA	LF	EA	EA	EA	EA	EA	EA	EA	CY
										PLACE ON INNER MBGF AT 100' SPACING	PLACE ON OUTER MBGF AT 100' SPACING	PLACE ALONG INNER BRIDGE RAILING/ CONCRETE	PLACE ALONG OUTER BRIDGE RAILING CONCRETE BARRIER		
										CANDLESTICK	CANDLESTICK	CUP-MOUNTED	CUP-MOUNTED		
IH20 WB SHAW RD	1875	2	1	36	3	2	1875	3	1	19	19	4	4	2	35
IH 20 EB SHAW RD	1775	2	1	34	3	2	1775	3	1	18	18	4	4	2	33
SHEET TOTAL	3650	4	2	70	6	4	3650	6	2	37	37	8	8	4	68

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER

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8/30/2024

MBGF DETAILS

SHEET 5 OF 5

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			69
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

DATE: $DATE$ $TIME$
FILE: $FILE$

LOC. NO.	PLAN SHEET NUMBER	LOCATION FEATURE	STA.	TO	STA.	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
																MOVE / RESET		L	L	R	R	S	S
								PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC. #	N	W	N	W	N	W
1	58	EB PICNIC AREA	1313+85.00		1319+55.00	TL-3	UNI	CONC	6"	SSCB	24"	32"	50'	1				X					
2	58	WB PICNIC AREA	1300+95.00		1308+65.00	TL-3	UNI	CONC	6"	SSCB	24"	32"	50'	1				X					
3	62	MOODY DRAW	1047+80.78		1050+20.78	TL-3	UNI	N/A	N/A	SSCB	24"	32"	50'	1									
4	62	MOODY DRAW	1047+39.22		1049+79.22	TL-3	UNI	N/A	N/A	SSCB	24"	32"	50'		1	1	3					X	
5	62	BILLINGSLEA DRAW	1248+29.22		1250+69.22	TL-3	UNI	N/A	N/A	SSCB	24"	32"	50'		1	1	4					X	
6	62	BILLINGSLEA DRAW	1248+70.78		1251+10.78	TL-3	UNI	N/A	N/A	SSCB	24"	32"	50'		1	1	5					X	
7	62	FM2903	1188+72.50		1190+42.50	TL-3	UNI	N/A	N/A	SSCB	24"	32"	50'		1	1	6					X	
8	62	FM2903	1188+72.50		1190+42.50	TL-3	UNI	N/A	N/A	SSCB	24"	32"	50'		1	1	7					X	
9	62	SALT DRAW	4+52.92		13+52.75	TL-3	UNI	N/A	N/A	SSCB	24"	32"	50'		1	1	8					X	
10	62	SHAW RD	137+94.74		140+40.74	TL-3	UNI	N/A	N/A	SSCB	24"	32"	50'		1	1	9					X	
11	62	SHAW RD	32+00.00		63+00.00	TL-3	UNI	N/A	N/A	SSCB	24"	32"	50'		1	1	10					X	
													TOTALS	3	8	8						

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

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

STATE OF TEXAS
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CRASH CUSHION SUMMARY SHEET

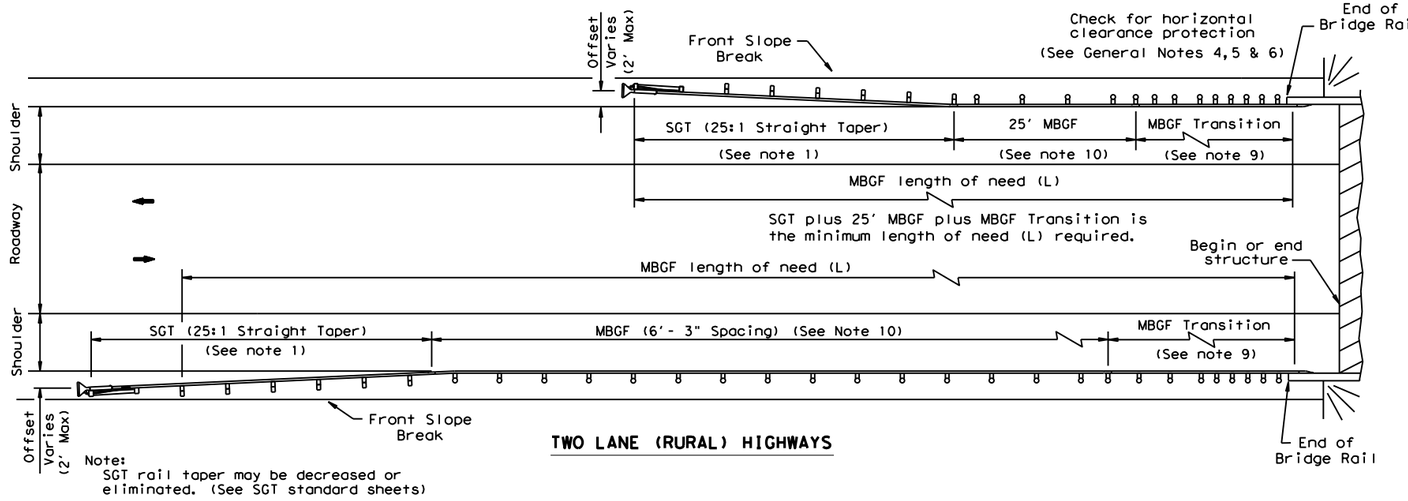
SHEET 1 OF 1

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			70
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

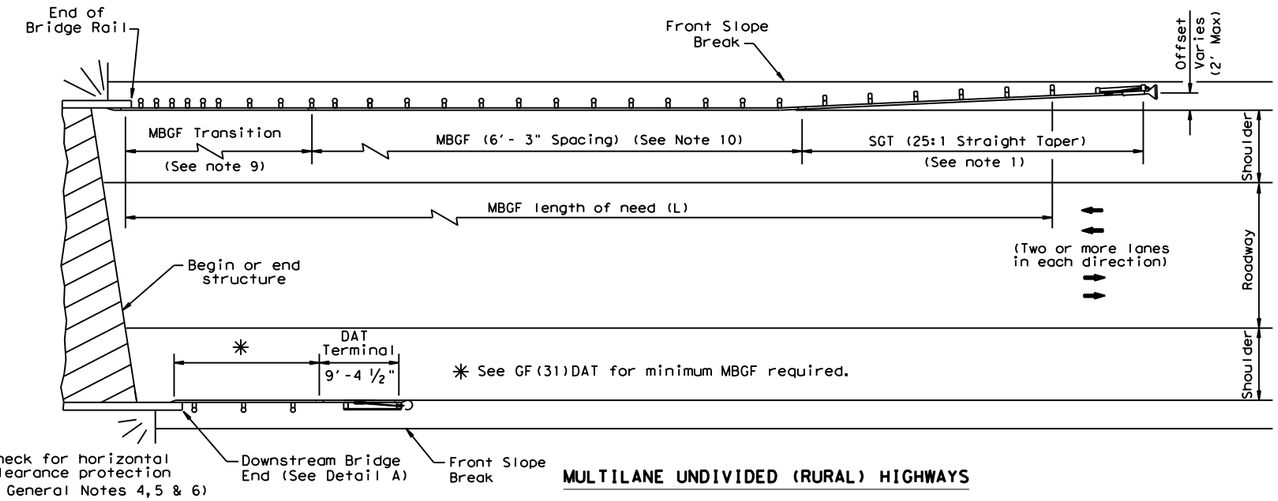
DATE: $DATE$
FILE: $FILE$
$TIME$

DATE:
FILE:

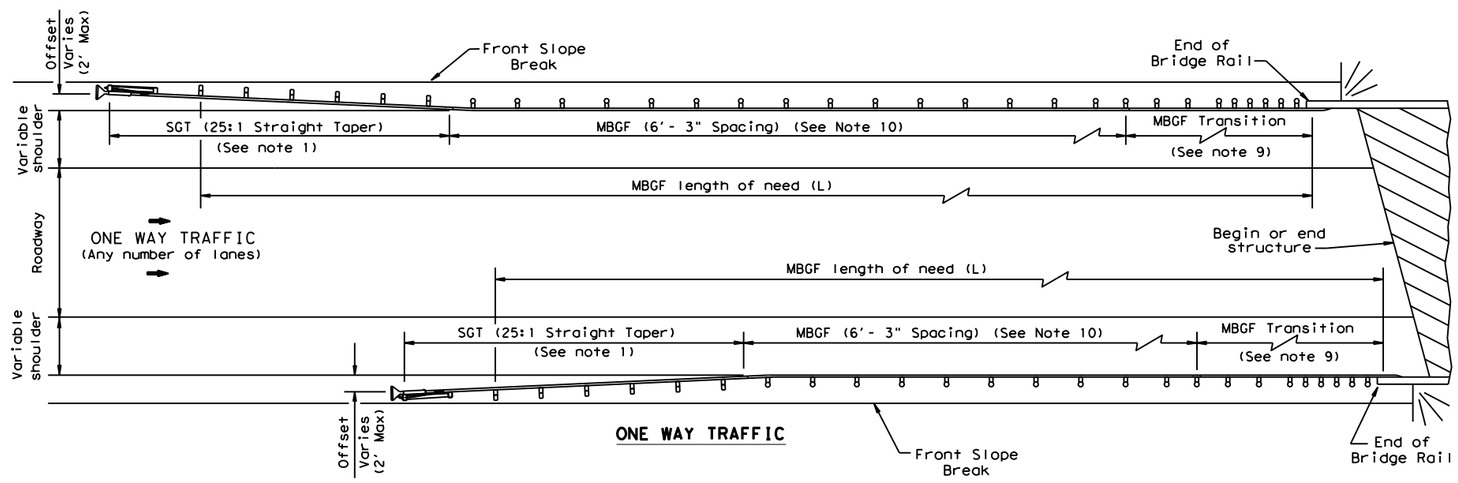


TWO LANE (RURAL) HIGHWAYS

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



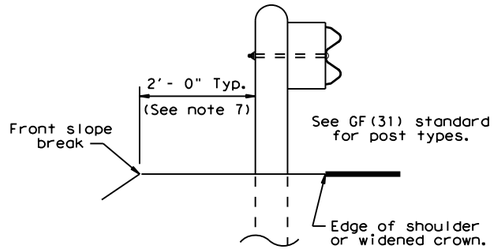
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



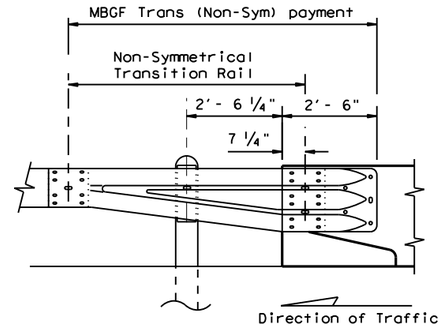
ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF



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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

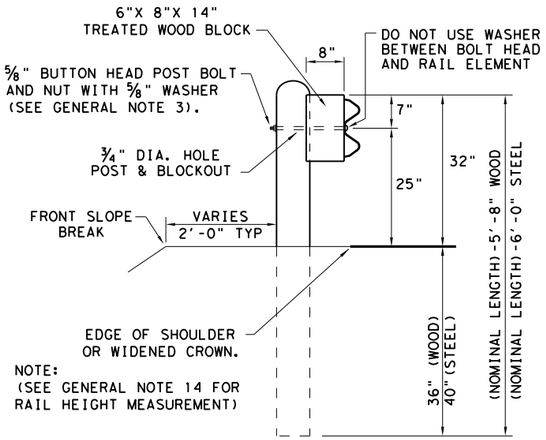
BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

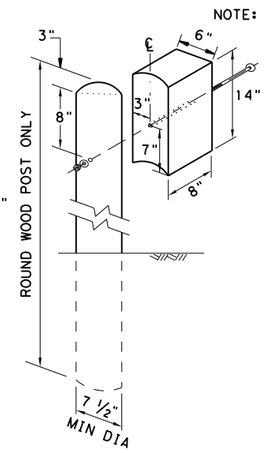
BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	0•	103	IH 20
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	ODA	REEVES		71

DATE:
FILE:

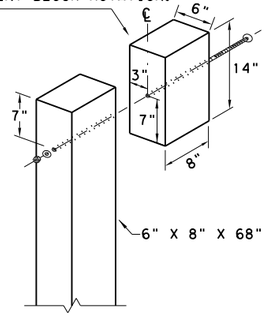


TYPICAL POST PLACEMENT

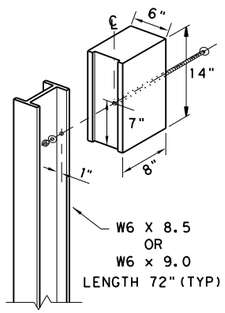


WOOD BLOCK TO ROUND WOOD POST

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

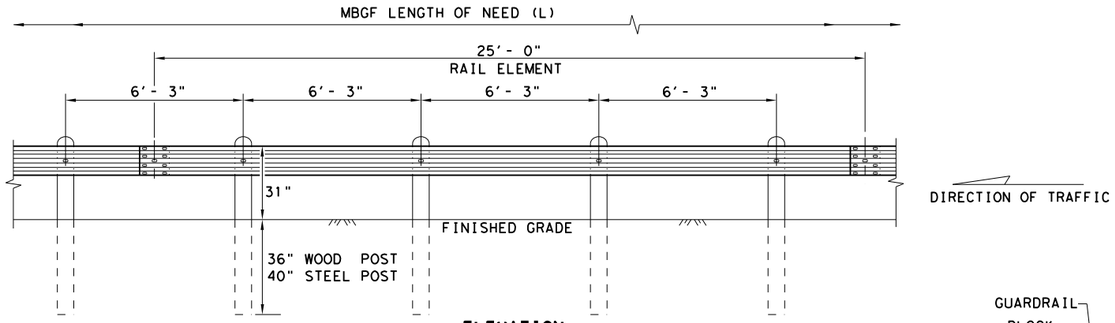


WOOD BLOCK TO RECTANGULAR WOOD POST



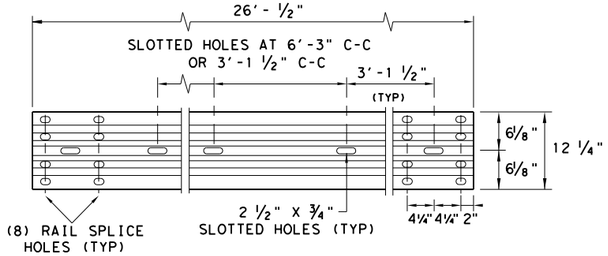
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION MID-SPAN RAIL SPLICE

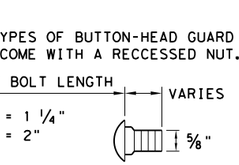
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

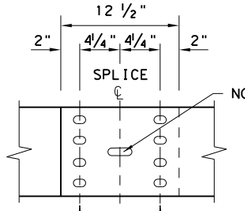
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



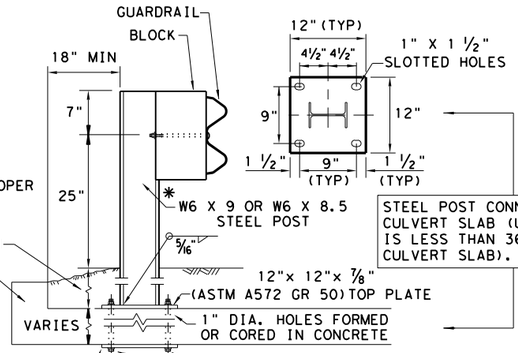
BUTTON HEAD BOLT

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.



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

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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" 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 1/4" 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 1/2" 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 5/8" 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.

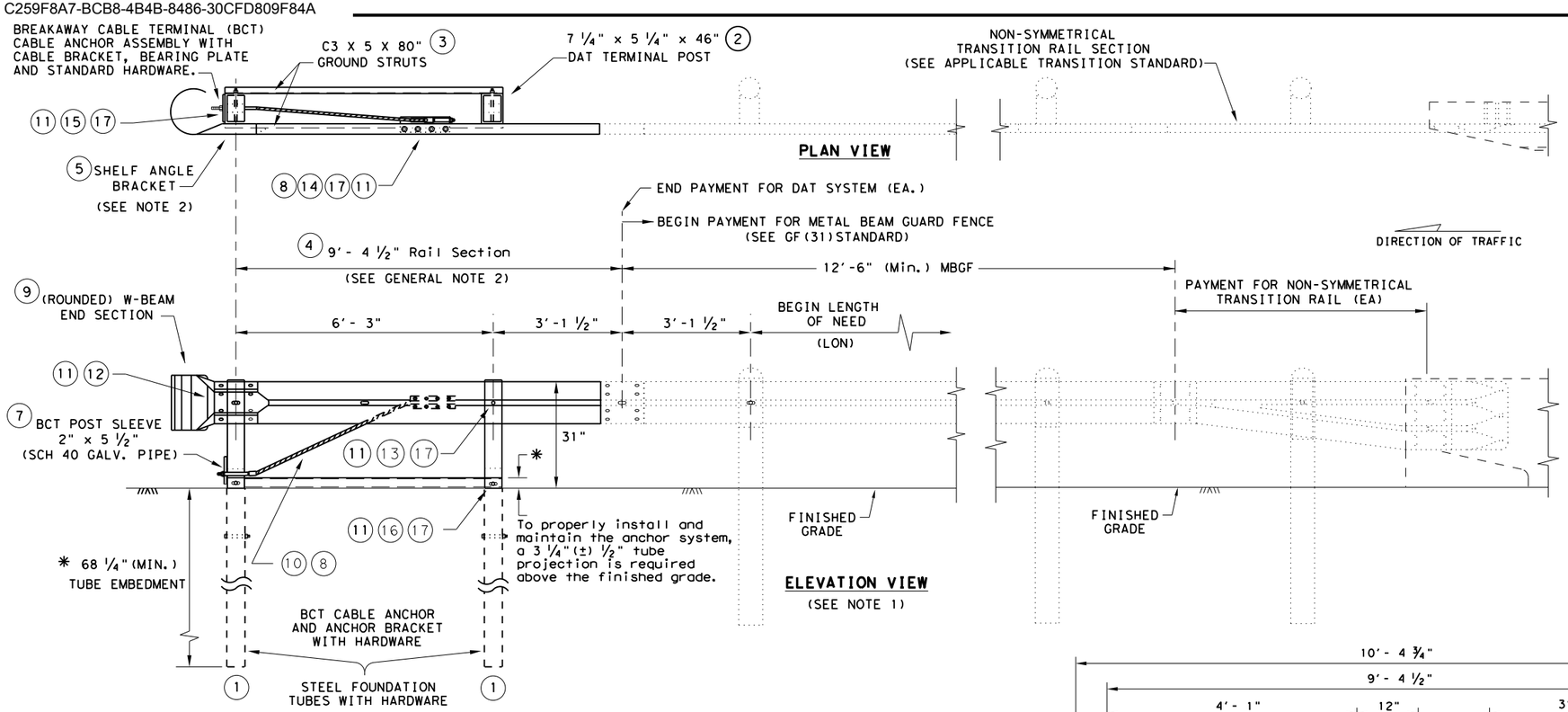
Texas Department of Transportation

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	0003	06	103	IH 20
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		72

DATE:
FILE:



DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

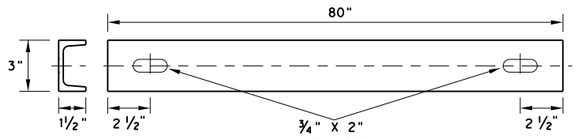
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

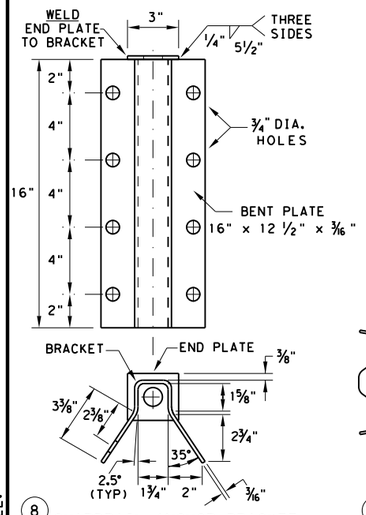
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(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

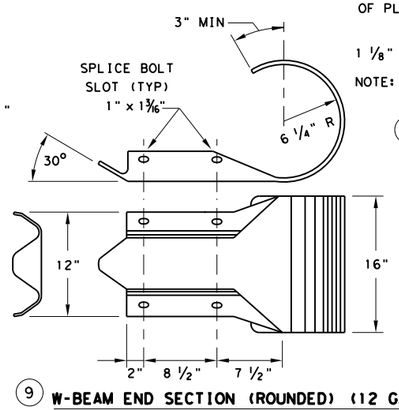
(4) TERMINAL RAIL ELEMENT FOR DAT



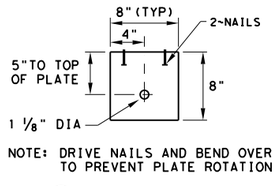
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

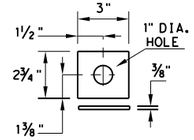


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

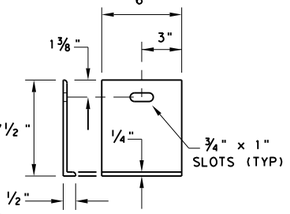


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

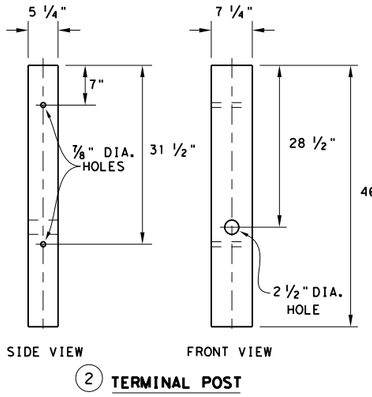
(6) BEARING PLATE
8"x 8"x 5/8" R



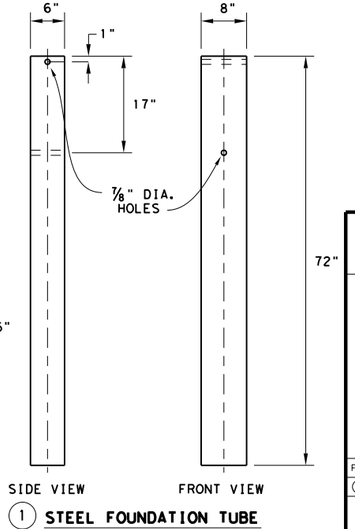
END PLATE



(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 REVISIONS	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	ODA	REEVES		73

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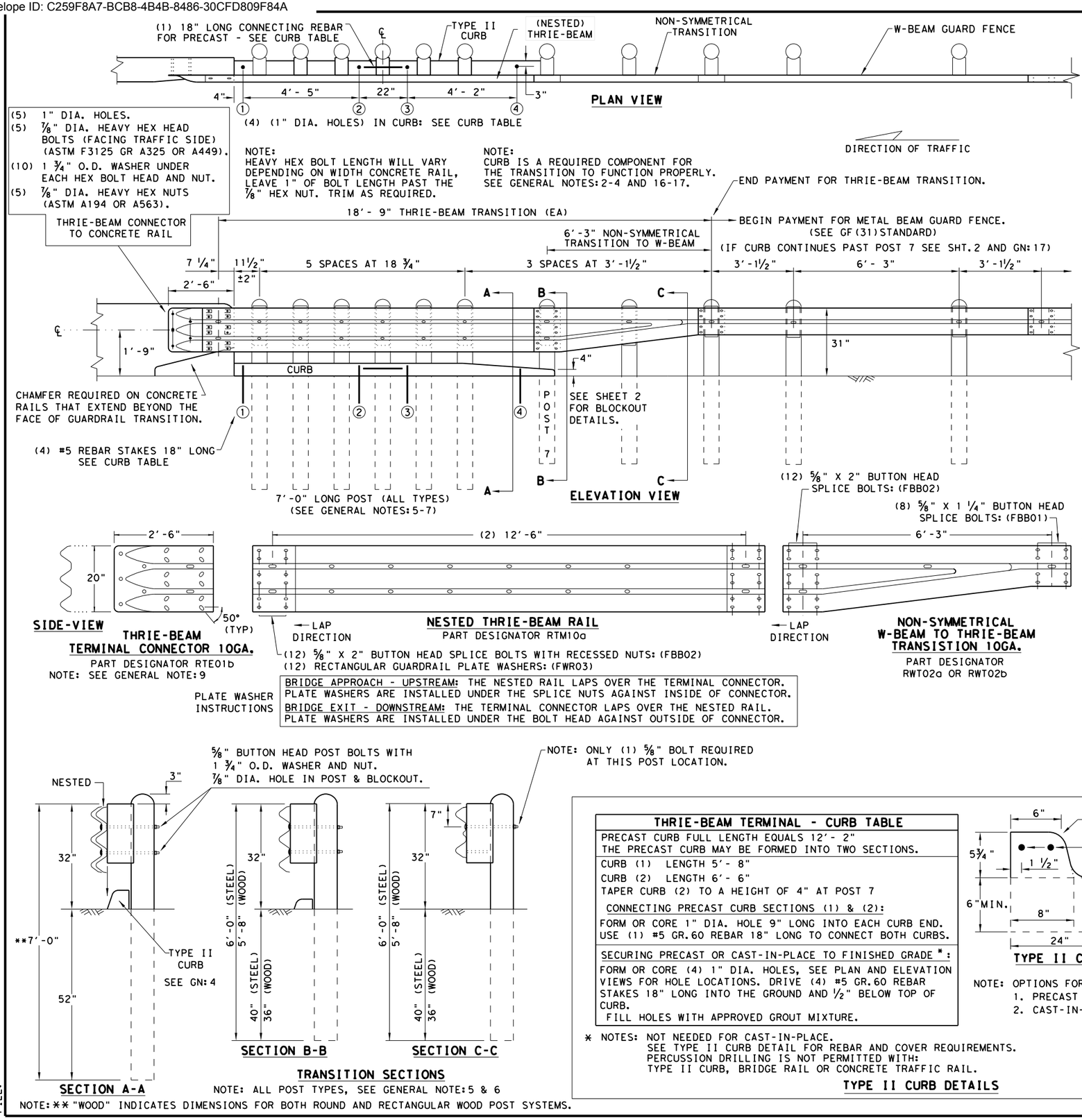


GENERAL NOTES

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.

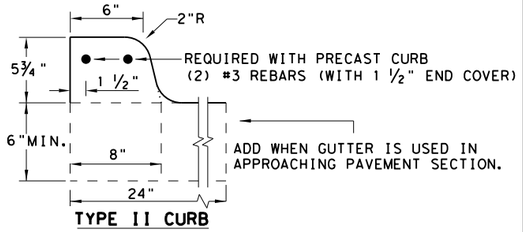
THRIE-BEAM TERMINAL - CURB TABLE

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.



TYPE II CURB

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

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

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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	ODA	REEVES		74

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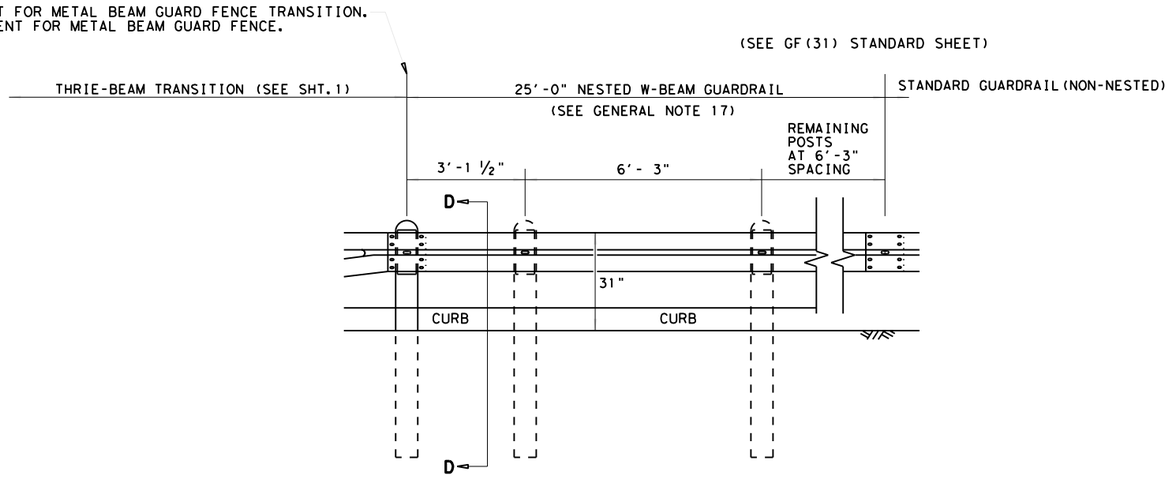
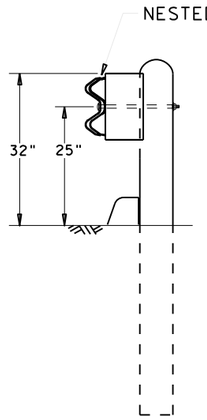
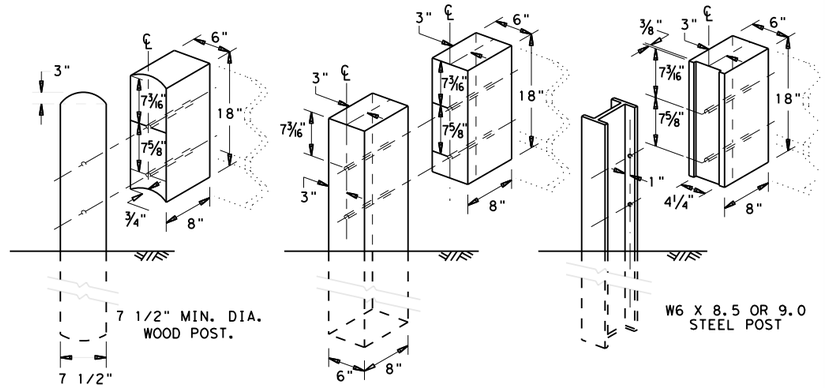
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation | Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
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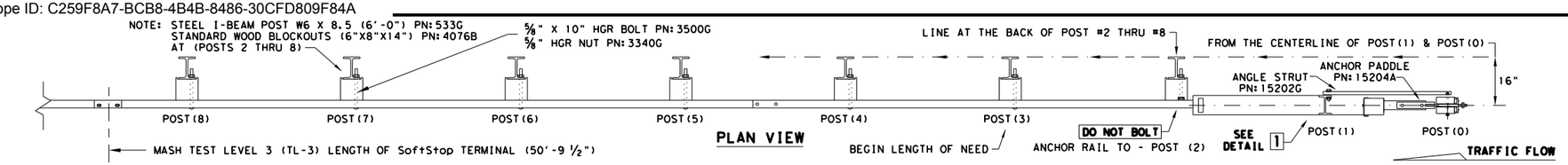
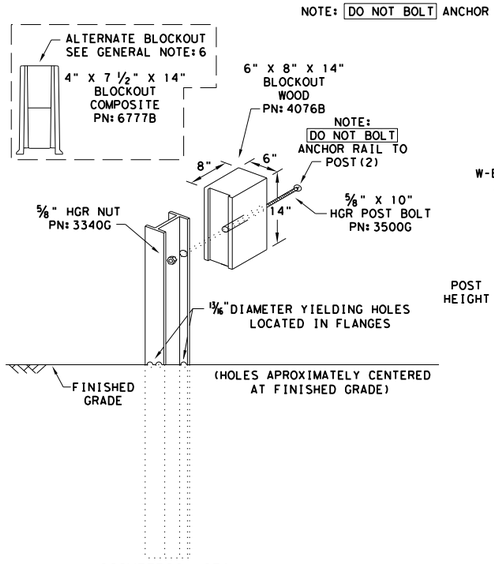
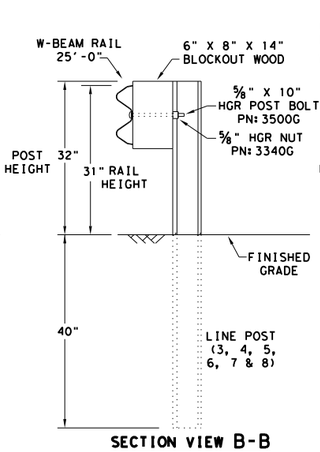




ISOMETRIC VIEW POST(1 & 2)

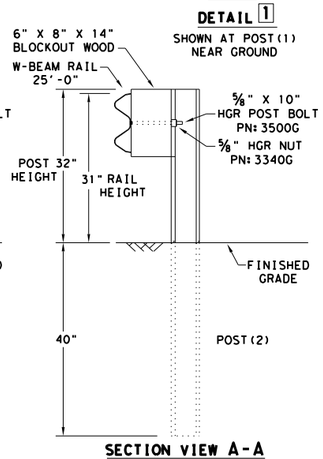
W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)



SECTION VIEW B-B

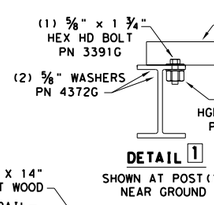
6'-0" (W6 X 8.5)
I-BEAM POST PN: 533G



SECTION VIEW A-A

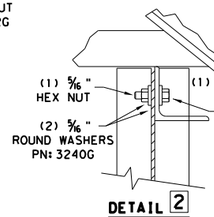
6'-0" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15000G

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



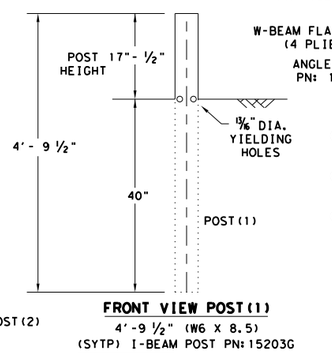
DETAIL 1

SHOWN AT POST(1) NEAR GROUND



DETAIL 2

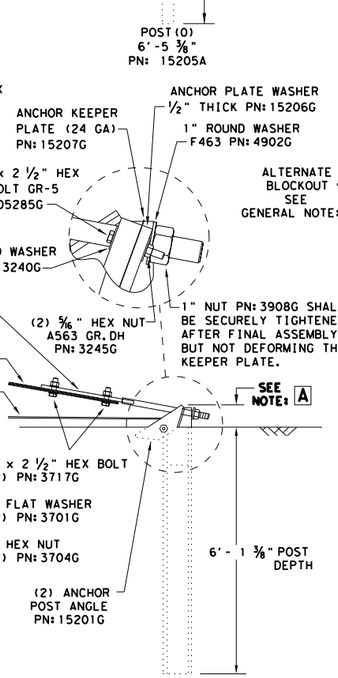
SHOWN AT POST(1)



FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

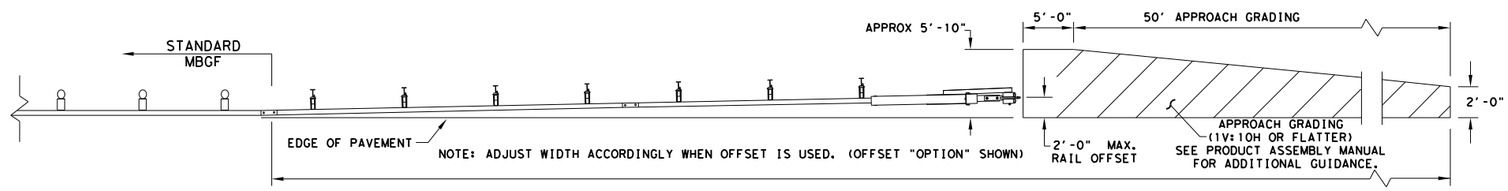


DETAIL 3

AT POST(0)

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

TRAFFIC FLOW



APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
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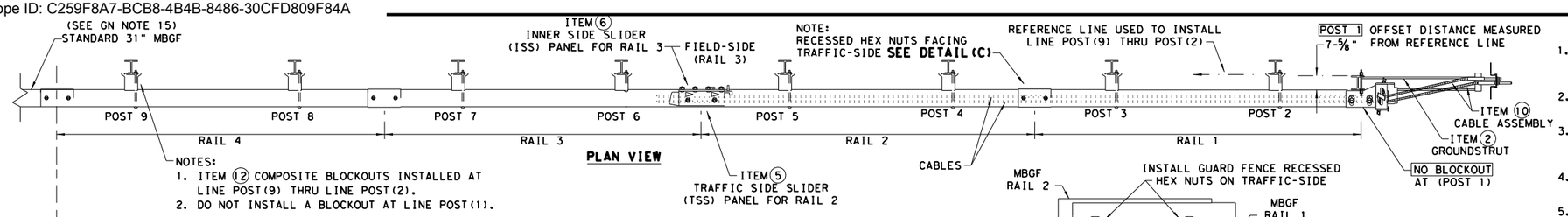
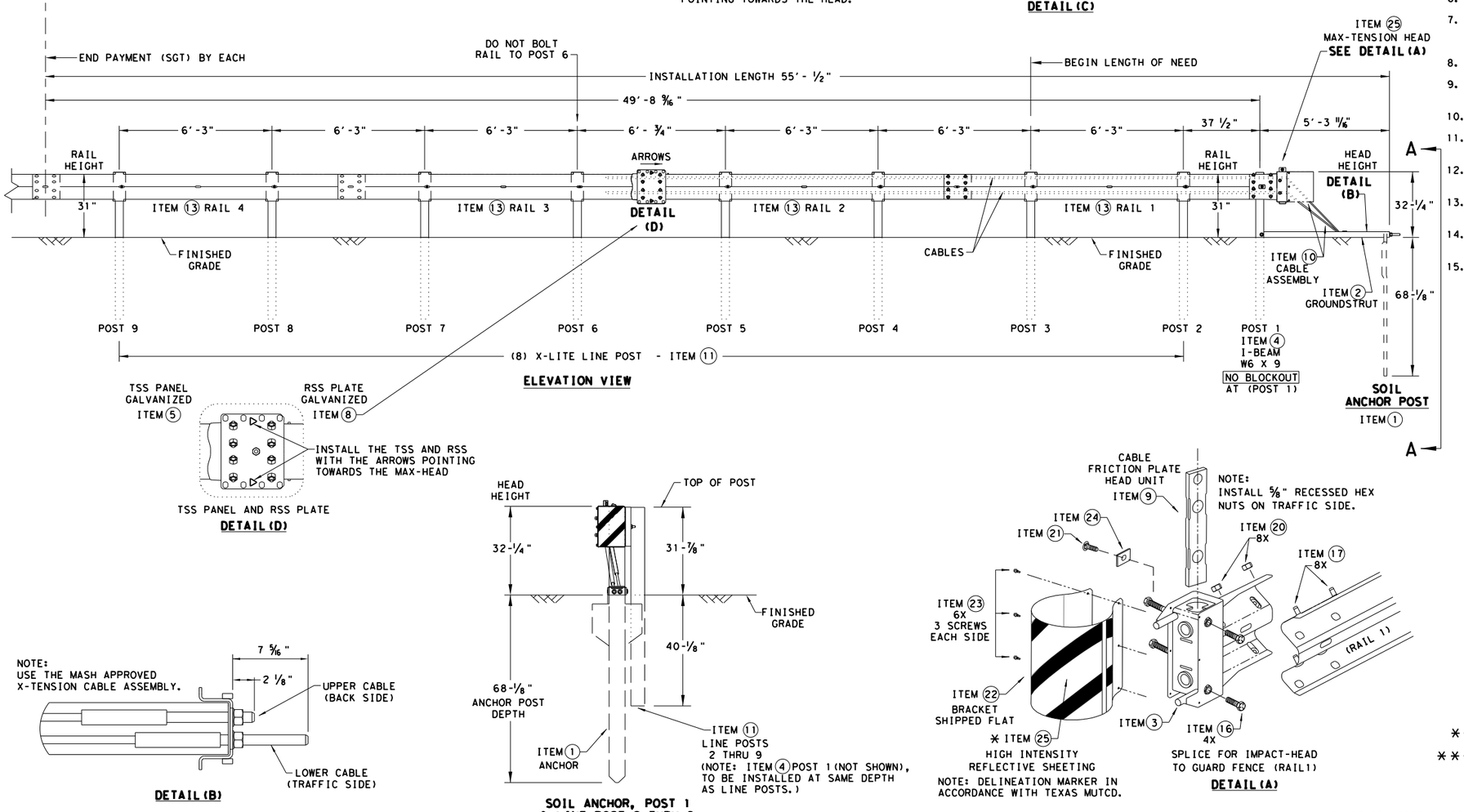
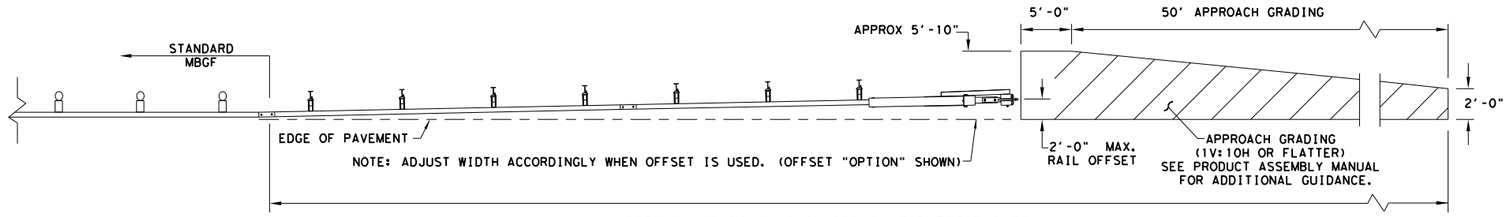






TRAFFIC FLOW

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	5/8" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	3/4" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	5/8" X 1 1/4" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	5/8" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	5/8" WASHER F436 STRUCTURAL MGAL	2
20	4001116	5/8" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	5/8" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	1/4" X 3/4" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
* 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
** 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
** 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

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

Texas Department of Transportation

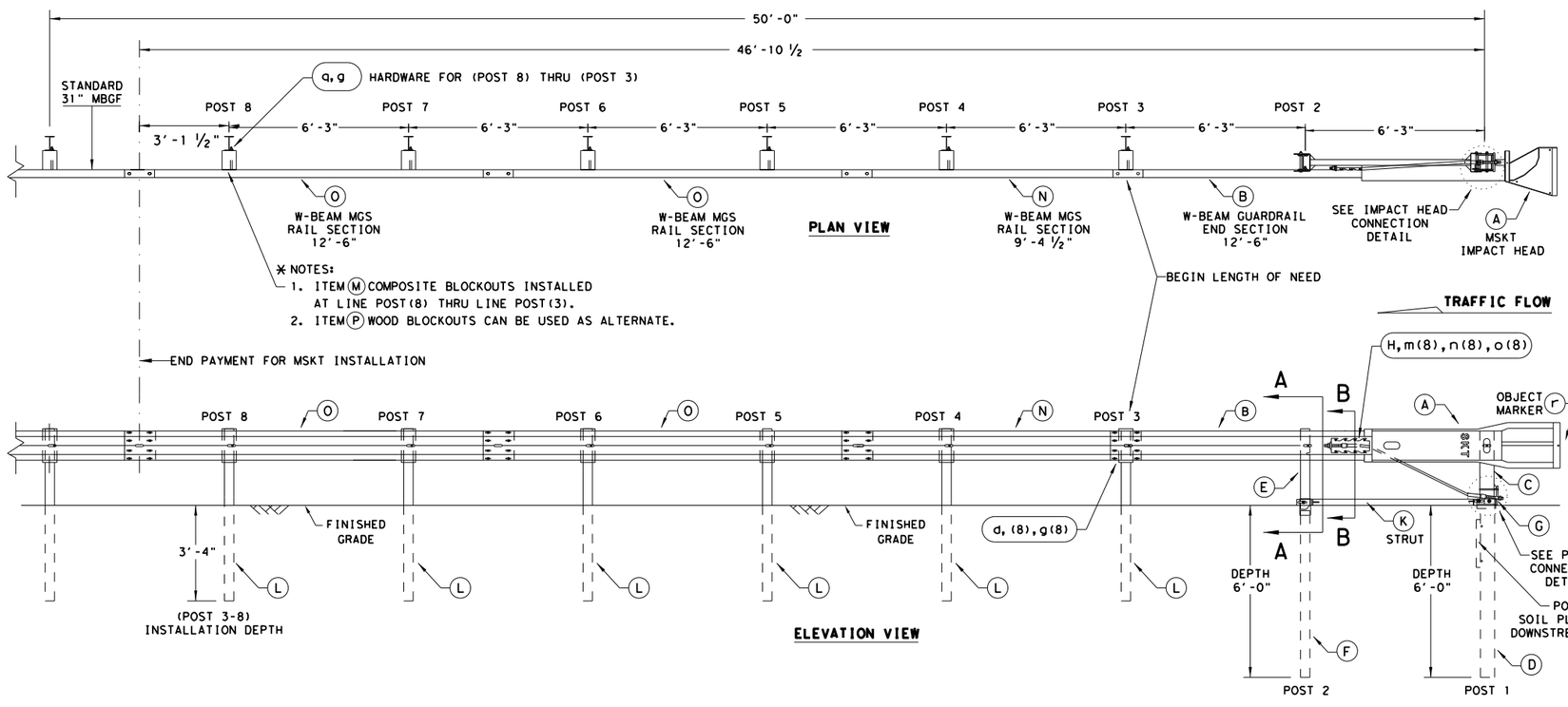
Design Division Standard

MAX-TENSION END TERMINAL MASH - TL-3

SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		77

DATE:
FILE:



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

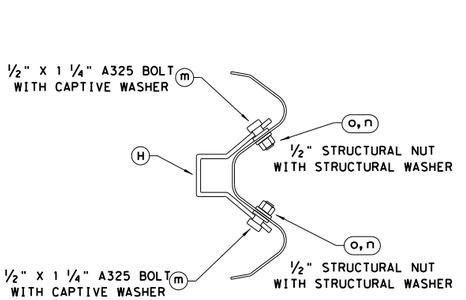
GENERAL NOTES

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

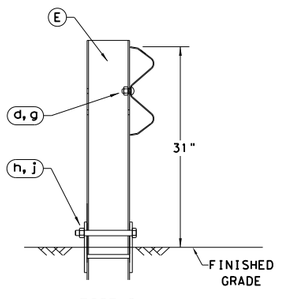
ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	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 3/16" 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: *

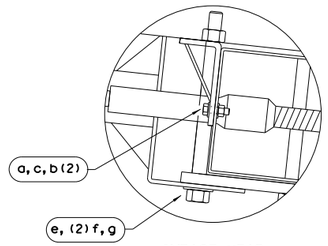
ALTERNATIVE ITEMS NOT SHOWN. **
* ITEM(P) 8" WOOD-BLOCKOUT
** ITEM(Q) 25'GUARD FENCE PANEL



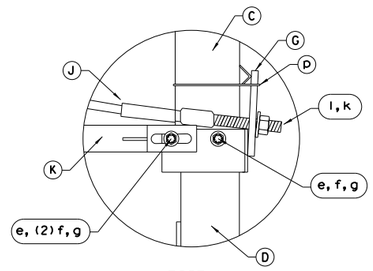
SECTION B-B
ANCHOR BRACKET



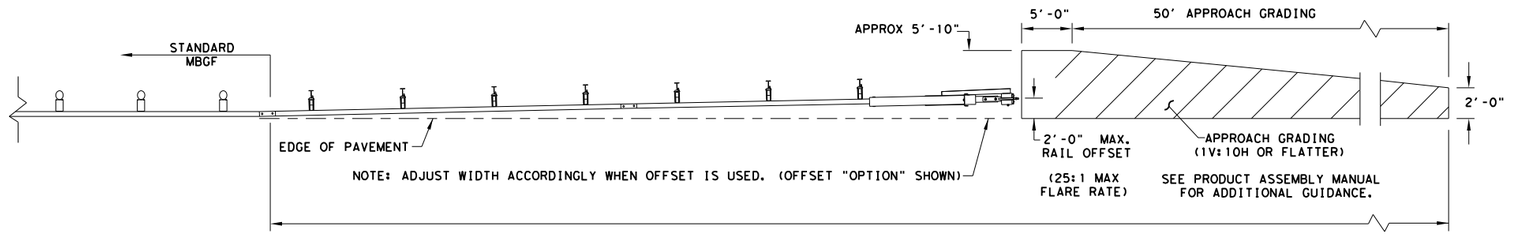
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

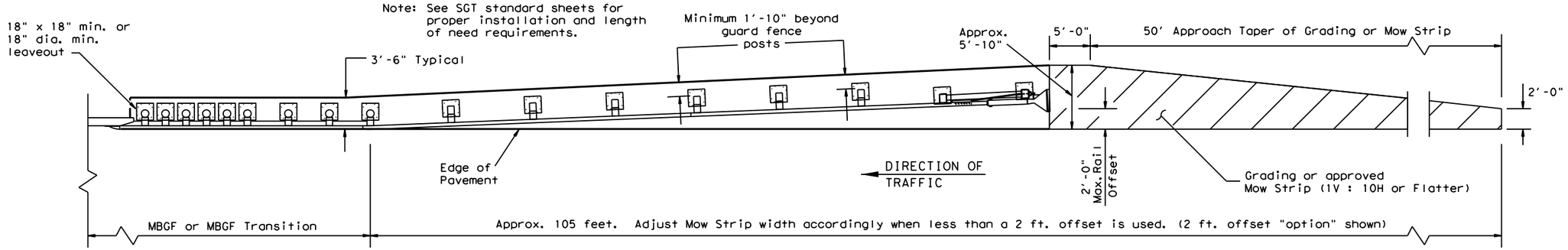
SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

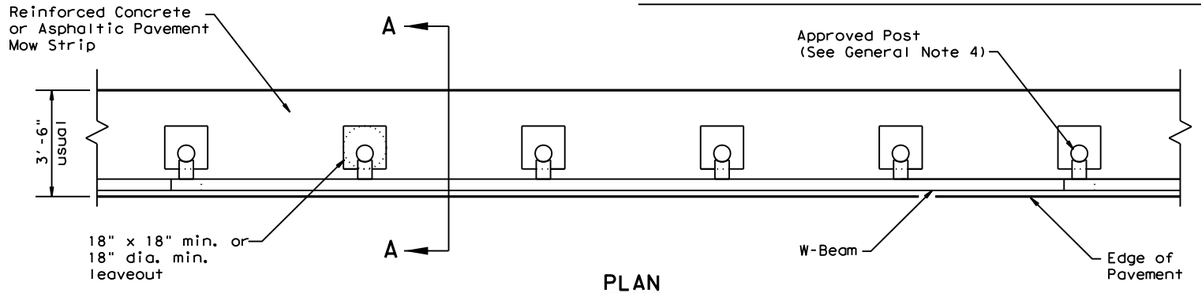
SGT(12S)31-18

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		78

DATE:
FILE:

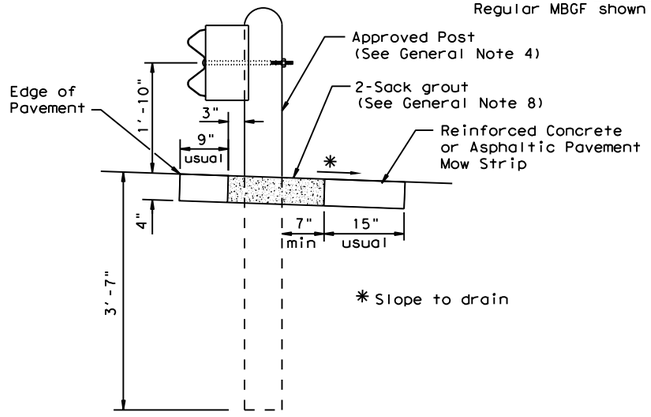


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



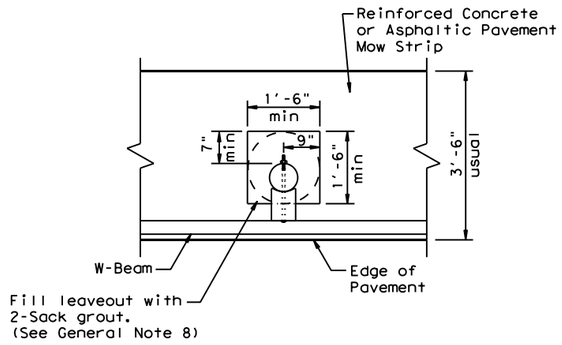
PLAN

Regular MBGF shown with Mow Strip



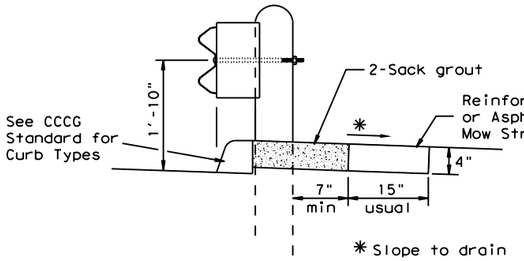
SECTION A-A

Typical



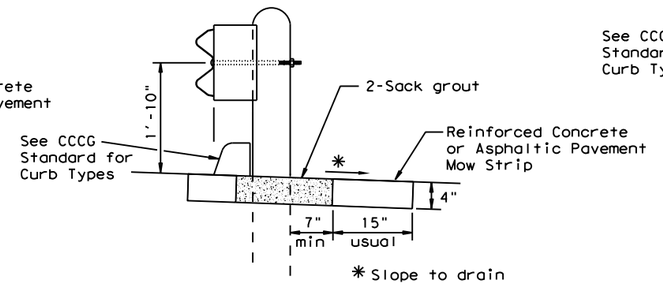
MOW STRIP DETAIL

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



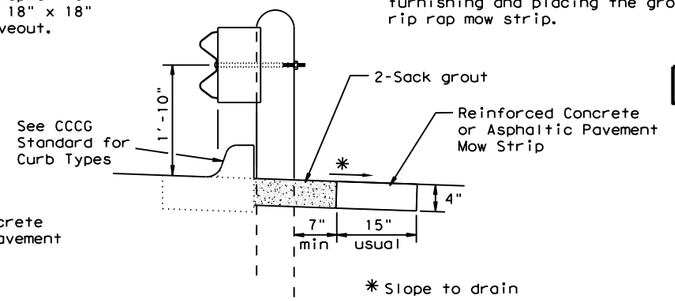
CURB OPTION (1)

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	06	103	IH 20
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		79

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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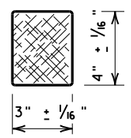
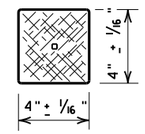
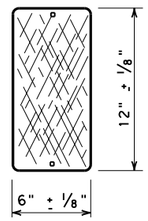
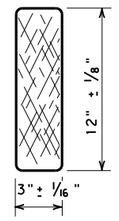
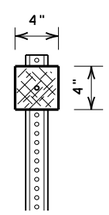
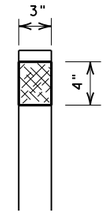
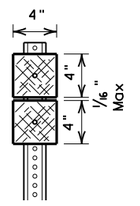
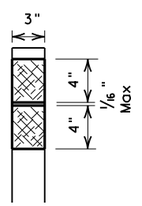
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.			

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

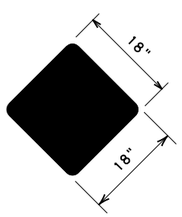
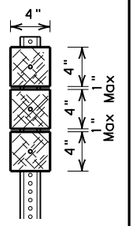
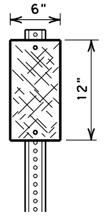
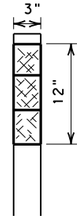
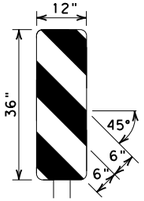
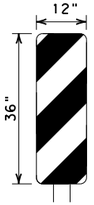
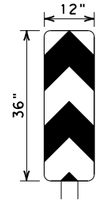
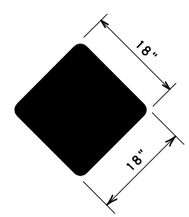
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

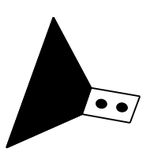
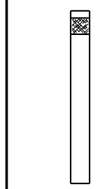
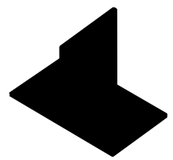
OBJECT MARKERS

	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

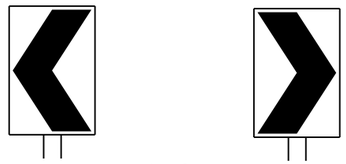
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

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



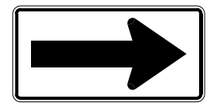
W1-8

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	

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

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

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DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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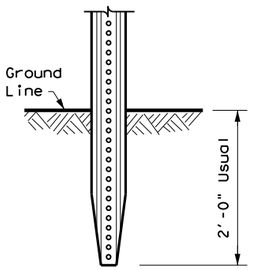
REVISIONS	0003	06	103	IH 20
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	ODA	REEVES		80

DATE:
FILE:

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

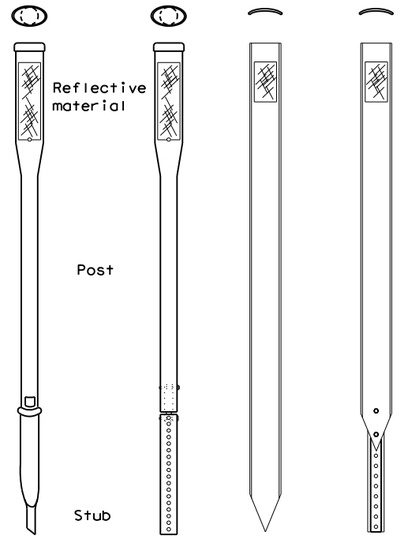


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

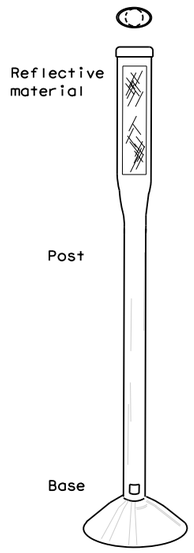
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



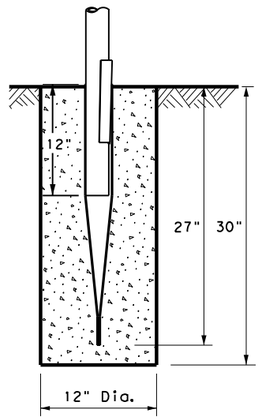
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

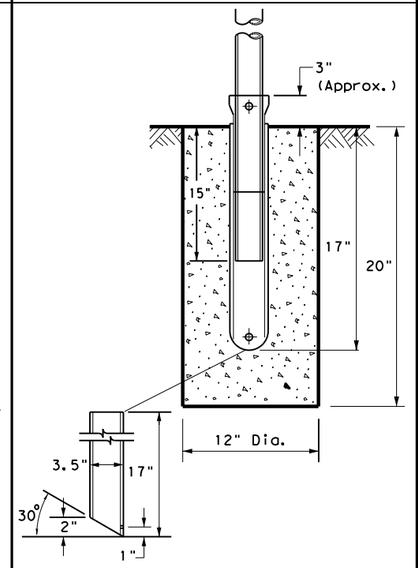
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

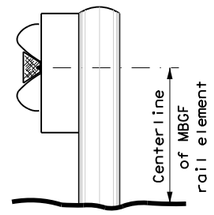
NOTE

1. Install per manufacturer's recommendations.

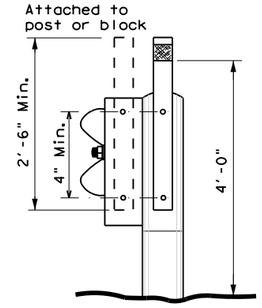
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

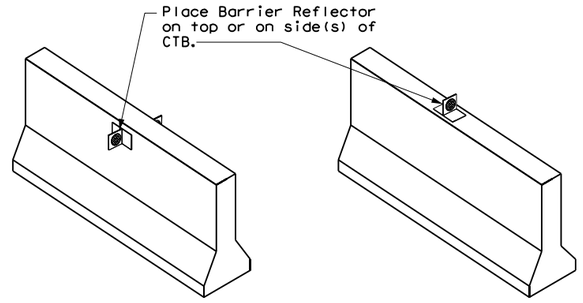
GF1



GF2



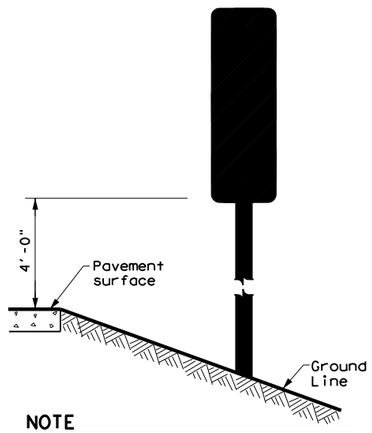
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

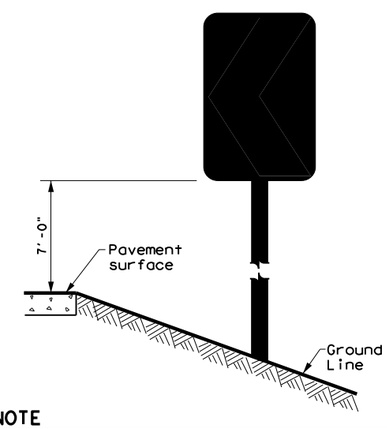
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

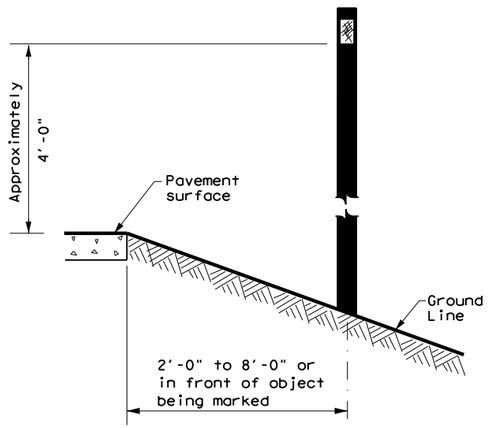
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

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DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	ODA	REEVES		81

20B

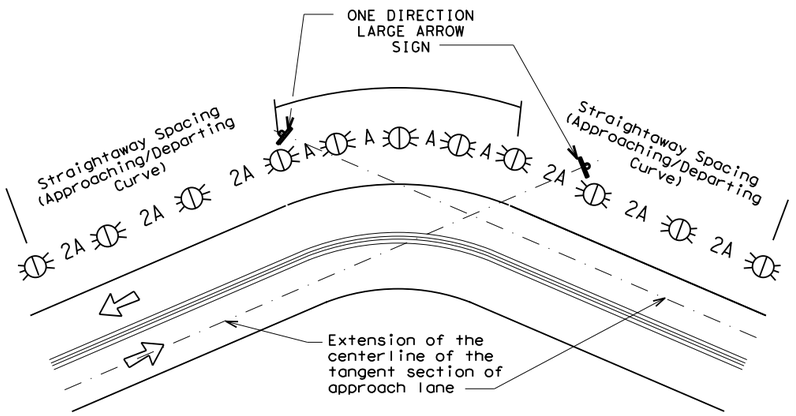
DATE:
FILE:

DATE:
FILE:

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

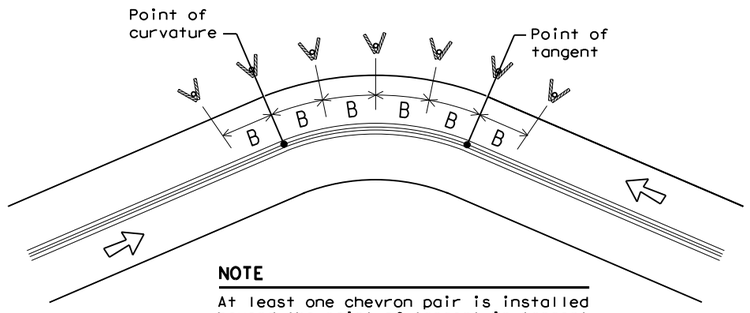
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

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DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

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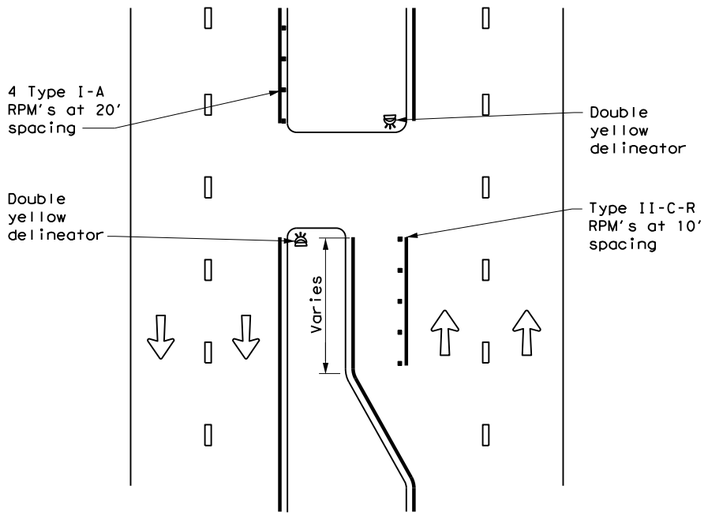
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	ODA	REEVES		82

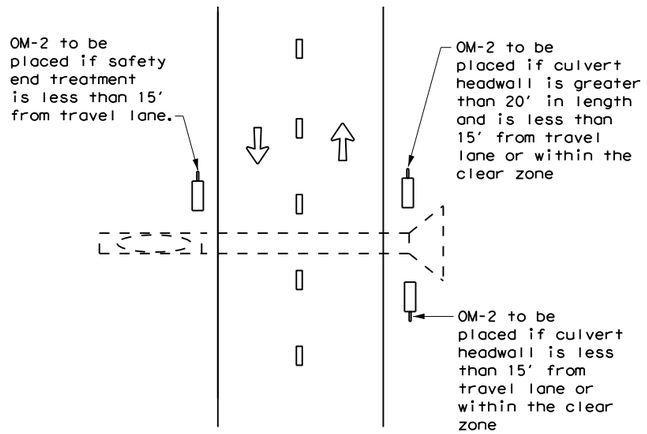
20C

CROSSOVERS



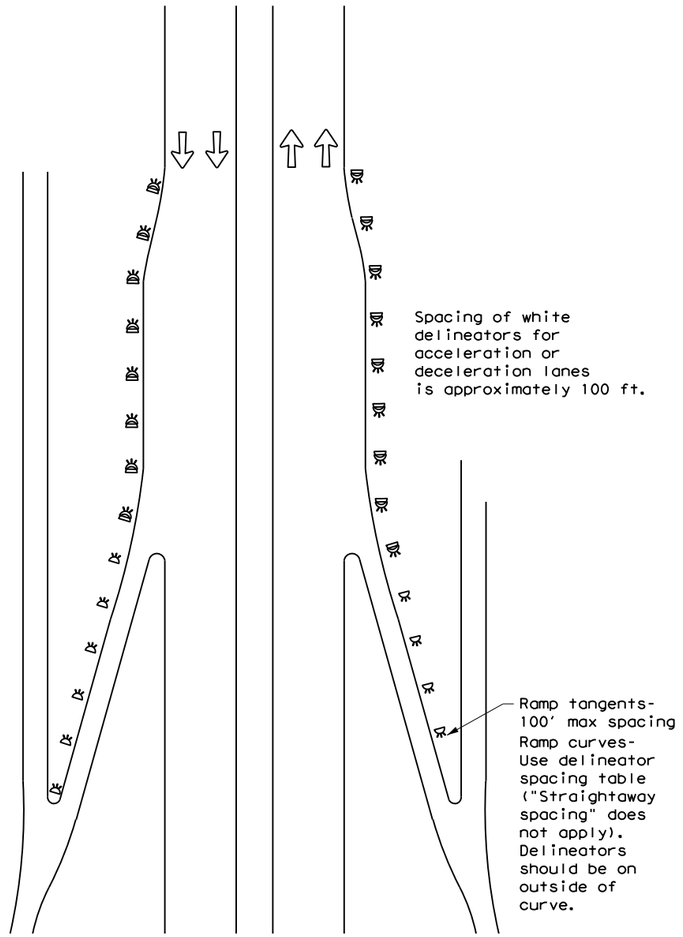
DETAIL 1

FOR CULVERTS WITHOUT MBGF



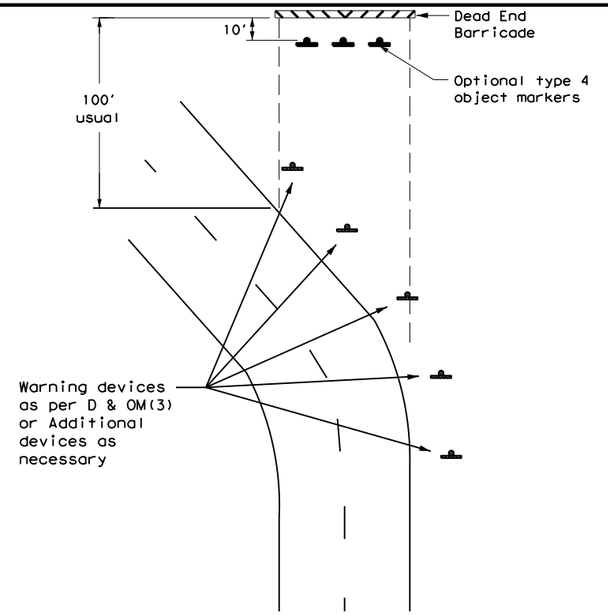
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



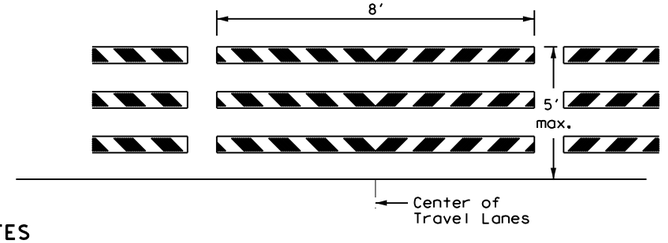
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

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DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dgm4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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7-20	ODA	REEVES		83

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DATE:
FILE:

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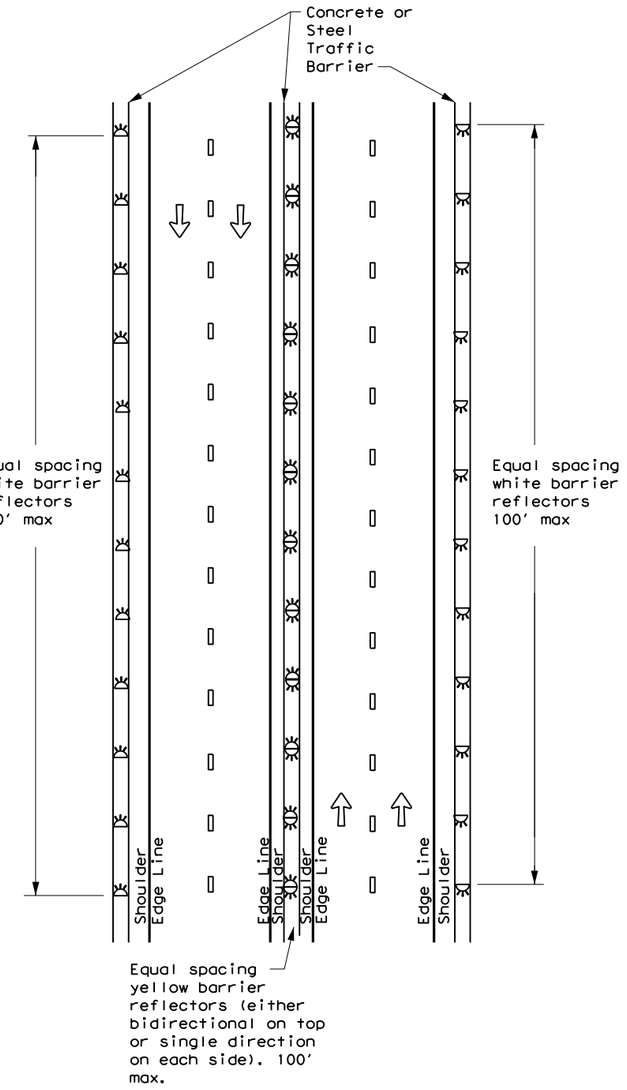
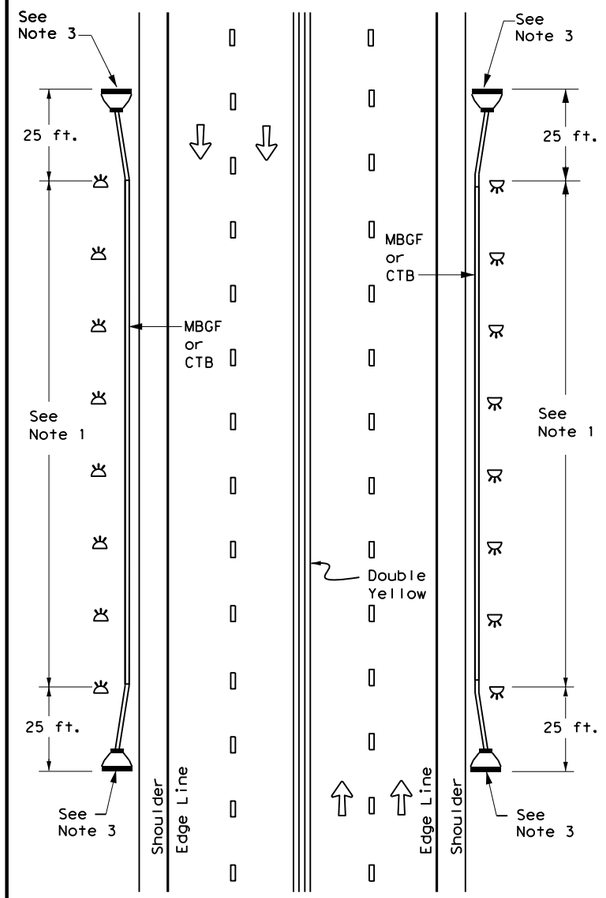
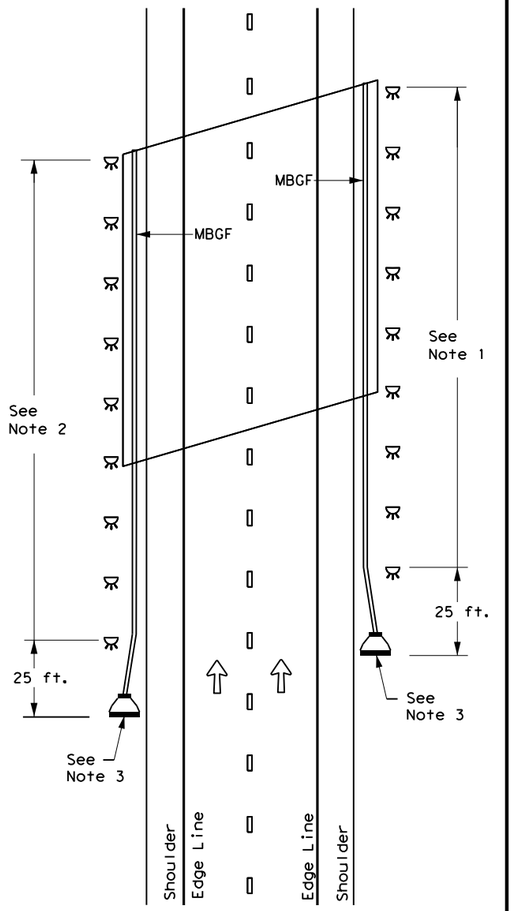
CONTINUOUS CONCRETE OR STEEL BARRIER



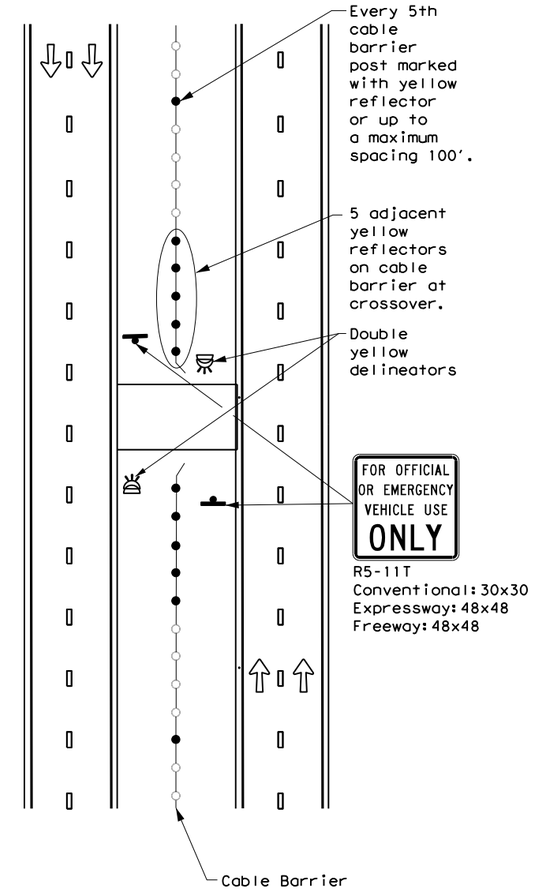
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100′ max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100′ max.)
2. Equal spacing (100′ max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3)in front of the terminal end.

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

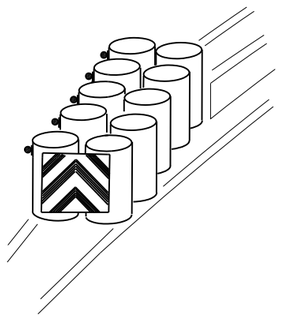
Traffic Safety Division Standard

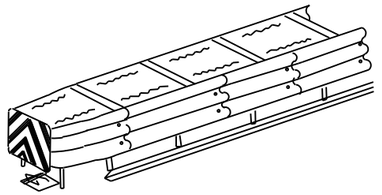
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

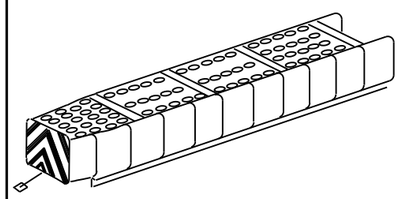
D & OM(6)-20

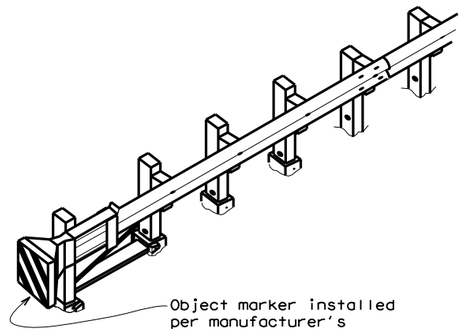
FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	09	IH 20
7-20	DIST	COUNTY		SHEET NO.
	ODA	REEVES		84

DATE:
FILE:

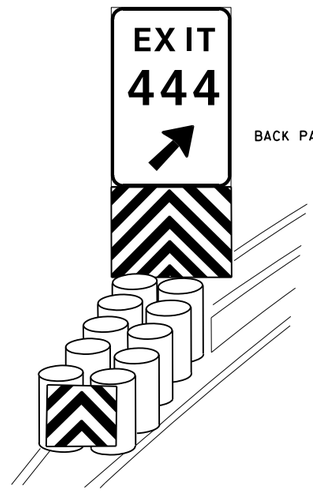




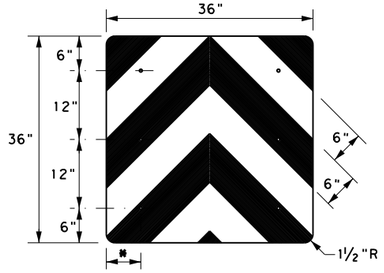


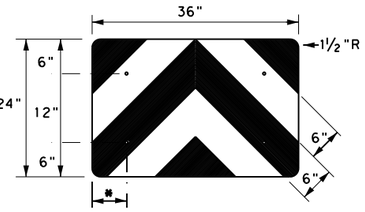


Object marker installed per manufacturer's recommendations.

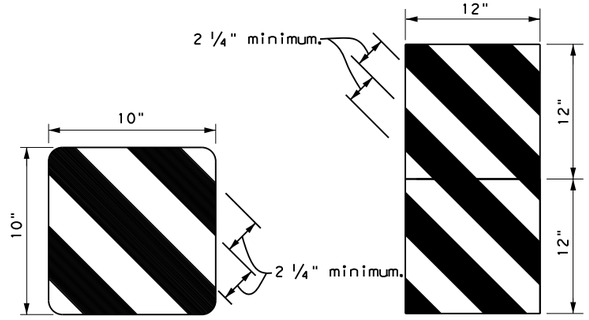


BACK PANEL (OPTIONAL)

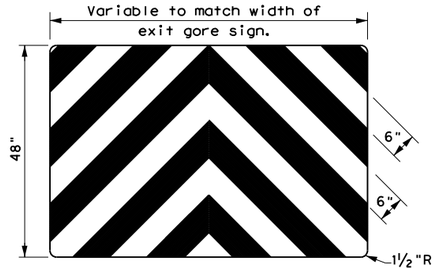


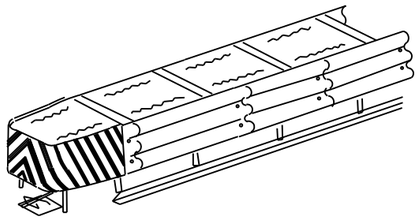


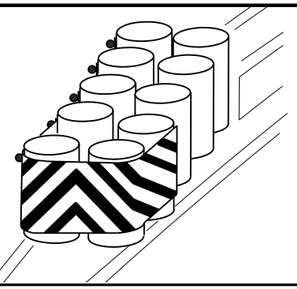
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

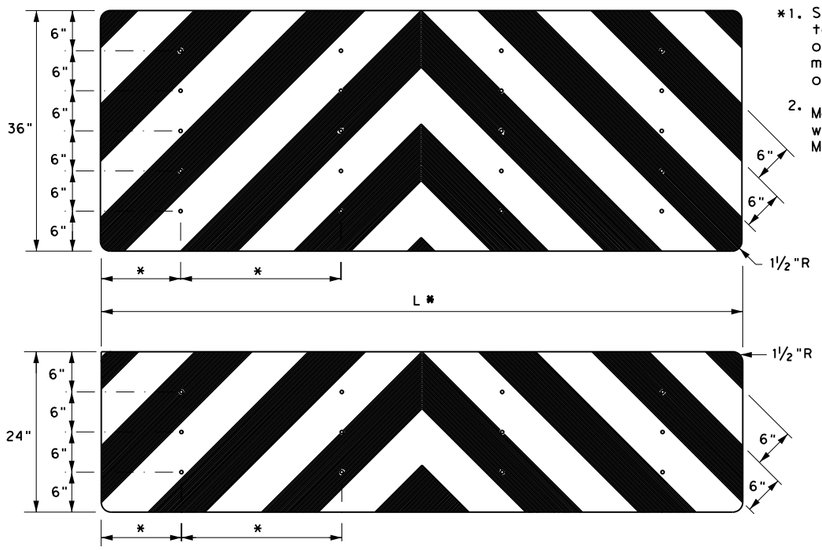


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: __domvig20.dgn__	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
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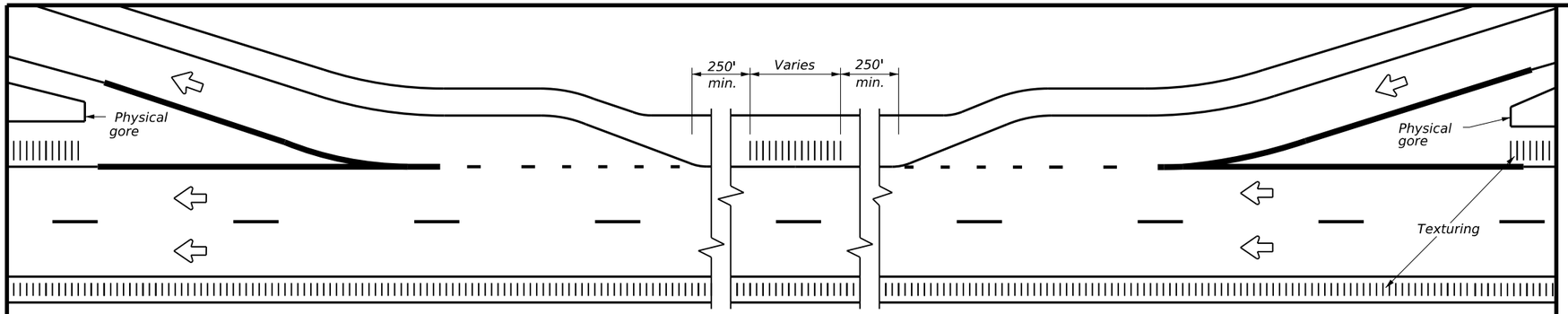
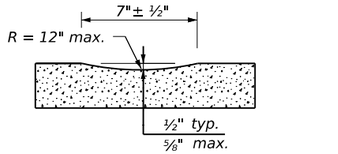
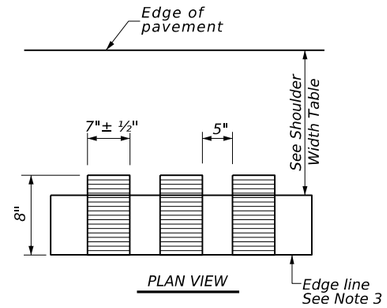


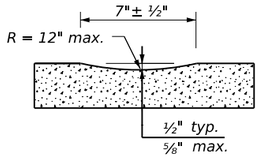
TYPICAL RUMBLE STRIP PLACEMENT AT EXIT AND ENTRANCE RAMPS



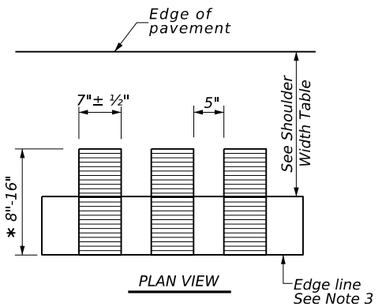
PROFILE VIEW
OPTION 1



CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

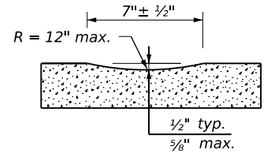


PROFILE VIEW
OPTION 2

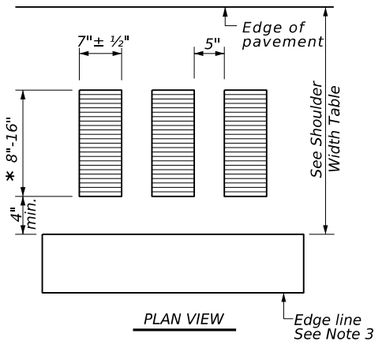


* This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

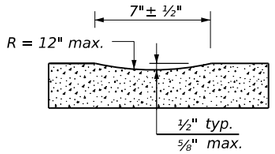


PROFILE VIEW
OPTION 3

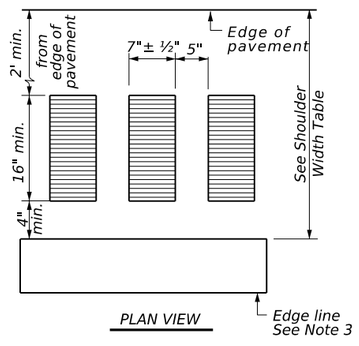


* This distance may vary based on width of shoulder

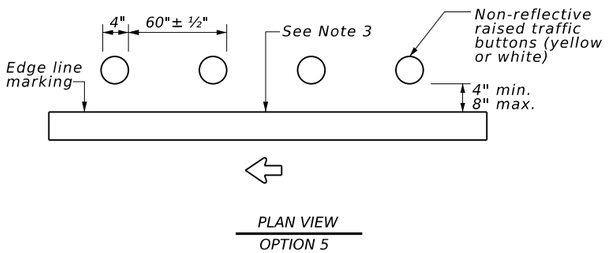
CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PROFILE VIEW
OPTION 4

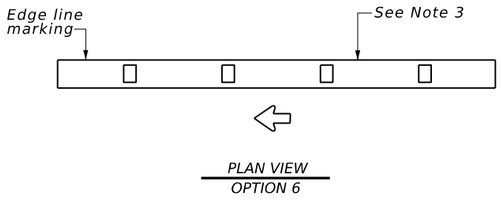


CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW
OPTION 5

RAISED EDGE LINE
(Rumble Strips)



PLAN VIEW
OPTION 6

PROFILE EDGE LINE MARKINGS
(Rumble Strips)

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use standard sheets PM(2) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.
5. Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.
6. Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.
7. Consideration should be given to noise levels when edge line rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

9. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
10. Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble stripe.

WHEN INSTALLING RAISED OR PROFILE EDGE LINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.
15. Raised profile thermoplastic markings used as edge lines may substitute for buttons.

SHOULDER WIDTH TABLE

EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5, or 6	Option 1, 2, 3, 5, or 6	Option 2, 4, 5, or 6

Texas Department of Transportation

Traffic Safety Division Standard

EDGE LINE RUMBLE STRIPS ON FREEWAYS AND DIVIDED HIGHWAYS RS(1) -23

FILE: rs(1)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
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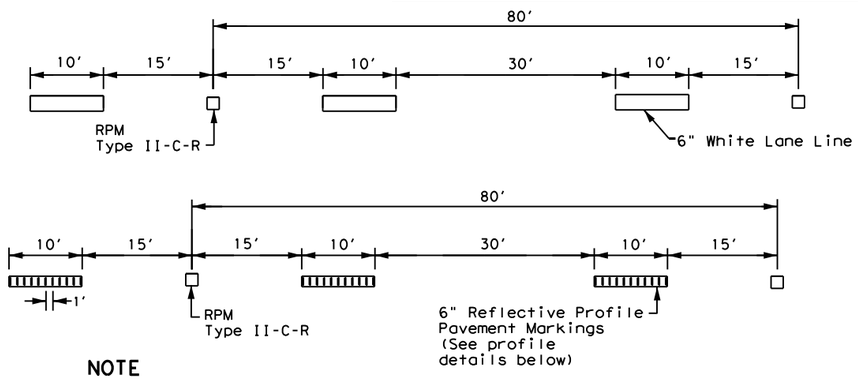
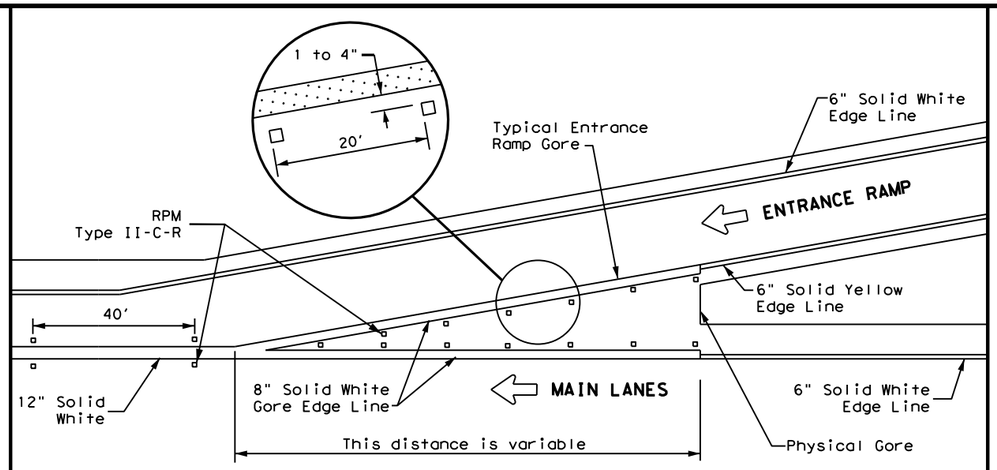


NOTE

Reflectorized raised pavement markers Type II-C-R shall be spaced on 80'centers with the clear face toward normal traffic and the red face toward wrong way traffic. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.

TRAFFIC LANE LINES PAVEMENT MARKING



TYPICAL ENTRANCE RAMP GORE MARKING

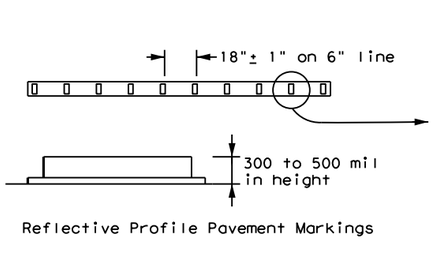
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

LEGEND	
⇦	Traffic flow
↱	Pavement marking arrows (white)
▫	Reflectorized Raised Markers (RPM) Type II-C-R

GENERAL NOTE

On concrete pavements the raised pavement markers shall be placed to one side of the longitudinal joints.



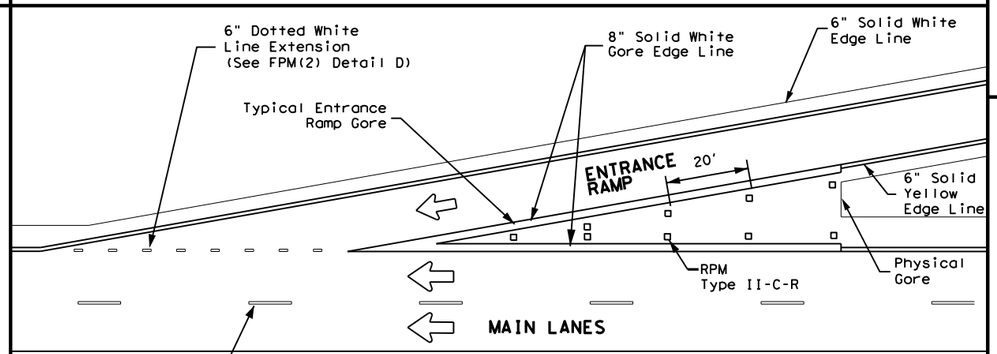
Reflective Profile Pavement Markings

Standard 6" Profile Detail

NOTE

Edge lines should typically be 6" wide and the materials shall be as specified in the plans. See details above if reflective profile pavement markings are to be used.

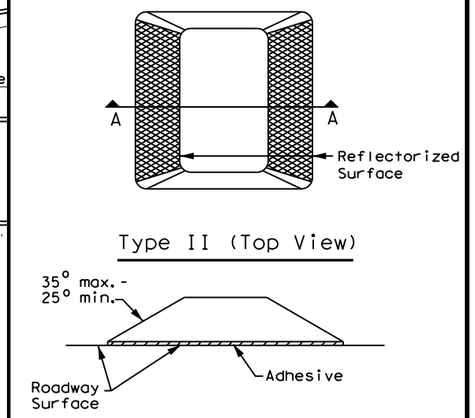
EDGE LINE PAVEMENT MARKINGS



NOTE

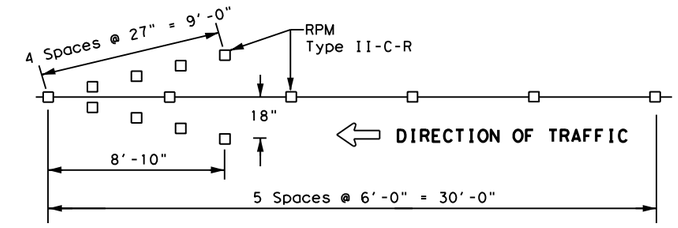
See the Roadway Design Manual Chapter 3 to determine if a tapered acceleration lane may be used.

TAPERED ACCELERATION LANE



SECTION A

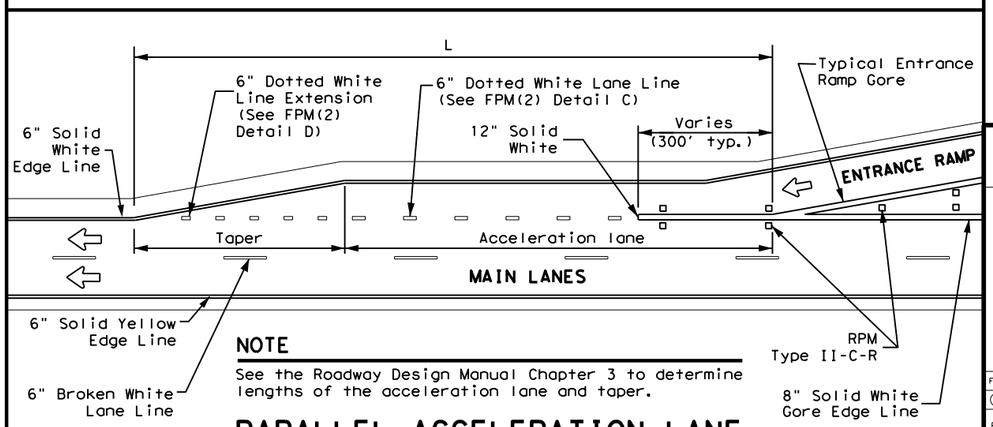
REFLECTORIZED RAISED PAVEMENT MARKER (RPM)



NOTES

1. Reflectorized raised pavement markers Type-II-C-R in the wrong way arrow shall have the clear face toward normal traffic and the red face toward the wrong way traffic.
2. Red reflectorized wrong way arrows, not to exceed two, may be placed on exit ramps. Locations of the arrows shall be as shown in the plans or as directed by the engineer.

WRONG WAY ARROW



NOTE

See the Roadway Design Manual Chapter 3 to determine lengths of the acceleration lane and taper.

PARALLEL ACCELERATION LANE

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS WITH RAISED PAVEMENT MARKERS

FPM(1)-22

FILE: fpm(1)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
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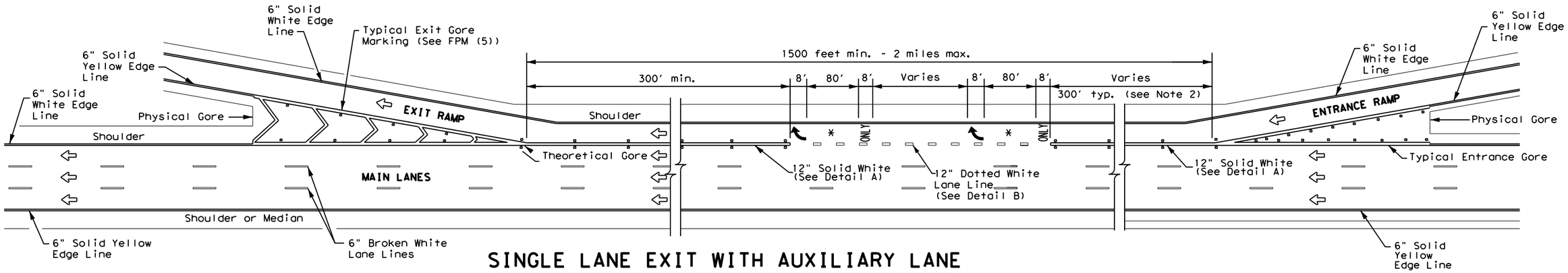
5-00 2-10				

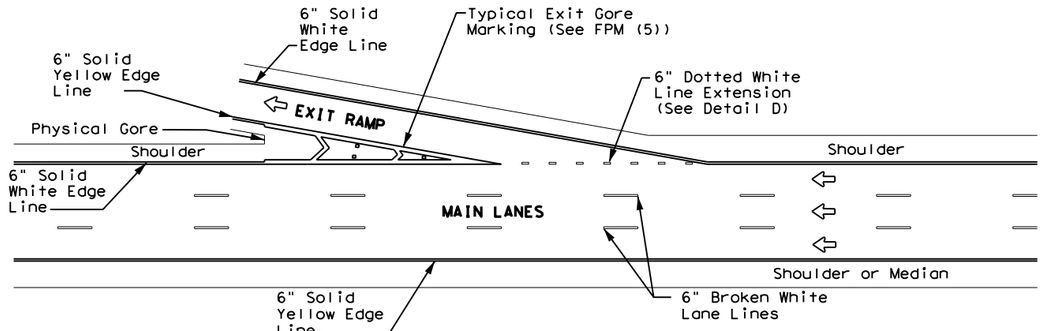
23A

DATE:
FILE:



SINGLE LANE EXIT WITH AUXILIARY LANE

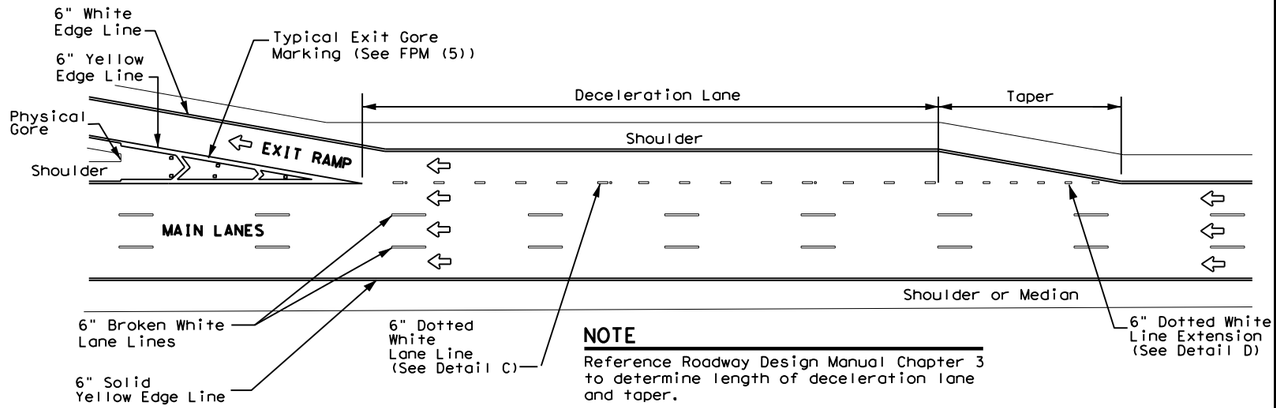
(See Note 2)



NOTE

Reference Roadway Design Manual Chapter 3 to determine if tapered deceleration lane may be used.

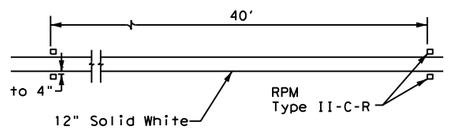
TAPERED DECELERATION LANE



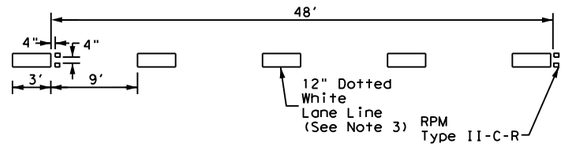
NOTE

Reference Roadway Design Manual Chapter 3 to determine length of deceleration lane and taper.

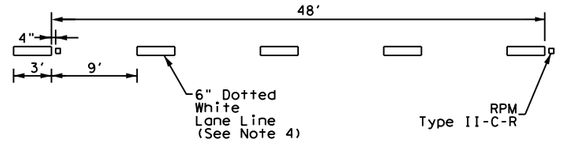
PARALLEL DECELERATION LANE



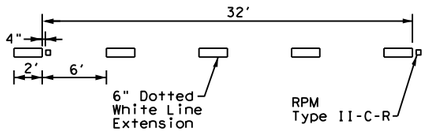
DETAIL A



DETAIL B



DETAIL C



DETAIL D

GENERAL NOTES

1. Pavement markings shall be white except as otherwise noted.
2. Length of 12" white line may vary depending on location.
3. Wide (12") dotted lane line (see Detail B) is used to separate a through lane that continues beyond the interchange from an adjacent mandatory exit lane.
4. Normal (6") dotted lane line (see Detail C) is used at parallel acceleration and deceleration lanes.
5. See FPM(1) for traffic lane line pavement marking details.

LEGEND	
⇦	Traffic flow
↱	Pavement marking arrows (white)
▫	Reflectorized Raised Markers (RPM) Type II-C-R
✳	Arrow markings are optional, however "ONLY" is required if arrow is used

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

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

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD FREEWAY PAVEMENT MARKINGS ENTRANCE AND EXIT RAMPS

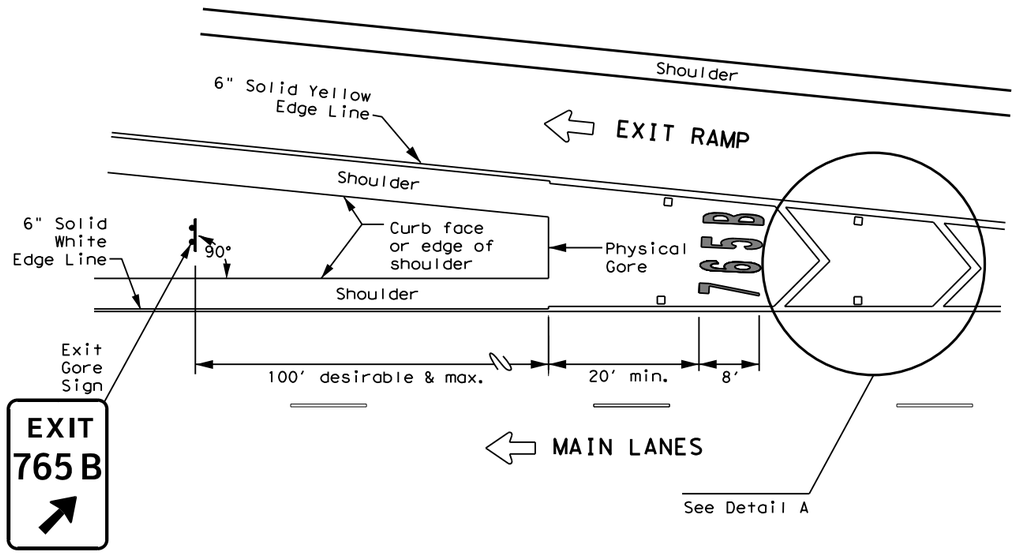
FPM(2)-22

FILE: fpm(2)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
2-77 5-00 2-12	DIST	COUNTY		SHEET NO.
4-92 8-00 10-22	ODA	REEVES		88
8-95 2-10				

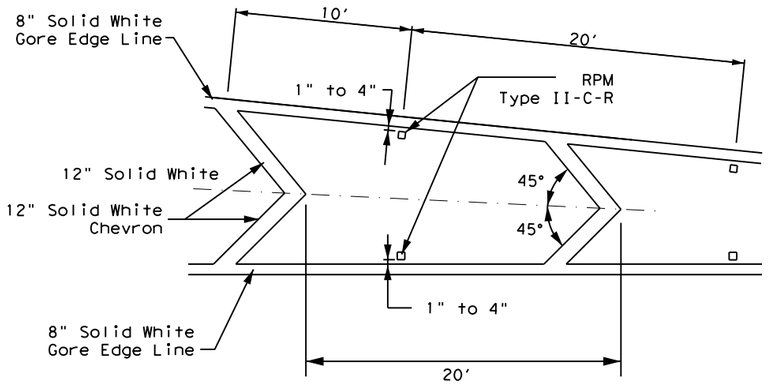
23B

EXIT NUMBER PAVEMENT MARKING NOTES

1. Minimum 8 foot white exit number pavement markings should be used, unless otherwise noted.
2. Spacing between letters and numbers should be approximately 4 inches.
3. Pavement markings are to be located as specified elsewhere in the plans.
4. Numbers and Letters details can be found in the Standard Highway Design for Texas (SHSD) Section 12 at http://www.txdot.gov



MARKINGS WITH EXIT NUMBER



NOTES

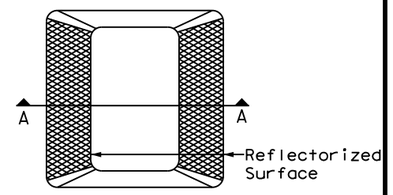
1. Raised pavement markers shall be centered between each chevron or neutral area line.
2. For more information, see Reflectorized Raised Pavement Marker Detail.

DETAIL A

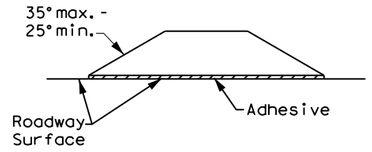
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

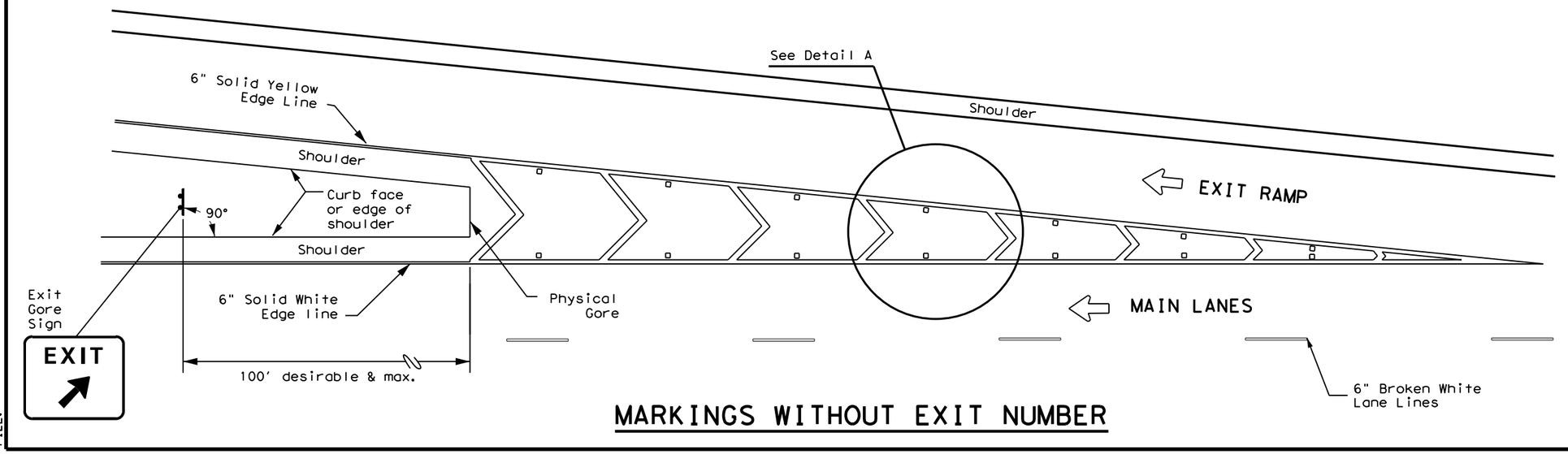
LEGEND	
⇦	Traffic flow
▫	Reflectorized Raised Markers (RPM) Type II-C-R



Type II (Top View)



SECTION A



MARKINGS WITHOUT EXIT NUMBER

REFLECTORIZED RAISED PAVEMENT MARKER (RPM)

Texas Department of Transportation — Traffic Safety Division Standard

EXIT GORE PAVEMENT MARKINGS

FPM(5)-22

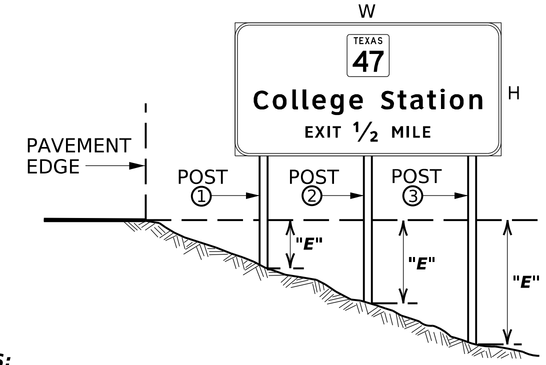
FILE: fpm(5)-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-19 10-22	0003	06	103	IH 20
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		89

DATE:
FILE:

23E

SUMMARY OF LARGE SIGNS - GROUND MOUNT (TY G)

RD.	STATION OR LOCATION (ie. LAT, LONG COUNTY Lat. Clearance)	SIGN NO.	SIGN BACK-GROUND COLOR	SIGN IMAGE OR TEXT	SIGN DIMENSIONS (WxH) (FT)	PLAQUES, & OTHER ATTACHMENTS (SQ FT) DIRECT APPLY	PLAQUES, & OTHER ATTACHMENTS (SQ FT) ALUMINUM (TYPE A) ⁎⁎	BACKGROUND SUBSTRATE (SQ FT) INSTALL GROUND MOUNT (TYPE G)	BACKGROUND SUBSTRATE (SQ FT) REPLACE GROUND MOUNT (TYPE G)	TYPE OF MOUNT	"E" DIMENSION ⁎ Post 1	"E" DIMENSION ⁎ Post 2	"E" DIMENSION ⁎ Post 3	GALVANIZED STRUCTURAL STEEL SIZE	LINEAR FEET Post 1	LINEAR FEET Post 2	LINEAR FEET Post 3	TOTAL WEIGHT LBS.	DRILLED SHAFT LINEAR FEET NON-REINF 12"Ø	DRILLED SHAFT LINEAR FEET REINF 24"Ø	RIPRAP APRON (CY)
IH20-EB	1173+70 REEVES -	1	GREEN	EXIT 22 ↗	5 x 7.5			37.5		221	0	0		S4X7.7	7	7		178.2	6		
IH20-EB	1240+72 REEVES -	2	GREEN	Pecos 18 Odessa 93	7 X 3.5			24.5		221	2.5	3.8		S4X7.7	13	14.3		280.6	8		
IH20-EB	1251+84 REEVES -	3	BLUE	PICNIC AREA 1 MILE	9 X 5			45.0		221	2.5	4		S4x7.7	14.5	16		305.3	8		
IH20-EB	1289+21 REEVES -	4	BLUE	PICNIC AREA NEXT RIGHT	10 X 5			50.0		221	3.75	3.34		S4X7.7	15.75	15.34		309.8	8		
IH20-EB	71+64 REEVES -	5	GREEN	EXIT 29 Shaw Rd 1 MILE	7 X 2.5 12 X 7.5			17.5 90.0		221	2.3125	2.875		W6x9	16.813	17.375		374.1		12	
IH20-EB	103+16 REEVES -	6	GREEN	Texas A&M Agricultural Research Station NEXT RIGHT	15.5 X 10.5 15.5 X 24			162.75 372		221	1.96	3.125		W8x18	32.96	34.125		1251.1		12	
IH20-EB	187+10 REEVES -	7	GREEN	Pecos 9 Monahans 47	8.5 X 3.5			29.75		221	1.8	2.125		S4X7.7	12.3	12.625		262.3	37.5		
				PAGE TOTALS				829.00									PAGE TOTALS	2961.39	38	24	-



NOTES:

1. ⁎ The **"E"** dimension is the elevation difference at the post between the ground and the edge of pavement or top of curb.
2. 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.
3. 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.

ATTACHMENT NOTE:

1. ⁎⁎ This column is for aluminum Type A and not direct apply. Direct apply is subsidiary to the sign. See TSR(2) and TSR(5).

LARGE ROADSIDE SIGN DESIGN PROCESS

1. Determine sign design, sign dimensions, sign location, and sign mounting height above ground, using slope or elevation measurements.
2. Determine each post length, including the **"E"** dimensions of each post.
3. Determine the wind zone using the Wind Velocity Worksheet.
4. Determine post size using SMD(LRSS). Use LRSS(1) for Zone 1 (90 mph), LRSS(2) for Zone 2 (80 mph), and LRSS(3) for Zone 3 (70 mph).
5. Determine initial leg post weights using the 'Post Weight Data' table value shown on LRSS(1), LRSS(2), or LRSS(3). Then add any extra post length weight to determine total weight beyond 10' post length.

   Example: For a sign with two posts, size W8x21, with each post 15' long, the total steel weight would be:

   509.4+(15-10)*21*2 = 719.4 lbs

   Note: the '21' in W8x21 refers to the weight of beam in pounds/foot.
6. Determine foundation diameter, base connection data, and bolt keeper data using SMD(2-1) and perforated fuse plate dimensions using SMD(2-2). (Only foundation diameter is needed for this sheet).
7. Determine foundation depth using the TxDOT Cone Penetration Test data on SMD(LRSS-4). Alternatively, Cohfric Design may be used.

TYPE OF MOUNT 3 3 1
- Wind Design Zone
- No. of Posts 2 or 3
- Series No. 1 Aluminum

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...

9/13/2024

Texas Department of Transportation
Traffic Safety Division Standard

EB SUMMARY OF LARGE SIGNS GROUND MOUNT

SOLS(TY G)

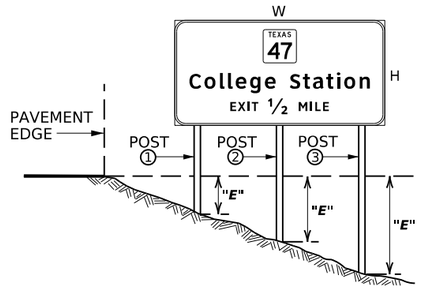
FILE: SOLS(TY G)-24_Example.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 2024	CONT 06	SECT 06	JOB 10	HIGHWAY IH 20
REVISIONS 5-87 5-01 5-24 11-93 1-04 8-95 9-08	DIST ODA	COUNTY REEVES		SHEET NO. 90

19

DATE:
FILE:

SUMMARY OF LARGE SIGNS - GROUND MOUNT (TY G)

RD.	STATION OR LOCATION (ie. LAT, LONG COUNTY Lat. Clearance)	SIGN NO.	SIGN BACK-GROUND COLOR	SIGN IMAGE OR TEXT	SIGN DIMENSIONS (WxH) (FT)	PLAQUES, & OTHER ATTACHMENTS (SQ FT)		BACKGROUND SUBSTRATE (SQ FT)		TYPE OF MOUNT	"E" DIMENSION ⚹			GALVANIZED STRUCTURAL STEEL					DRILLED SHAFT		RIPRAP APRON
								INSTALL	REPLACE						LINEAR FEET			TOTAL	LINEAR FEET		
						DIRECT APPLY	ALUMINUM (TYPE A) ⚹⚹	GROUND MOUNT (TYPE G)	GROUND MOUNT (TYPE G)		Post ①	Post ②	Post ③	SIZE	Post ①	Post ②	Post ③	WEIGHT LBS.	NON-REINF 12"Ø	REINF 24"Ø	(CY)
IH20-EB	206+25	1	GREEN	EXIT 29 / Shaw Rd 1 MILE	7 X 2.5			17.5		221											
	REEVES				12 X 7.5			90.0													
	-										1.9	2		S4X7.7	16.4	16.5		323.7	8		
IH20-EB	161+10	2	GREEN	EXIT 29 / Shaw Rd ↗	7 X 2.5			17.5		221											
	REEVES				12 X 7.5			90.0													
	-										2.27	2.35		S4X7.7	16.77	16.85		329.3	8		
IH20-EB	154+05	3	BLUE	EXIT 29 ↗						221											
	REEVES				5 X 7.5			37.5													
	-										0	0		S4x7.7	14.5	14.5		293.7	6		
IH20-EB	90+30	4	BLUE	Toyah 8 / El Paso 197						221											
	REEVES				7.5 X 3.5			26.25													
	-										2.5	2.54		S4X7.7	13	13.04		270.9	8		
IH20-EB	1375+15	5	BLUE	PICNIC AREA 1 MILE						221											
	REEVES				9 X 5			45.0													
	-										2.67	2.42		S4X7	14.67	14.42		294.4	8		
IH20-EB	1332+37	6	BLUE	PICNIC AREA NEXT RIGHT						221											
	REEVES				10 X 5			50.0													
	-										2.33	3.23		S4X7	14.33	15.23		298.0	8		
IH20-EB	1322+50	7	BLUE	PICNIC AREA ↗						221											
	REEVES				6.5 X 6.5			42.25													
	-										0	0		S4X7.7	13.5	13.5		278.3	6		
IH20-EB	1211+62	8	GREEN	EXIT 22 / FM 2903 / Toyah ↗	7 X 2.5			17.5		221											
	REEVES				9 X 10			90.0													
	-										2.833	3.54		W8X18	19.833	20.54		770.3		12	
IH20-EB	1203+78	9	GREEN	EXIT 22 ↗						221											
	REEVES				5 X 7.5			37.5													
	-										0	0		S4X7.7	14.5	14.5		293.7	6		
IH20-EB	1121+95	10	GREEN	Van Horn 69 / El Paso 189						221											
	REEVES				5 X 7.5			37.5													
	-										2.5	3.5417		S4X7.7	17	18.0417		340.2	37.5		
				PAGE TOTALS				599										3,493	58	12	-



NOTES:

1. ⚹ The **"E"** dimension is the elevation difference at the post between the ground and the edge of pavement or top of curb.
2. 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.
3. 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.

ATTACHMENT NOTE:

1. ⚹⚹ This column is for aluminum Type A and not direct apply. Direct apply is subsidiary to the sign. See TSR(2) and TSR(5).

LARGE ROADSIDE SIGN DESIGN PROCESS

1. Determine sign design, sign dimensions, sign location, and sign mounting height above ground, using slope or elevation measurements.
2. Determine each post length, including the **"E"** dimensions of each post.
3. Determine the wind zone using the Wind Velocity Worksheet.
4. Determine post size using SMD(LRSS). Use LRSS(1) for Zone 1 (90 mph), LRSS(2) for Zone 2 (80 mph), and LRSS(3) for Zone 3 (70 mph).
5. Determine initial leg post weights using the 'Post Weight Data' table value shown on LRSS(1), LRSS(2), or LRSS(3). Then add any extra post length weight to determine total weight beyond 10' post length.

   Example: For a sign with two posts, size W8x21, with each post 15' long, the total steel weight would be:

   *509.4+(15-10)*21*2 = 719.4 lbs*

   Note: the '21' in W8x21 refers to the weight of beam in pounds/foot.
6. Determine foundation diameter, base connection data, and bolt keeper data using SMD(2-1) and perforated fuse plate dimensions using SMD(2-2). (Only foundation diameter is needed for this sheet).
7. Determine foundation depth using the TxDOT Cone Penetration Test data on SMD(LRSS-4). Alternatively, Cohfric Design may be used.

TYPE OF MOUNT 3 3 1
- 3 — Wind Design Zone
- 3 — Series No.
- 1 — Aluminum
- No. of Posts 2 or 3

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...

9/13/2024

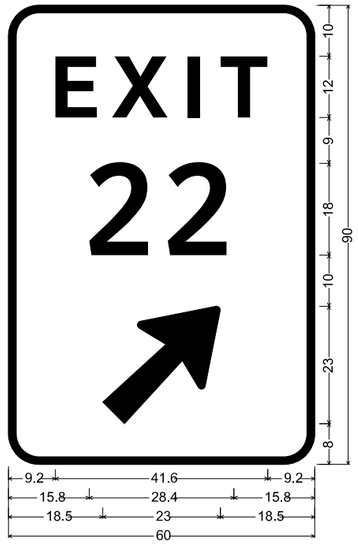
Texas Department of Transportation

Traffic Safety Division Standard

WB SUMMARY OF LARGE SIGNS GROUND MOUNT SOLS(TY G)

FILE: SOLS(TY G)-24_Example.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
5-87 5-01 5-24	DIST	COUNTY		SHEET NO.
11-93 1-04	ODA	REEVES		91
8-95 9-08				

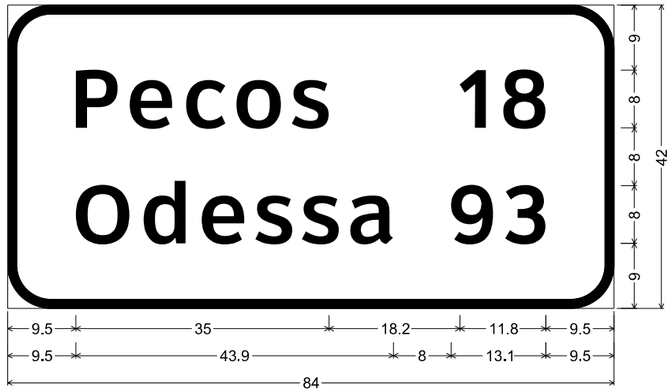
DATE:
FILE:



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

SIGN NO 1
STATION: 1173+70
ROADWAY: IH 20
COUNTY: REEVES
LOCATION: EB

SIGN NO 9
STATION: 1203+78
LOCATION: WB



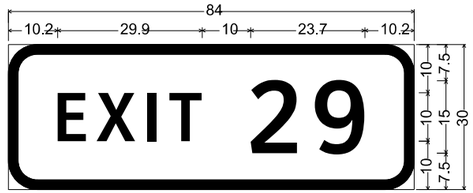
E7-2T_VARx42;
6.0" Radius, 1.3" Border, White on Green;
"Pecos", ClearviewHwy-5-W-R; "18", ClearviewHwy-5-W-R;
"Odessa", ClearviewHwy-5-W-R; "93", ClearviewHwy-5-W-R;

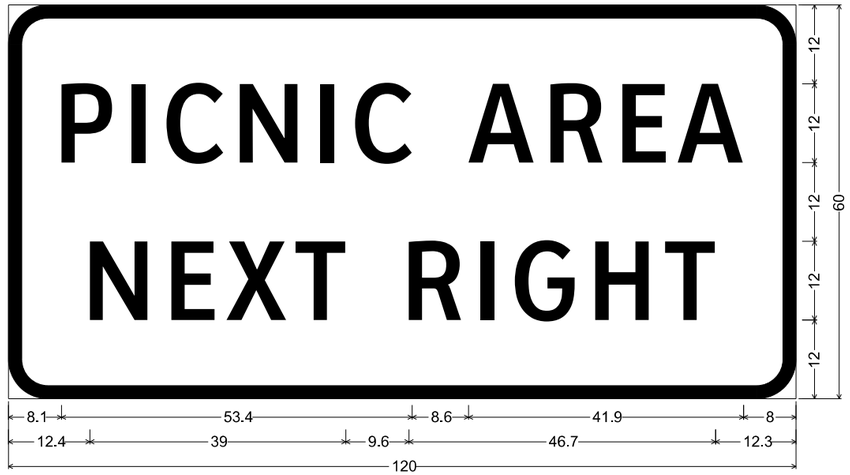
SIGN NO 2
STATION: 1240+72
ROADWAY: IH 20
COUNTY: REEVES
LOCATION: EB

E21-4T_120x60;
2.0" Border, White on Blue;
"PICNIC AREA", ClearviewHwy-3-W; "1 MILE", ClearviewHwy-3-W;

SIGN NO 3
STATION: 1251+84
ROADWAY: IH 20
COUNTY: REEVES
LOCATION: WB

SIGN NO 5
STATION: 1375+15
LOCATION: WB

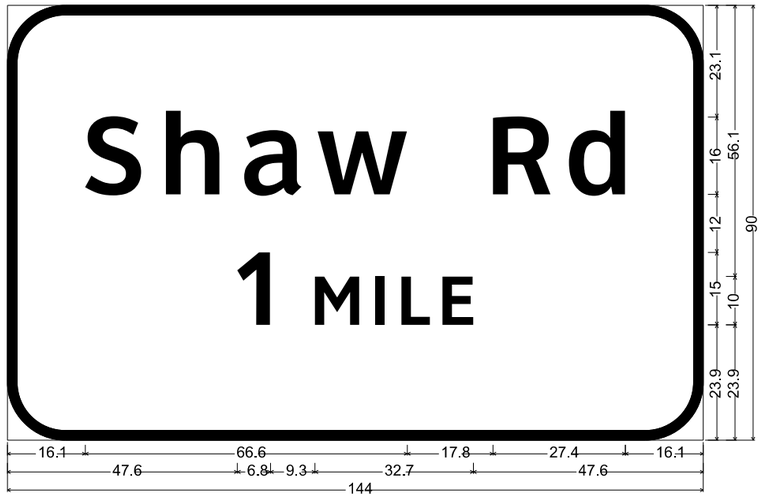




E21-5T_120x60;
2.0" Border, White on Blue;
"PICNIC AREA", ClearviewHwy-3-W; "NEXT RIGHT", ClearviewHwy-3-W;
E2-4G_VARx24;
6.0" Radius, 1.0" Border, White on Green;
"NEXT RIGHT", ClearviewHwy-4-W;

SIGN NO 4
STATION: 1289+21
ROADWAY: IH 20
COUNTY: REEVES
LOCATION: EB

SIGN NO 6
STATION: 1332+37
LOCATION: WB

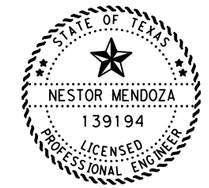


E1-5P_84x30;
6.0" Radius, 2.0" Border, White on Green;
"EXIT 29", ClearviewHwy-4-W;
E6-2a_VARx90;
12.0" Radius, 2.0" Border, White on Green;
"Shaw"ClearviewHwy-5-W " Rd", ClearviewHwy-5-W-R; "1 MILE", ClearviewHwy-5-W-R;

SIGN NO 5
STATION: 71+64
ROADWAY: IH 20
COUNTY: REEVES
LOCATION: EB

SIGN NO 1
STATION: 206+25
LOCATION: WB

DATE: $DATE$ $TIME$
FILE: $FILE$



DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...
8/30/2024

LARGE SIGNS DETAILS

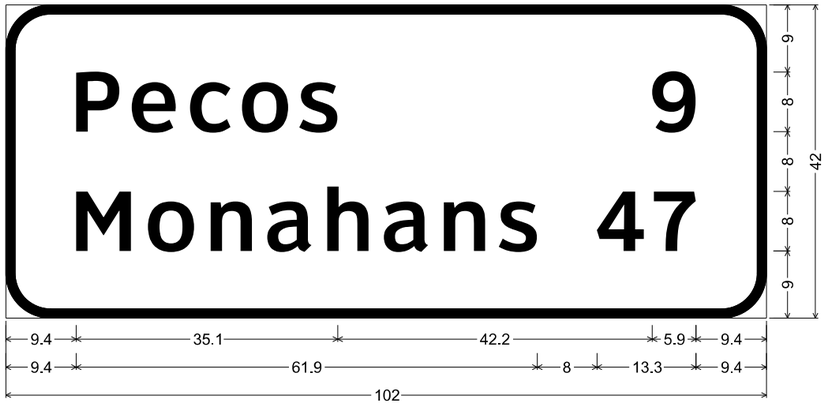
SHEET 1 OF 3

Texas Department of Transportation

FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			92
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

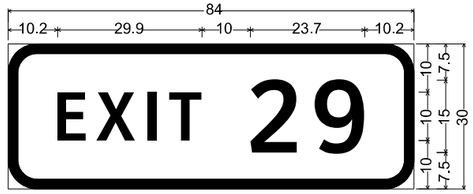
12.0" Radius, 2.0" Border, White on Green;
"Texas A&M", ClearviewHwy-5-W-R; "Agricultural", ClearviewHwy-5-W-R; "Research", ClearviewHwy-5-W-R;
"Station", ClearviewHwy-5-W-R;

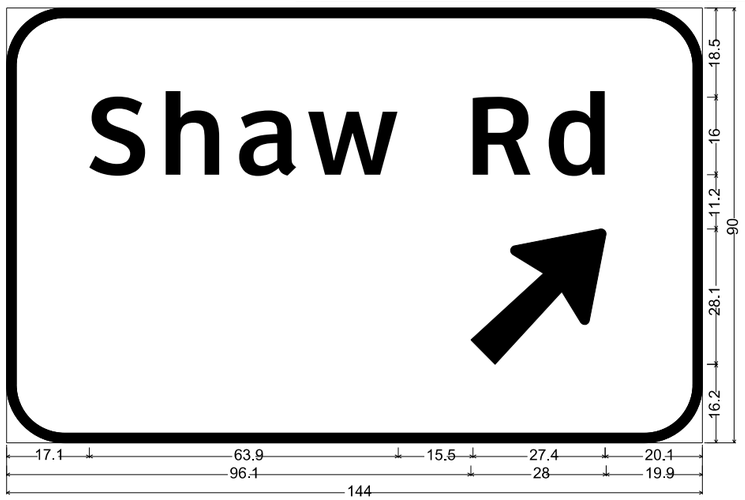
SIGN NO 6
STATION: 103+16
ROADWAY: IH 20
COUNTY: REEVES
LOCATION: EB



E7-2T_VARx42;
6.0" Radius, 1.3" Border, White on Green;
"Pecos", ClearviewHwy-5-W-R; "9", ClearviewHwy-5-W-R; "Monahans", ClearviewHwy-5-W-R;
"47", ClearviewHwy-5-W-R;

SIGN NO 7
STATION: 187+10
ROADWAY: IH 20
COUNTY: REEVES
LOCATION: EB





E1-5P_84x30;
6.0" Radius, 2.0" Border, White on Green;
"EXIT 29", ClearviewHwy-4-W;
12.0" Radius, 2.0" Border, White on Green;
"Shaw Rd ", ClearviewHwy-5-W-R; " ", ClearviewHwy-5-W-R; Arrow A-3 - 35.6" 45°;

SIGN NO 2
STATION: 161+10
ROADWAY: IH 20
COUNTY: REEVES
LOCATION: WB

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

SIGN NO 3
STATION: 154+05
ROADWAY: IH 20
COUNTY: REEVES
LOCATION: WB

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...

8/30/2024

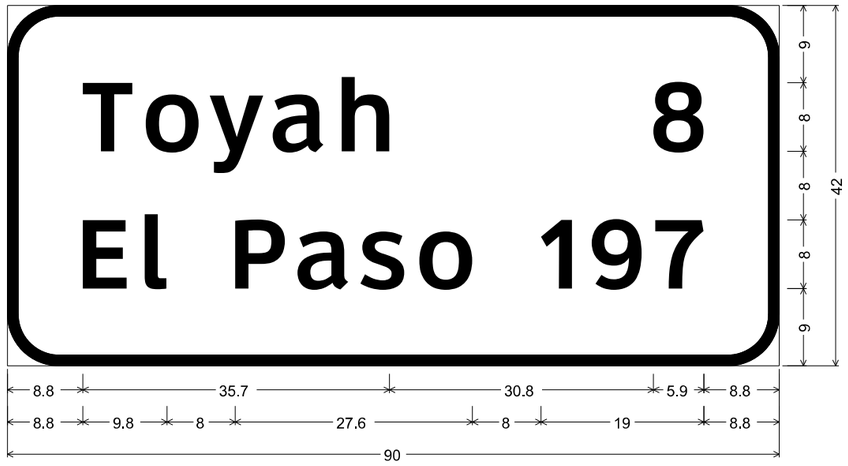
LARGE SIGNS DETAILS

SHEET 2 OF 3

Texas Department of Transportation

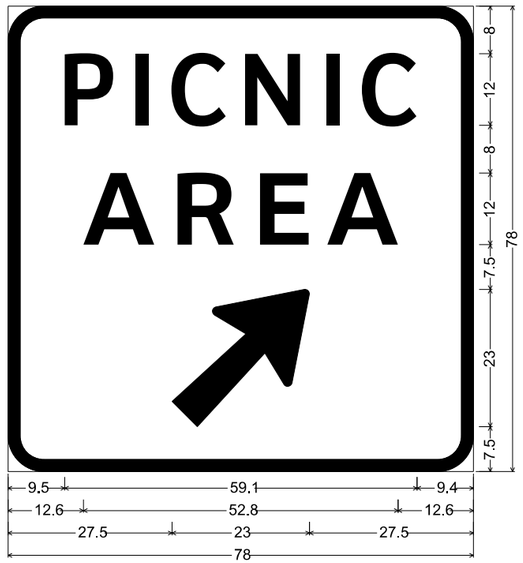
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			93
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

DATE: $DATE$ $TIME$
FILE: $FILE$



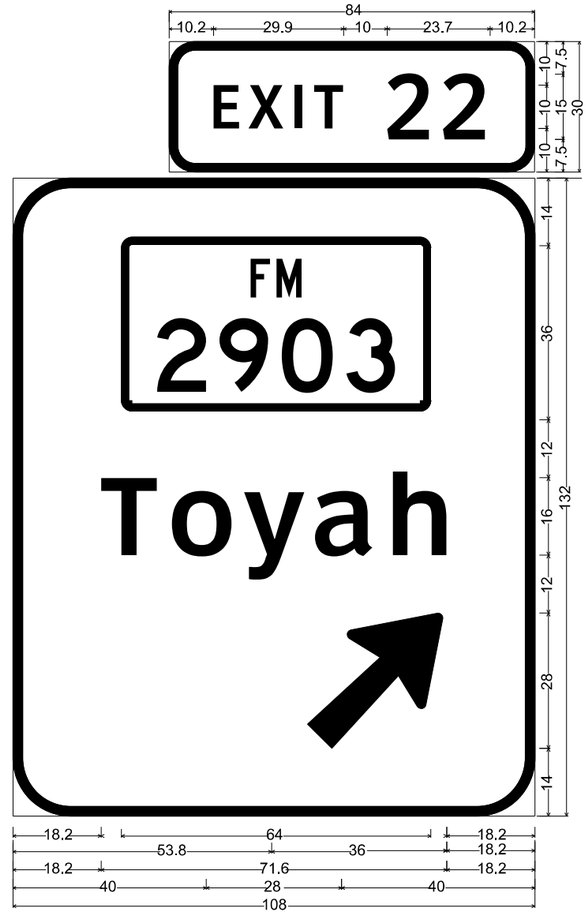
E7-2T_VARx42;
6.0" Radius, 1.3" Border, White on Green;
"Toyah", ClearviewHwy-5-W-R; "8", ClearviewHwy-5-W-R;
"El Paso", ClearviewHwy-5-W-R; "197", ClearviewHwy-5-W-R;

SIGN NO 4
STATION: 90+30
ROADWAY: IH 20
COUNTY: REEVES
LOCATION: WB



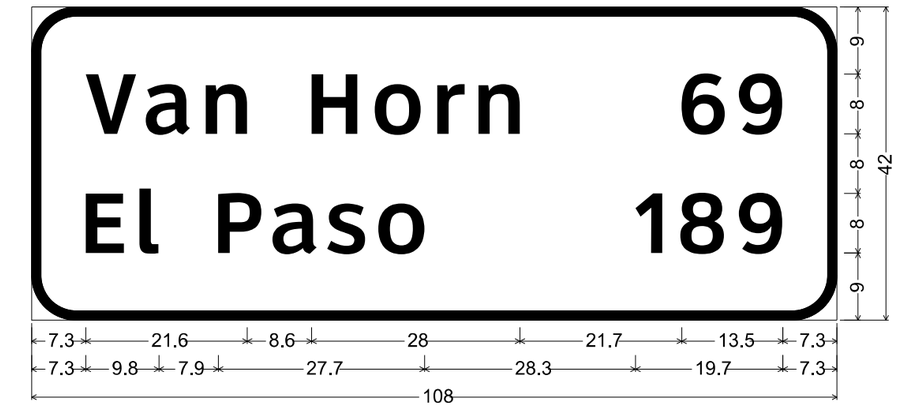
E21-6T_78x78;
6.0" Radius, 2.0" Border, White on Blue;
"PICNIC", ClearviewHwy-4-W; "AREA", ClearviewHwy-6-W;
Arrow A-2 - 29.3" 45°;

SIGN NO 7
STATION: 1211+62
ROADWAY: IH 20
COUNTY: REEVES
LOCATION: WB



E1-2_VARx120;
12.0" Radius, 2.0" Border, White on Green;
US 56 M1-4; "Toyah", ClearviewHwy-5-W-R; Arrow A-3 - 35.6" 45°;

SIGN NO 8
STATION: 1203+78
ROADWAY: IH 20
COUNTY: REEVES
LOCATION: WB



E7-2T_VARx42;
6.0" Radius, 1.3" Border, White on Green;
"Van Horn", ClearviewHwy-5-W-R; "69", ClearviewHwy-5-W-R; "El Paso", ClearviewHwy-5-W-R;
"189", ClearviewHwy-5-W-R;

SIGN NO 10
STATION: 1121+95
ROADWAY: IH 20
COUNTY: REEVES
LOCATION: WB

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...
8/30/2024

LARGE SIGNS DETAILS

SHEET 3 OF 3

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	06	103	IH 20

DATE: $DATE$ $TIME$
FILE: $FILE$

EAST BOUND SUMMARY OF SMALL SIGNS

STA. NO.	SIGN NO.	SIGN NOMENCLATURE	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
1003+3	1	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			19									
1035+4	2	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	48 X 48	X		10BWG	1	SA	P		
1047+5	3	I-3	(RIVER NAME) RIVER	36 x 18	X		10BWG	1	SA	P		
			MOODY DRAW									
1056+1	4	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			20									
1071+4	5	R5-11T	**FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T		
1108+9	6	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			21									
1141+5	7	I-2aT	TOYAH*CityLimit*Pop61	42 X 24	X		10BWG	1	SA	P		
1161+5	8	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			22									
1172+7	9	W13-2	EXIT / (SPEED) MPH	48 X 60	X		10BWG	1	SA	P		
			30									
1178+3	10	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	48 X 48	X		10BWG	1	SA	P		
1198+3	11	W4-1R	SYMBOL - MERGE AHEAD RIGHT	48 X 48				2				
1215+1	12	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			23									
1227+2	13	R2-1	SPEED LIMIT (SPEED)	36 X 48				2				
			80									
1235+9	14	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	48 X 48	X		10BWG	1	SA	P		
1264+2	15	R5-11T	**FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T		
1267+7	16	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			24									
1330+9	17	D9-16T	TRUCK PARKING	30 X 24	X		10BWG	1	SA	P		
		D9-1bP	AHEAD	24 X 10								
1320+7	18	D9-16T	TRUCK PARKING	30 X 24	X		10BWG	1	SA	P		
		D9-1dP	LEFT ARROW	24 X 10								
1312+2	19	W4-1R	SYMBOL - MERGE AHEAD RIGHT	48 X 48	X		10BWG	1	SA	P		
1320+8	20	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			25									
1373+3	21	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			26									
1379+5	22	R5-11T	**FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T		

**LEFT SIDE OF ROADWAY

DATE:

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.

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NOTE:

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2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Nestor Mendoza, P.E.
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8/30/2024

Texas Department of Transportation

Traffic Operations Division Standard

EAST BOUND
SUMMARY OF SMALL SIGNS

SHEET 1 OF 2

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
4-16	DIST	COUNTY		SHEET NO.
8-16	ODA	REEVES		95

EAST BOUND SUMMARY OF SMALL SIGNS

STA. NO.	SIGN NO.	SIGN NOMENCLATURE	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
1416+4	23	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	48 X 48	X		10BWG	1	SA	P		
			NOTE: SIGN IS DOWN									
3+40	24	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			27									
32+00	25	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T		
60+60	26	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			28									
113+45	27	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			29									
122+25	28	W13-2	EXIT / (SPEED) MPH	48 X 60	X		10BWG	1	SA	P		
			25									
127+50	29	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	48 X 48	X		10BWG	1	SA	P		
144+32	30	W4-1R	SYMBOL - MERGE AHEAD RIGHT	48 X 48	X		10BWG	2	SA	P		
							*I-BEAM					
167+90	31	M3-2B	EAST	36 X 18	X		10BWG	1	SA	P		
		M1-1T	INTERSTATE(TEXAS)	36 X 36								
			20									
172+00	32	R2-1	SPEED LIMIT (SPEED)	36 X 48	X		10BWG	2	SA	P		
			80				*I-BEAM					

ALUMINUM SIGN BLANKS THICKNESS	
	Minimum Thickness
Square Feet	
Less than 7.5	0.080"
7.5 to 15	0.100"
Greater Than 15	0.125"

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STATE OF TEXAS
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8/30/2024

Texas Department of Transportation

Traffic Operations Division Standard

EAST BOUND SUMMARY OF SMALL SIGNS

SHEET 2 OF 2

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
4-16	DIST	COUNTY		SHEET NO.
8-16	ODA	REEVES		96

TB

DATE:
FILE:

WEST BOUND SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

STA. NO.	SIGN NO.	SIGN NOMENCLATURE	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)
166+48	1	D10-2	<2 DIGIT MILE MARKER>	12 x 36	X		10BWG	1	SA	P		
			30									
156+45	2	W13-2	EXIT / (SPEED) MPH	48 X 60	X		10BWG	1	SA	P		
			20									
150+60	3	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	48 x 48	X		10BWG	1	SA	P		
132+95	4	W4-1R	SYMBOL - MERGE AHEAD RIGHT	48 X 48	X		10BWG	2	SA	P		
							*I-BEAM					
113+36	5	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			29									
110+27	6	M3-2B	WEST	36 X 18	X		10BWG	1	SA	P		
		M1-1T	INTERSTATE (TEXAS)	36 X 36								
			20									
106+24	7		Missing Sign-(ONLY THE POST IS STANDING)	N/A	X		10BWG	1	SA	P		
60+48	8	D10-2	<2 DIGIT MILE MARKER>	12 x 36	X		10BWG	1	SA	P		
33+30	9	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T		
			**LEFT SIDE OF ROADWAY									
24+18	10	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	48 X 48	X		10BWG	1	SA	P		
4+72	11	D10-2	<2 DIGIT MILE MARKER>	12 x 36	X		10BWG	1	SA	P		
			27									
1380+2	12	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T		
			**LEFT SIDE OF ROADWAY									
1373+5	13	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			26									
1330+9	14	D9-16T	TRUCK PARKING	30 X 24	X		10BWG	1	SA	P		
		D9-1bP	AHEAD	24 X 10								
1323+5	15	D9-16T	TRUCK PARKING	30 X 24	X		10BWG	1	SA	P		
		D9-1dP	LEFT ARROW	24 X 10								
1320+5	16	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			27									
1308+8	17	W4-1R	SYMBOL - MERGE AHEAD RIGHT	48 X 48			10BWG	2				
1267+7	18	D10-2	<2 DIGIT MILE MARKER>	12 36	X		10BWG	1	SA	P		
			24									
1264+6	19	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T		
			**LEFT SIDE OF ROADWAY									
1260+2	20	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	48 X 48	X		10BWG	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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STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...

8/30/2024

Texas Department of Transportation

Traffic Operations Division Standard

WEST BOUND SUMMARY OF SMALL SIGNS

SHEET 1 OF 2

FILE:	sums16.dgn	DN: _TxDOT_	CK: TxDOT	DW: _TxDOT_	CK: TxDOT
©TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0003	06	103	IH 20
4-16		DIST	COUNTY		SHEET NO.
8-16		ODA	REEVES		97

18

WEST BOUND SUMMARY OF SMALL SIGNS

SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)

STA. NO.	SIGN NO.	SIGN NOMENCLATURE	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
1214+9	21	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			23									
1213+5	22	I-2aT	(CITY NAME) CITY LIMIT	42 X 24	X		10BWG	1	SA	P		
			TOYAH CITY LIMIT POP 61									
1202+9	23	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	48 X 48	X		10BWG	1	SA	P		
1174+6	24	W4-1R	SYMBOL - MERGE AHEAD RIGHT	48 X 48	X		10BWG	1	SA	P		
1161+3	25	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			22									
1151+5	26	M3-2B	WEST	36 X 18	X		10BWG	1	SA	P		
		M1-1T	INTERSTATE (TEXAS)	36 X 36								
			20									
1146+2	27	R19-8	FASTEN SAFETY BELTS STATE LAW	48 X 48	X		10BWG	1	SA	P		
1109+7	28	R2-1	SPEED LIMIT (SPEED)	36 X 48	X		10BWG	2	SA	P		
			80				*I-BEAM					
1108+6	29	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			21									
1071+5	30	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	48 X 48	X		10BWG	1	SA	T		
			**LEFT SIDE OF ROADWAY									
1061+9	31	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	48 X 48	X		10BWG	1	SA	P		
1055+7	32	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			20									
1049+7	33	I-3	(RIVER NAME) RIVER	36 x 18	X		10BWG	1	SA	P		
			MOODY DRAW									
1003+0	34	D10-2	<2 DIGIT MILE MARKER>	12 X 36	X		10BWG	1	SA	P		
			28									

ALUMINUM SIGN BLANKS THICKNESS	
	Minimum Thickness
Square Feet	0.080"
Less than 7.5	0.100"
7.5 to 15	0.125"

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STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Nestor Mendoza, P.E.
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8/30/2024

Texas Department of Transportation

Traffic Operations Division Standard

WEST BOUND SUMMARY OF SMALL SIGNS

SHEET 2 OF 2

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0003	06	103	IH 20
4-16		DIST	COUNTY		SHEET NO.
8-16		ODA	REEVES		98

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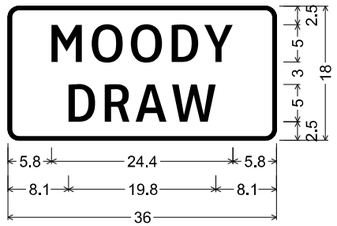
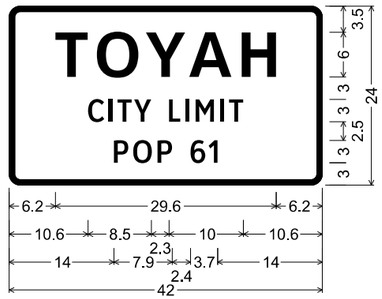
DATE:
FILE:



I-3 5in;
1.5" Radius, 0.5" Border, White on Green;
"MOODY", ClearviewHwy-3-W;
"DRAW", ClearviewHwy-3-W;

SOSS SIGN NO 3
STATION: 1047+58
ROADWAY: IH 20
COUNTY: REEVES
LOCATION: EB

SOSS SIGN NO 31
STATION: 11049+76
LOCATION: WB



I-2aT 6in;
1.5" Radius, 0.8" Border, White on Green;
"TOYAH", ClearviewHwy-5-W-R;
"CITY LIMIT", ClearviewHwy-3-W;
"POP 61", ClearviewHwy-3-W;

SOSS SIGN NO 7
STATION: 1141+53
ROADWAY: IH 20
COUNTY: REEVES
LOCATION: EB

SOSS SIGN NO 20
STATION: 1213+53
LOCATION: WB

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...
8/30/2024

SMALL SIGNS DETAILS

SHEET 1 OF 1

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	06	103	IH 20

CK:
DW:
CK:
DN:

DATE: $DATE$ $TIME$
FILE: $FILE$

BID ITEM	644	644	644	644
DESC CODE	7073	7001	7004	7017
DESCRIP.	REMOVE SM RD SN SUP&AM	IN SM RD SN SUP&AM TY10BWG (1)SA(P)	IN SM RD SN SUP&AM TY10BWG (1)SA(T)	IN SM RD SN SUP&AM TY10BWG (2)SA(P)
UNIT	EA	EA	EA	EA
EB. SOSS. SHEET*1	20	19	2	1
EB. SOSS. SHEET*2	10	7	1	2
WB. SOSS. SHEET*1	18	16	2	2
WB. SOSS. SHEET*2	14	12	1	1

SHEET TOTALS	
EB_SHEETS	2
WB_SHEETS	2
	4

TOTAL - INST SIGNS	
TOTAL_EB	32
TOTAL_WB	34
	66

TOTAL- REMOVAL OF SMALL SIGNS	
TOTAL	79

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...
9/13/2024

SMALL SIGN REMOVAL SUMMARY

SHEET 1 OF 1

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	06	103	IH 20

DATE: $DATE$ $TIME$
FILE: $FILE$

SUMMARY OF LARGE SIGNS TO BE REMOVED

SIGN LABEL OR NUMBER	APPROXIMATE LOCATION OR STATION	SIGN IMAGE OR TEXT	REMOVE SIGN *	TY G: REMOVE LRSA (EA) SIGN	TY G: REMOVE LRSA (EA) STEEL	TY G: REMOVE LRSA (EA) FOUNDATION	TY G: REMOVE LRSA (EA) GRADE	TY G: REMOVE LRSA FOUNDATION ONLY 12 IN (EA)	TY G: REMOVE LRSA FOUNDATION ONLY 24 IN (EA)	REMOVE RIPRAP APRON	TY O: REMOVE SIGN SUPPORT (SIGN ONLY) (EA)	TY O: REMOVE SIGN SUPPORT (EA)	TY O: REMOVE WALKWAY (EA)
E5-1c	-31.308978, 103.793672 EB REEVES	1 EXIT 22		X									
D2-2	-31.319508 103.776056 EB REEVES	2 Pecos 18 Odessa 93		X									
E21-1T	-31.32105 103.77305 EB REEVES	3 PICNIC AREA 1 MILE		X									
E21-2T	-31.326594 103.762944 EB REEVES	4 PICNIC AREA NEXT RIGHT		X									
E1-5P E6	-31.354372, 103.706239 EB REEVES	5 EXIT 29 Shaw Rd 1 MILE		X									
CUSTOM E2-4G	-31.357606, 103.696886 EB REEVES	6 Texas A&M Agricultural Research Station NEXT RIGHT		X									
D2-2	-31.366336 103.671678 EB REEVES	7 Pecos 9 Monahans 47		X									
E1-5P E6-2a	-31.368564, 103.666375 WB REEVES	1 EXIT 29 Shaw Rd 1 MILE		X									
COLUMN TOTAL				8	–	–	–	–	–	–	–	–	–

SIGN LABEL OR NUMBER	APPROXIMATE LOCATION OR STATION	SIGN IMAGE OR TEXT	REMOVE SIGN *	TY G: REMOVE LRSA (EA) SIGN	TY G: REMOVE LRSA (EA) STEEL	TY G: REMOVE LRSA (EA) FOUNDATION	TY G: REMOVE LRSA (EA) GRADE	TY G: REMOVE LRSA FOUNDATION ONLY 12 IN (EA)	TY G: REMOVE LRSA FOUNDATION ONLY 24 IN (EA)	REMOVE RIPRAP APRON	TY O: REMOVE SIGN SUPPORT (SIGN ONLY) (EA)	TY O: REMOVE SIGN SUPPORT (EA)	TY O: REMOVE WALKWAY (EA)
E1-5P E6	-31.363911, 103.679808 WB REEVES	2 EXIT 29 Shaw Rd		X									
E5-1c	-31.363178, 103.681894 WB REEVES	3 EXIT 29		X									
D2-2	-31.356661, 103.700864 WB REEVES	4 Toyah 8 El Paso 197		X									
E21-1T	-31.340472, 103.740622 WB REEVES	5 PICNIC AREA 1 MILE		X									
E21-2T	-31.333892, 103.751997 WB REEVES	6 PICNIC AREA NEXT RIGHT		X									
E21-6T	-31.33225, 103.754544 WB REEVES	7 PICNIC AREA		X									
E1-5P E6	-31.31545, 103.784128 WB REEVES	8 EXIT 22 TM 2903 Toyah		X									
E5-1c	-31.314078, 103.786114 WB REEVES	9 EXIT 22		X									
D2-2	-31.301486, 103.807736 WB REEVES	10 Van Horn 69 El Paso 189		X									
COLUMN TOTAL				9	–	–	–	–	–	–	–	–	–
PAGE TOTALS				17	–	–	–	–	–	–	–	–	–

NOTE:

1. * For information only. Typically used in conjuction with Replacement of signs Ty G or TY O.

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...

10/1/2024

Texas Department of Transportation

Traffic Safety Division Standard

LARGE SIGN REMOVAL SUMMARY

FILE: SOLSR-24_Example.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
5-24	DIST	COUNTY		SHEET NO.
	ODA	REEVES		101

DATE: 09/25/2024 01:34 PM
FILE:

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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)

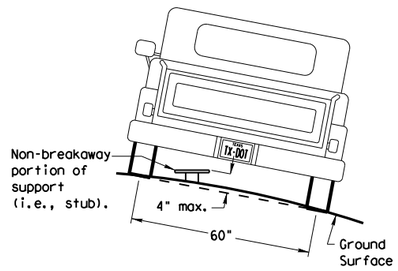
Anchor Type

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-1))

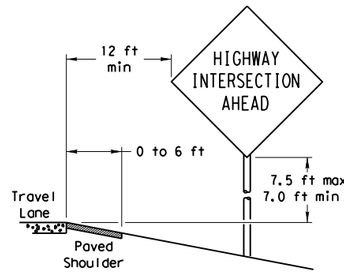
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

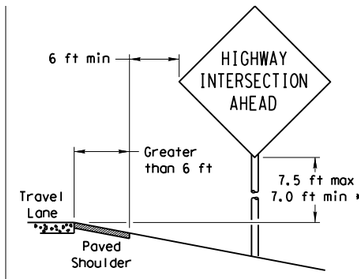
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

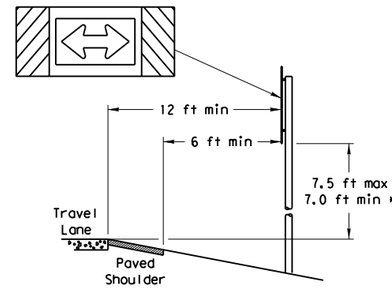
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



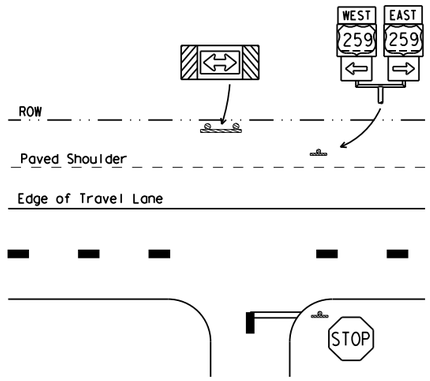
GREATER THAN 6 FT. WIDE

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.

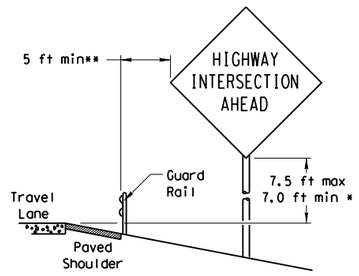
T-INTERSECTION



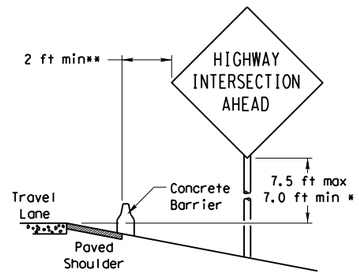
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



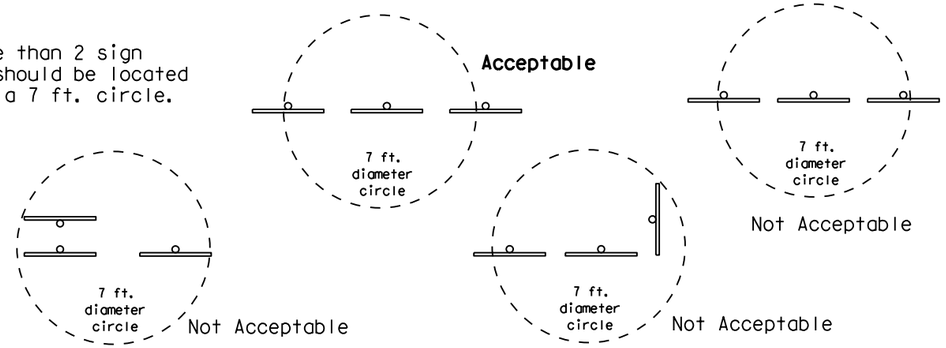
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

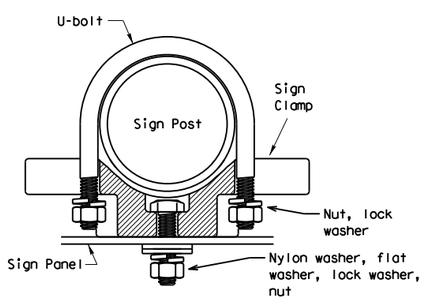
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

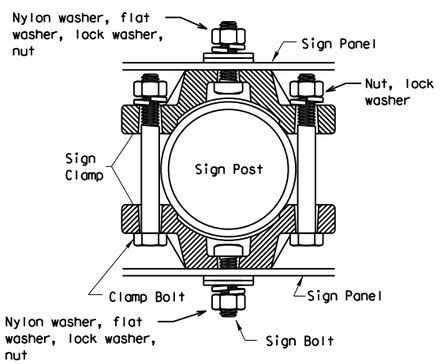


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

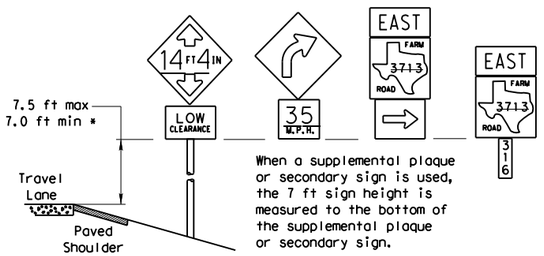
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



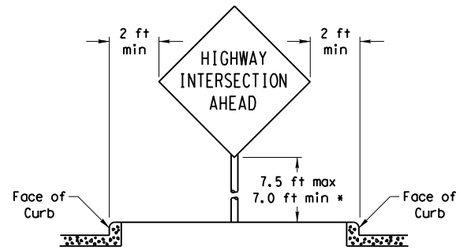
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



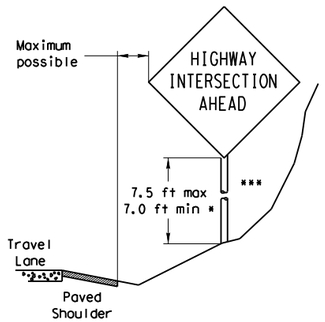
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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

REVISIONS
9-08

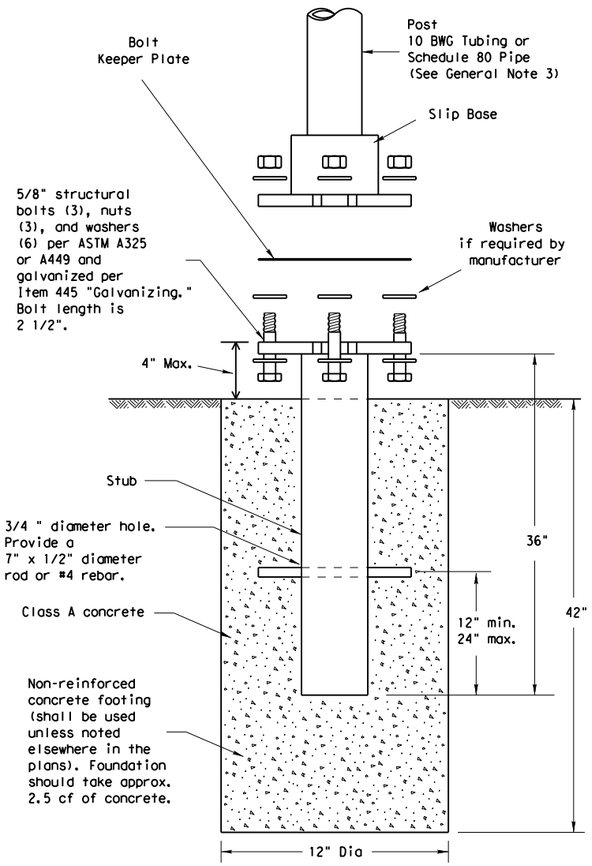
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0003	06	103	IH 20

DIST	COUNTY	SHEET NO.
ODA	REEVES	102

DATE:
FILE:

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.

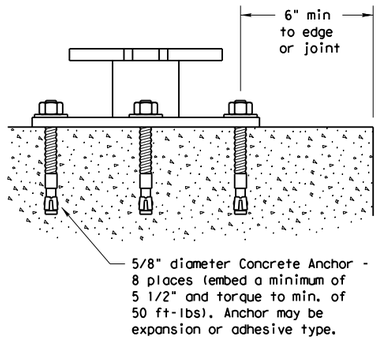
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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	06	103	IH 20

DIST	COUNTY	SHEET NO.
ODA	REEVES	103

DATE:
FILE:

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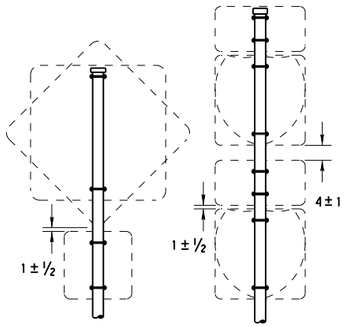
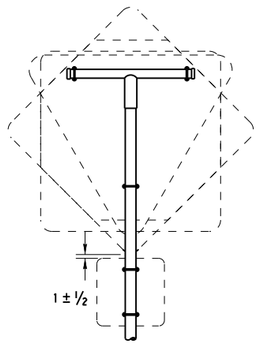
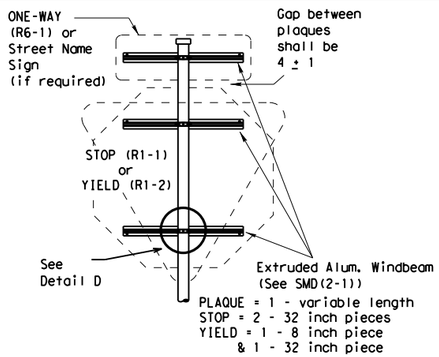


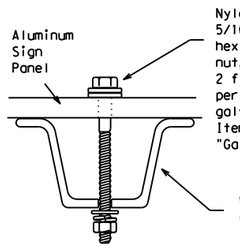
SM RD SGN ASSM TY XXXXX(1)XX(P)



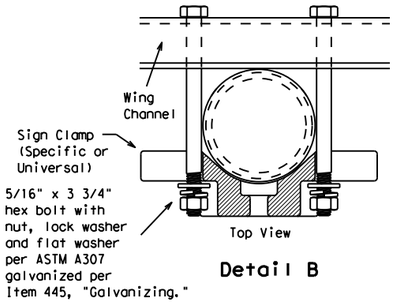
SM RD SGN ASSM TY XXXXX(1)XX(T)



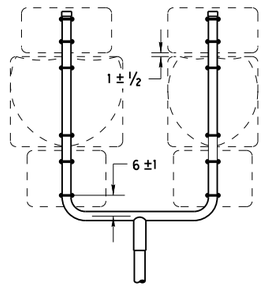
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



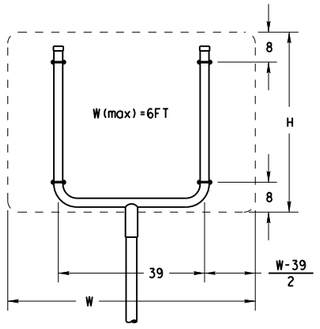
Detail A



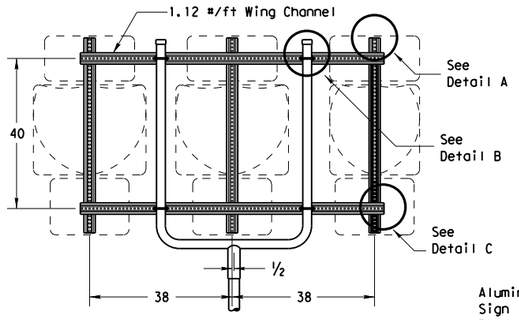
Detail B



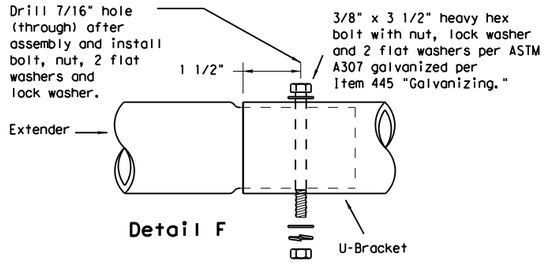
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

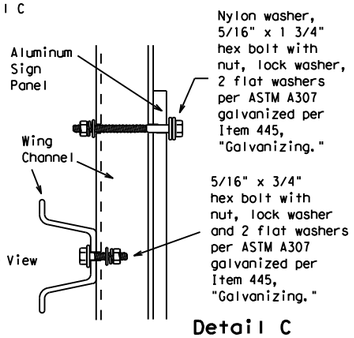


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

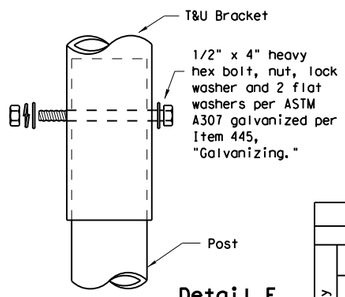


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



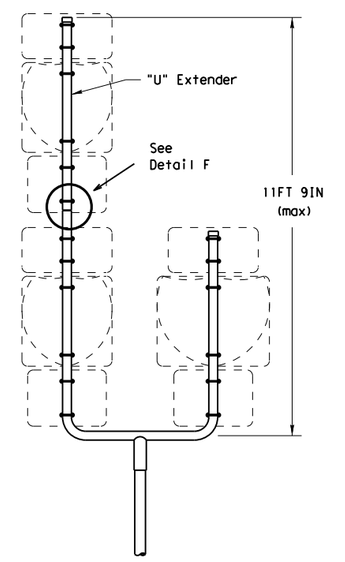
Detail E

GENERAL NOTES:

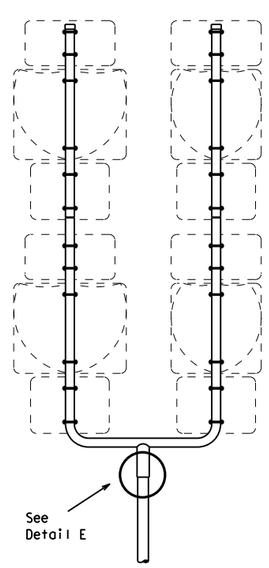
1.

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

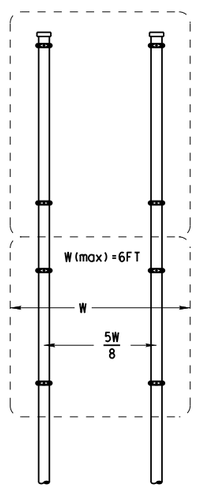
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material 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)

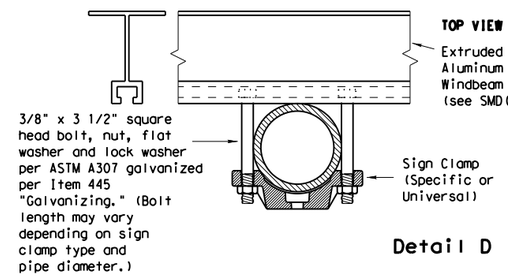


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

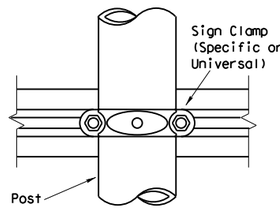


SM RD SGN ASSYM TY XXXXX(2)XX(P)

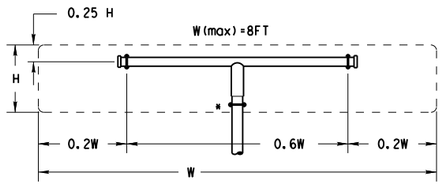
SIDE VIEW



Detail D



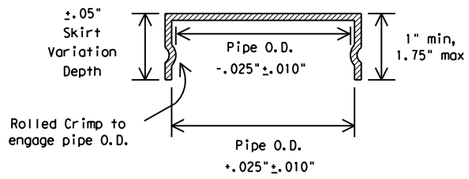
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	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)



All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

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

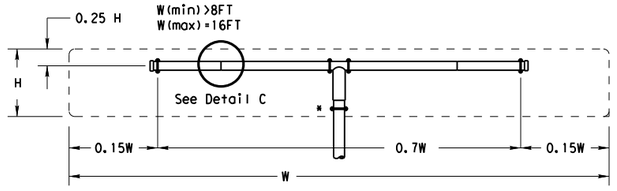
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
0003	06	103	IH 20

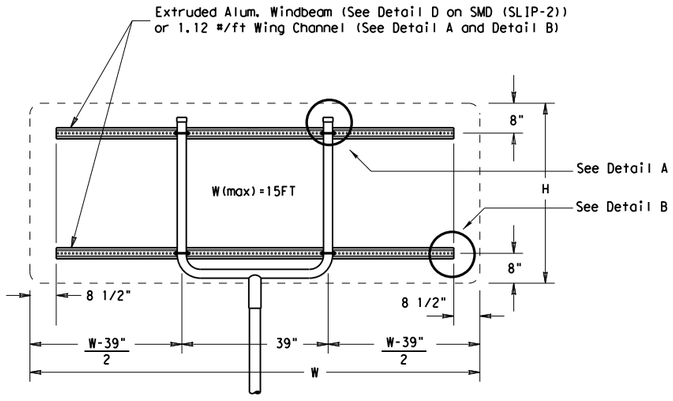
DIST	COUNTY	SHEET NO.
ODA	REEVES	104

DATE:
FILE:

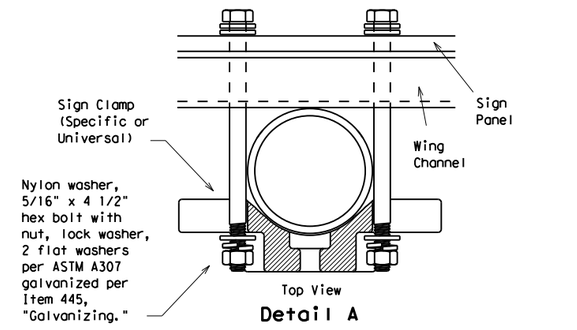


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

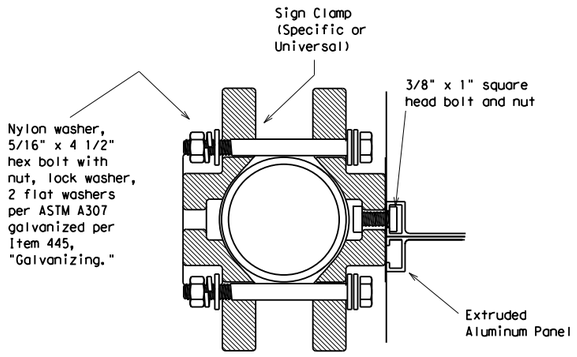
(* - See Note 12)



SM RD SGN ASSM TY XXXXX(1)XX(U-XX)

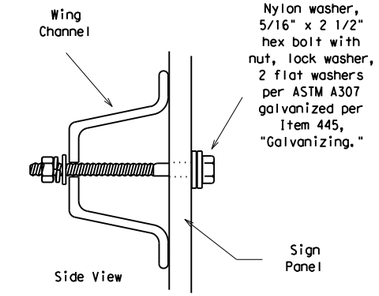


Detail A

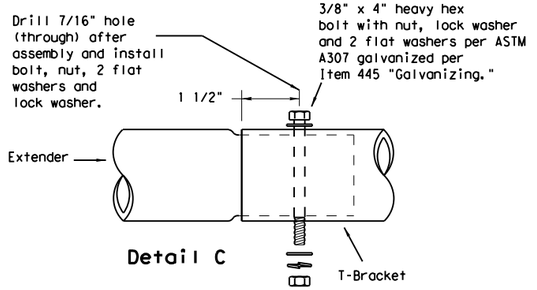


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET

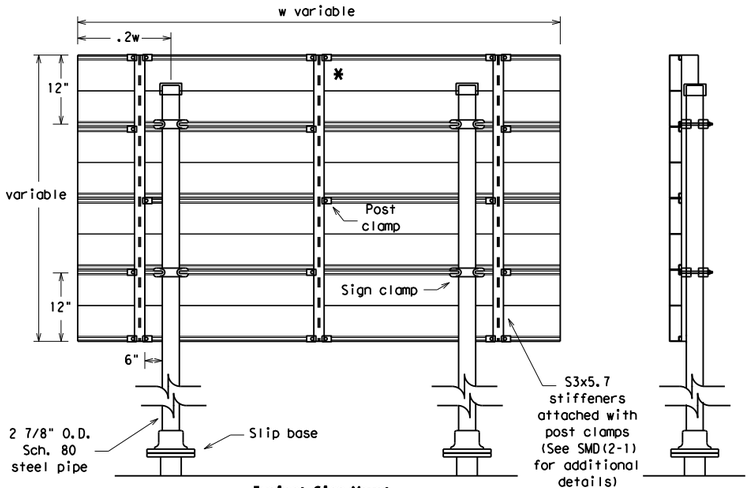


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

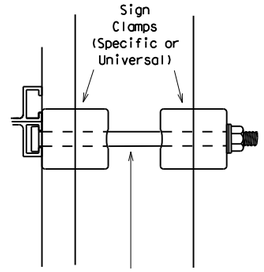


Typical Sign Mount

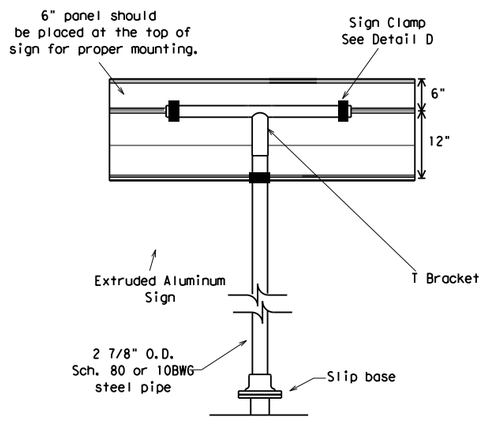
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

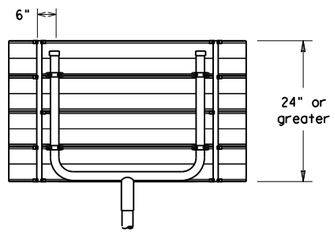
See Detail E
for clamp installation



Detail E



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

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.

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

9-08

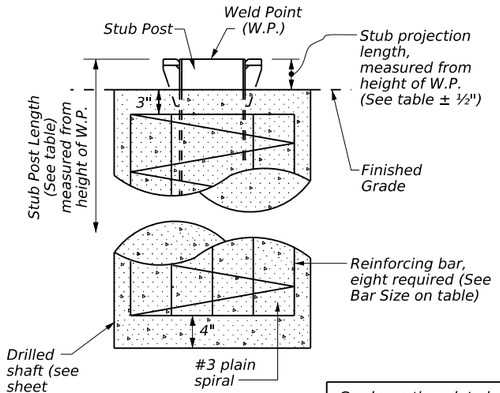
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0003	06	103	IH 20

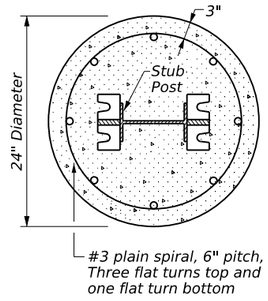
DIST	COUNTY	SHEET NO.
ODA	REEVES	105

DATE:
FILE:

REINFORCED FOUNDATION DETAIL



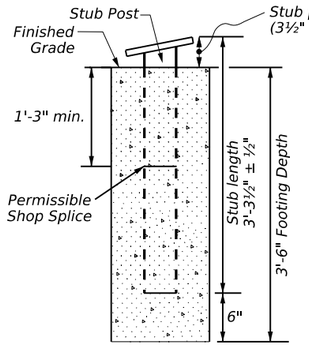
ELEVATION



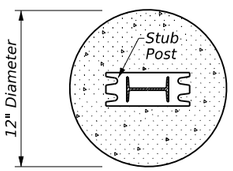
PLAN

Grade earthwork to be flush with the concrete footing. Slopes shall gradually contour to match plans.

⊛ NON-REINFORCED FOUNDATION DETAIL



ELEVATION



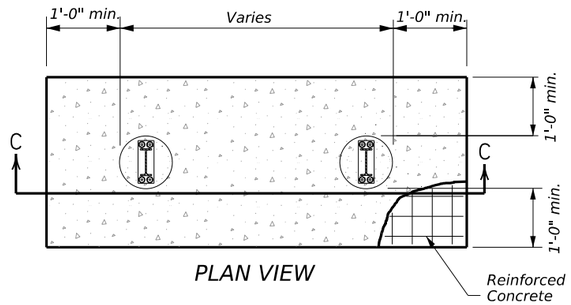
PLAN

Grade earthwork to be flush with the concrete footing. Slopes shall gradually contour to match plans.

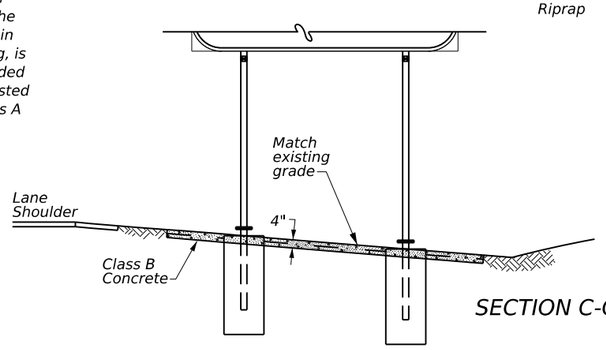
SIGN RIPRAP APRON DETAIL

NOTES:

1. Sign riprap aprons are optional.
2. If used, the depth of the apron shall be 4" or as indicated elsewhere on the plans.
3. Reinforced concrete shall be placed in accordance with Item 432, "Riprap."
4. Typical reinforcement is comprised of #3 or #4 bars @ 12" c.c. in both directions. However, the use of synthetic fiber, in lieu of steel reinforcing, is also acceptable; provided the fiber producer is listed on the "Fibers for Class A and Class B Concrete Applications" Material Producer List (MPL).



PLAN VIEW



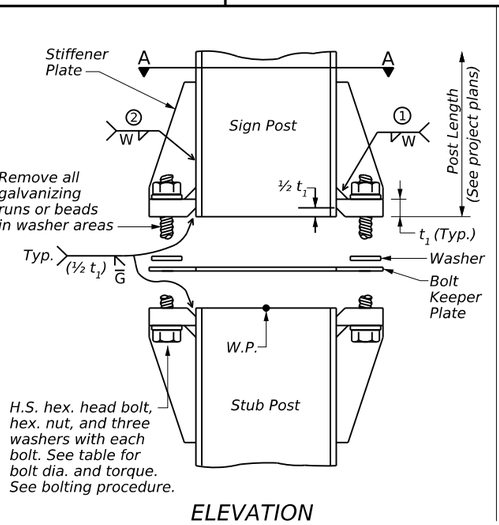
SECTION C-C

BOLTING PROCEDURE FOR ASSEMBLY OF BASE CONNECTION

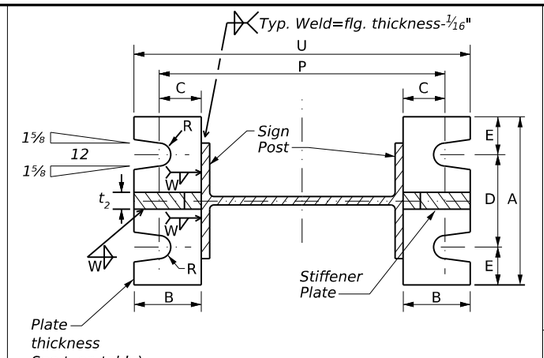
1. Assemble sign post, BOLT KEEPER PLATE and stub post with bolts and three flat washers per bolt, as shown.
2. Shim as required, to plumb post.
3. Tighten all bolts to the maximum possible with a 12 to 15 inch wrench to clean bolt threads and to bed washers and shims.
4. Loosen each bolt in sequence 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.

STRUCTURAL DATA TABLE

DIMENSIONS	BASE CONNECTION										BOLT KEEPER PLATE			FOUNDATION				
Post Size	Bolt Size & Torque	A	B	C	D	E	t_1	t_2	W	R	P	S	U	Stub length	Stub projection	Drill Shaft diameter	Bar Size	Concrete Type
W12x26	¾"Φ x 3½" 740-750 inch pounds 62-63 foot pounds	6"	2¼"	1⅜"	3½"	1¼"	1"	¾"	5/16"	13/32"	15"	1½"	16¾"	3'-0"	2½"	24"	#11	C
W10x22											12⅞"		14⅝"	3'-0"	2½"		#9	
W8x21											11"		12¾"	3'-0"	2½"		#8	
W8x18	⅝"Φ x 2¾" 440-450 inch pounds 36-38 foot pounds	5"	2"	1¼"	2¾"	1⅛"	¾"	½"	¼"	11/32"	10⅝"	1"	12⅛"	2'-6"	3"		#7	
W6x15											8½"		10"	2'-6"	3"		#6	
W6x9											8⅜"		9⅞"	2'-0"	3"		#5	
S4x7.7	½"Φ x 2½" 440-450 inch pounds 36-38 foot pounds	See Sign Post Stub (S4x7.7 and S3x5.7)									See Sign Post Stub (S4x7.7 and S3x5.7)			3'-3½"	3½"	12"	Non-reinforced ⊛	A
S3x5.7																		



ELEVATION

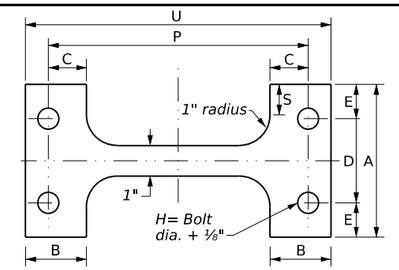


SECTION A-A

NOTES:

① Back up weld to be made before installing stiffener plate.

② Weld W may be continued across clips to seal joint.

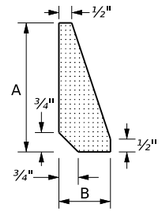


BOLT KEEPER PLATE
30 Ga galv. sheet steel

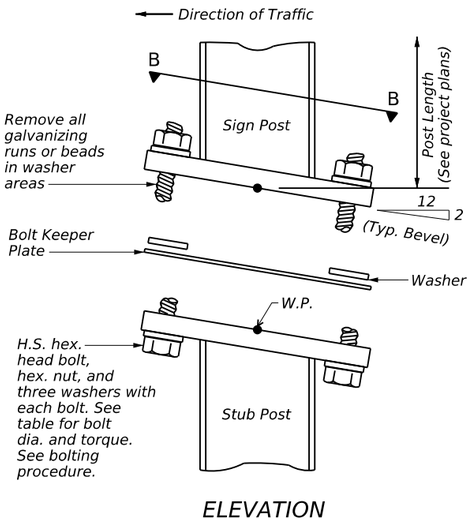
STIFFENER PLATE DETAIL

Steel Plate (thickness = t2)

(See Structural Data Table for dimensions)



SIGN POST AND STUB POST FOR WIDE FLANGE BEAMS (W)



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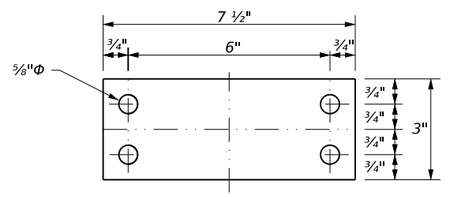
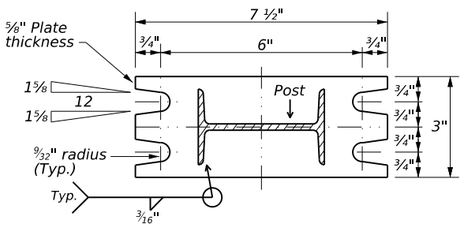
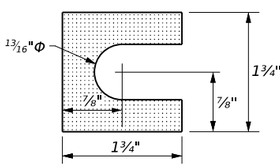


BOLT KEEPER PLATE
30 ga. galv. sheet steel



SECTION B-B

SIGN POST AND STUB POST (FOR S4x7.7 AND S3x5.7)



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.

SHIM DETAIL

Texas Department of Transportation

Traffic Safety Division Standard

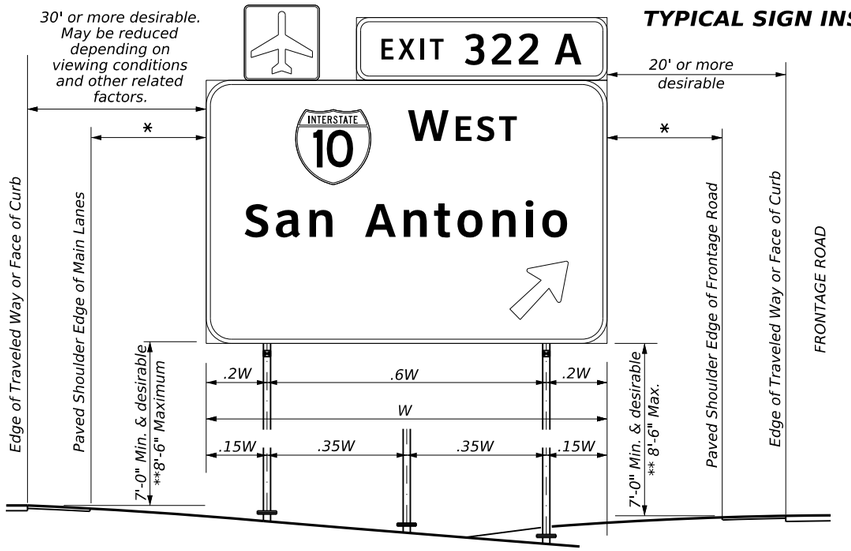
SIGN MOUNTING DETAILS LARGE ROADSIDE SIGNS FOUNDATION & STUB

SMD(2-1)-24

FILE: smd(2-1)-24.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
8-95 5-24 4-98 9-08	DIST	COUNTY		SHEET NO.
	ODA	REEVES		106

DATE:
FILE:

TYPICAL SIGN INSTALLATION AND LOCATION



LATERAL CLEARANCE NOTES:

1. Lateral clearances of signs mounted on the median side of the main lanes are the same as shown, where space will permit. Where a sign is to be located behind guardrail, an allowable minimum clearance of 5' may be used, measured from the face of the guardrail to the near edge of sign.
2. * 6' minimum and desirable may be used only in areas of limited lateral clearance and when approved by the Engineer.

POST SPACING NOTES:

1. Post spacing on a two post sign may be varied a maximum of ±10% of the total sign width to fit field conditions.
2. Post spacing on a three post sign may be varied a maximum of ±5% of the total sign width to fit field conditions.

SIGN HEIGHT NOTES:

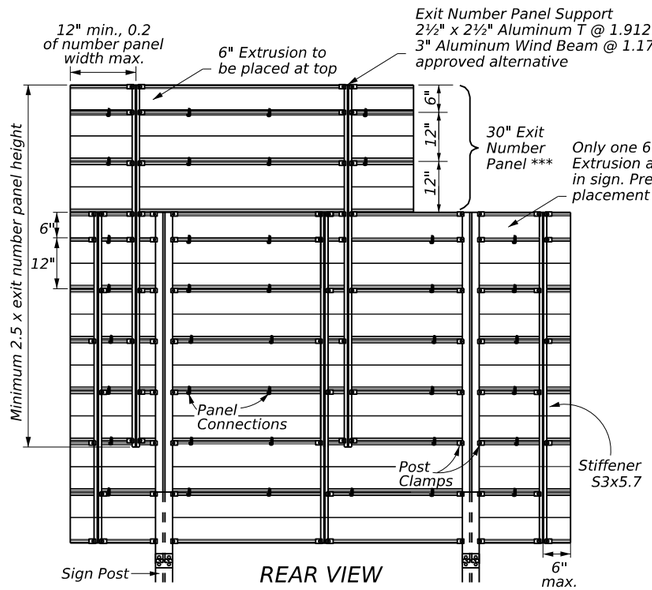
1. ** The 8'-6" maximum may be exceeded when placing signs on extreme slopes. In these conditions, a 7' minimum from natural ground to bottom of sign must be maintained.

GENERAL NOTES:

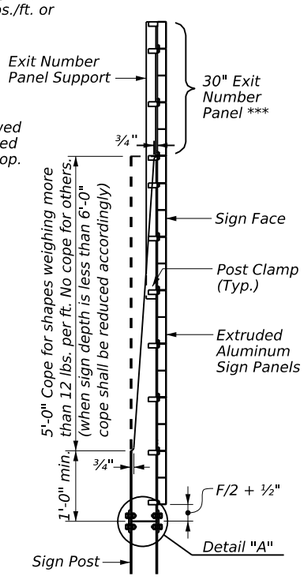
1. Exit number panel supports shall be ASTM A36 structural steel galvanized after fabrication, or ASTM B221 aluminum alloy 6061-T6 or approved alternative.
2. In accordance with DMS-7120, High-Strength (H.S.) Bolts, Nuts, and Washers shall be galvanized per ASTM Designation: B695 Class 50, or A153 Class C or D.
3. Posts, parent sign panels, and exit number panels shall comply with notes on sheets SMD(2-1) and SMD(2-3).
4. 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 sign plaques may be fabricated from flat sheet aluminum.
5. Exit number panel supports and other connection hardware required to fasten exit number panel to parent sign shall be subsidiary to "Aluminum Signs".
6. Signs to be furnished shall be detailed elsewhere in the plans. Refer to the "Typical Sign Requirements" standard for additional information.
7. *** Alternate exit number panel heights may be used, in accordance with the "Standard Highway Sign Designs for Texas (SHSD)."

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN HARDWARE	DMS-7120

ALUMINUM PARENT SIGN & EXIT NUMBER PANEL MOUNTING DETAILS

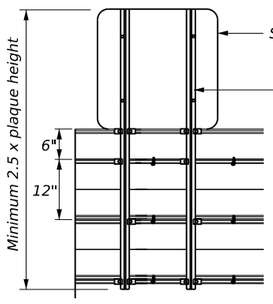


REAR VIEW



SIDE VIEW

SIGN PLAQUE MOUNTING DETAIL

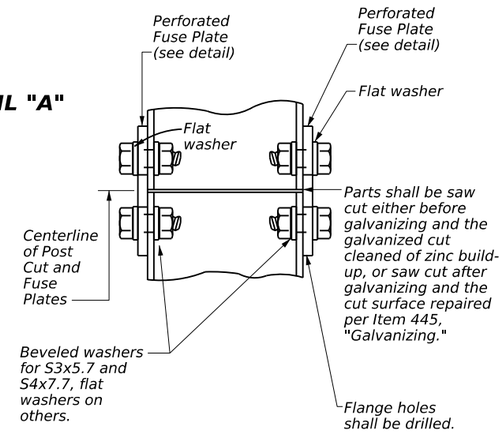


REAR VIEW

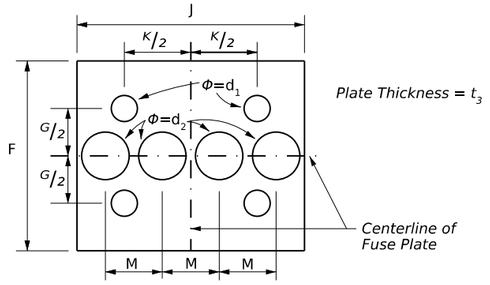
NOTE:

A sign plaque may be mounted to the parent sign or the exit number panel. See TSR(2) for typical plaque placement.

DETAIL "A"



PERFORATED FUSE PLATE DETAIL



NOTE:

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 Plates, contact the Traffic Safety Division.

STRUCTURAL DATA TABLE

DIMENSIONS	PERFORATED FUSE PLATE										
Post Size	F	G	J	K	M	d_1	d_2	t_3	Bolt Dia.	Wt. (ea.) (lbs.)	Bolt length
W12x26	6"	3"	6½"	3½"	1⅜"	13/16"	1 5/16"	½"	¾"	4.47	2¼"
W10x22	6"	3"	5¾"	2¾"	1⅜"	13/16"	1⅛"	½"	¾"	4.03	2¼"
W8x21	5½"	2½"	5¼"	2¾"	1¼"	13/16"	1"	½"	¾"	3.35	2¼"
W8x18	5"	2½"	5¼"	2¾"	1¼"	11/16"	1 1/16"	⅜"	⅝"	2.26	2¼"
W6x15	5"	2½"	6"	3½"	1½"	11/16"	1¼"	⅜"	⅝"	2.51	2¼"
W6x9	4¼"	2"	4"	2¼"	1"	9/16"	¾"	¼"	½"	1.01	1½"
S4x7.7	3¾"	1½"	2⅝"	1½"	⅝"	9/16"	⅜"	¼"	½"	0.60	1½"
S3x5.7											

Texas Department of Transportation

Traffic Safety Division Standard

SIGN MOUNTING DETAILS LARGE ROADSIDE SIGNS EXTRUDED ALUMINUM

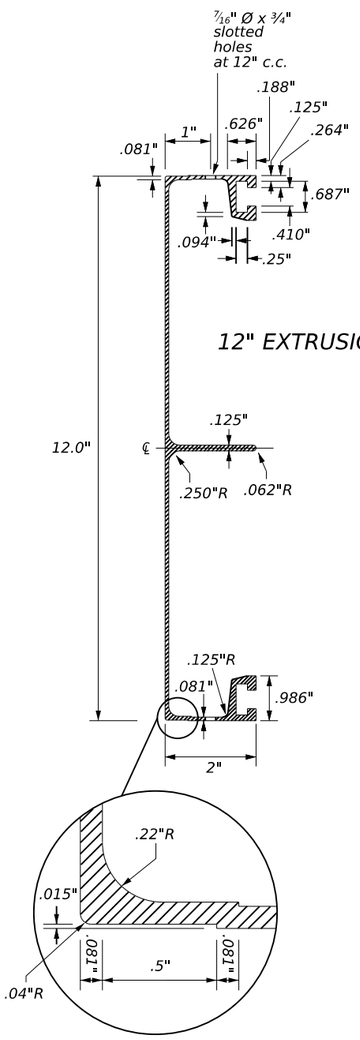
SMD(2-2)-24

FILE: smd(2-2)-24.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
8-95 9-08 5-24	DIST	COUNTY		SHEET NO.
	ODA	REEVES		107

27B

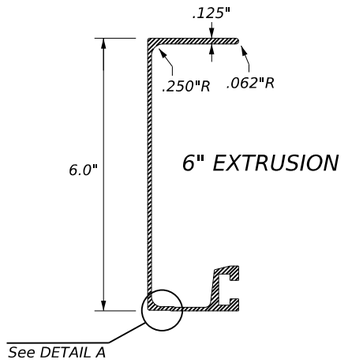
DATE:
FILE:

ALUMINUM SIGN PANEL EXTRUSION DETAILS

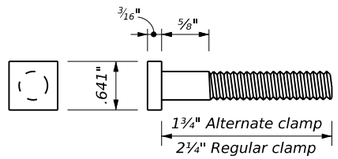


12" EXTRUSION

DETAIL A

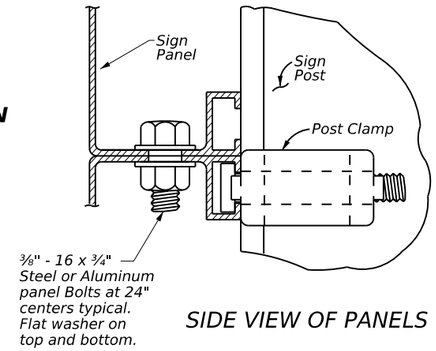


6" EXTRUSION



POST CLAMP BOLT DETAIL

PANEL CONNECTION DETAIL



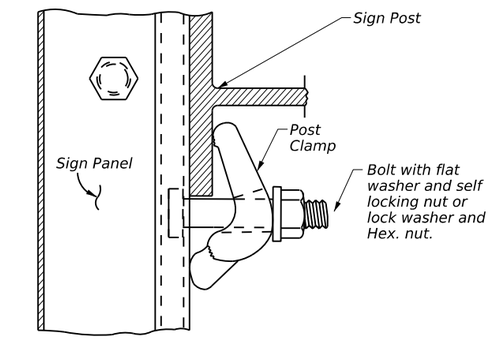
SIDE VIEW OF PANELS

GENERAL NOTES:

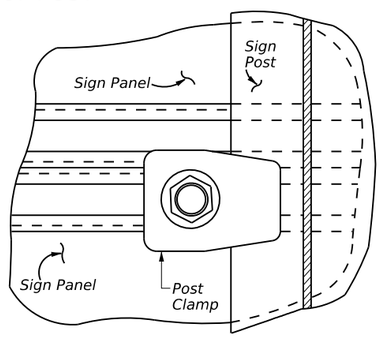
1. Design conforms with the 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (Large Roadside Signs with a 25-year Mean Recurrence Interval, MRI, and Overhead Signs with a 50-year MRI).
2. Materials and fabrication shall conform to the requirements of the Department Material Specifications.
3. Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN HARDWARE	DMS-7120

POST CONNECTION DETAIL

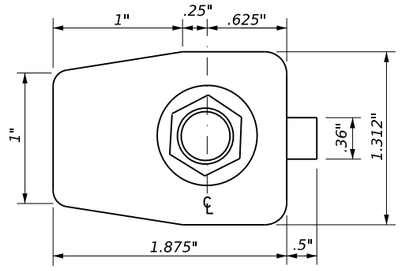


TOP VIEW OF POST

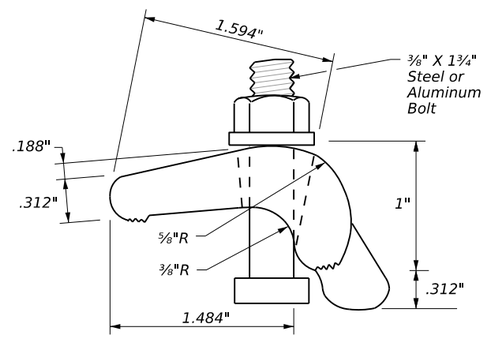


TOP VIEW OF CLAMP

REGULAR POST CLAMP DETAIL



PLAN

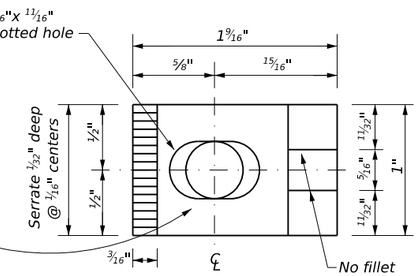


ELEVATION

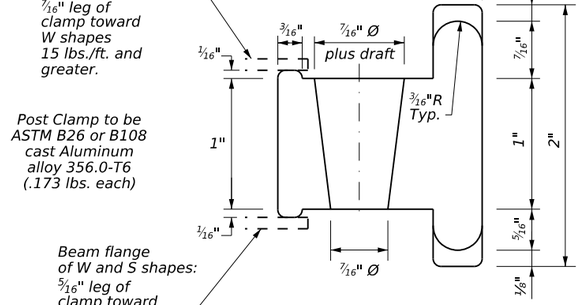
ALTERNATE POST CLAMP DETAIL

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.

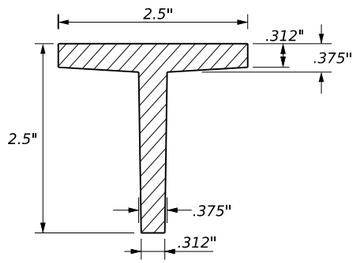


PLAN



ELEVATION

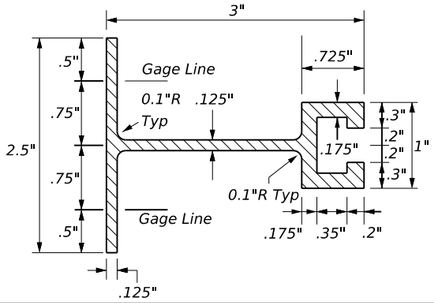
ALUMINUM T SECTION OR APPROVED ALTERNATIVE



1.912 lbs/ft

WINDBEAM CROSS SECTION

Windbeam to be extruded aluminum (1.175 lbs./ft.) or approved alternative



Texas Department of Transportation

Traffic Safety Division Standard

SIGN MOUNTING DETAILS SIGN PANELS & HARDWARE EXTRUDED ALUMINUM

SMD(2-3)-24

FILE: smd(2-3)-24.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 2024	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
2001 9-08 5-24	DIST	COUNTY		SHEET NO.
	ODA	REEVES		108

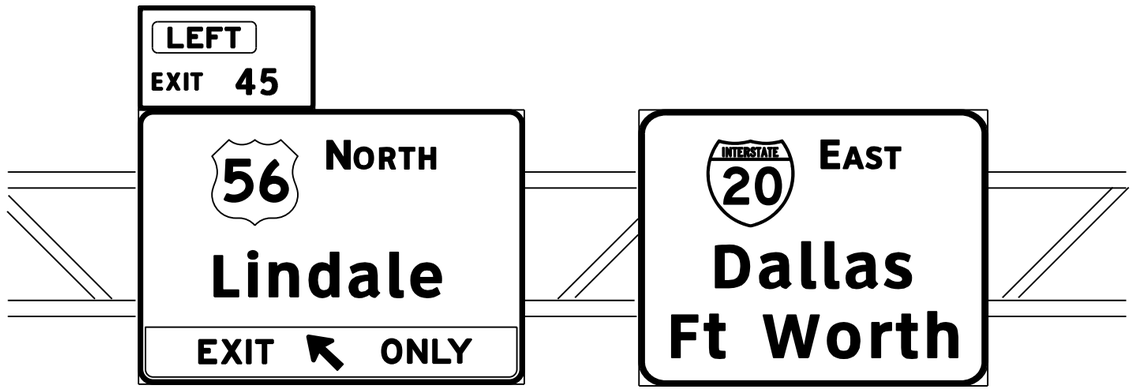
27C

DATE:
FILE:

DATE:
FILE:

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

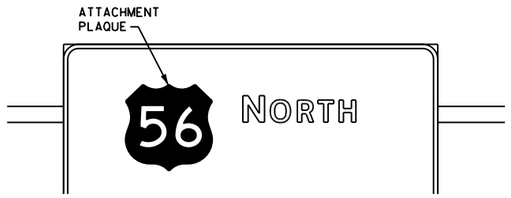
Traffic Operations Division Standard

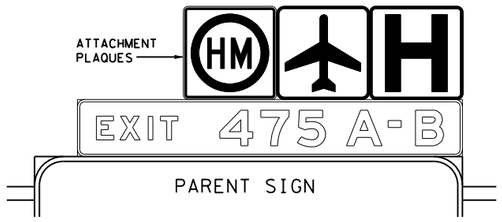
TYPICAL SIGN REQUIREMENTS

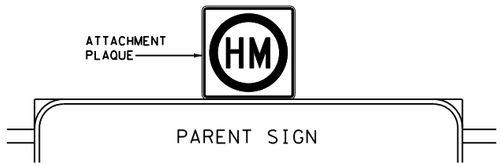
TSR(1)-13

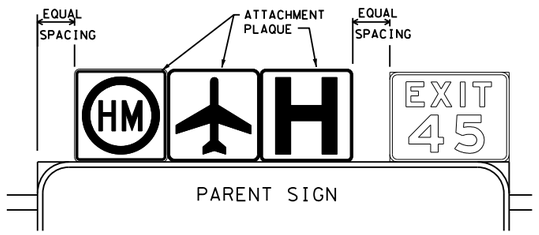
FILE: tsr1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
12-03 7-13	DIST.	REEVES		SHEET NO.
9-08	ODA	REEVES		109

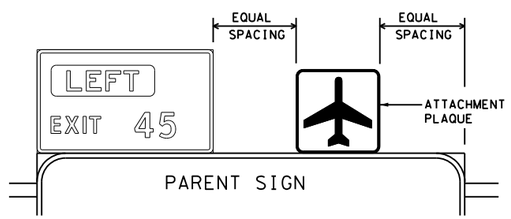
REQUIREMENTS FOR ATTACHMENTS TO OVERHEAD AND LARGE GROUND MOUNTED SIGNS











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

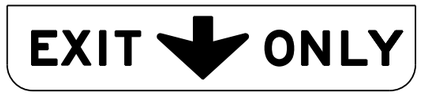
1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Route Marker legends (ie. IH, US, SH and FM shields) shall use the Federal 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.

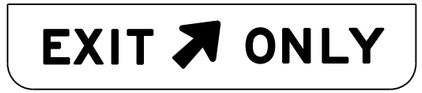
TYPICAL EXAMPLES

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

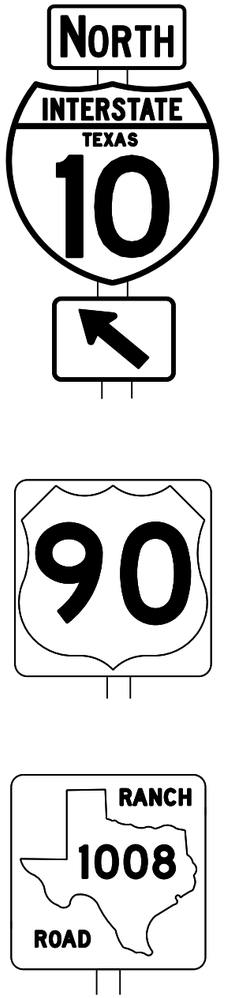
FILE: tsr2-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	ODA	REEVES		110

DATE:
FILE:

DATE:
FILE:

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

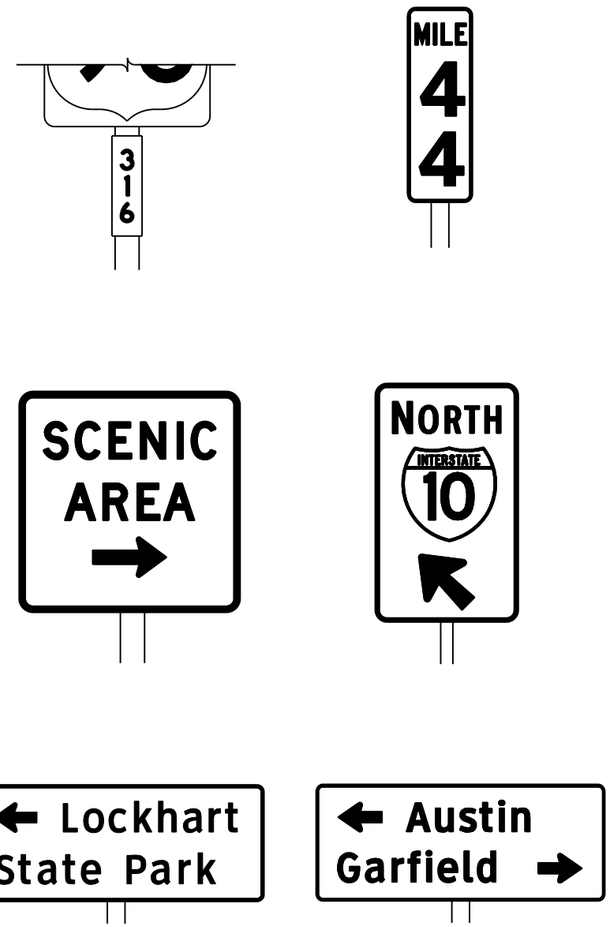
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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

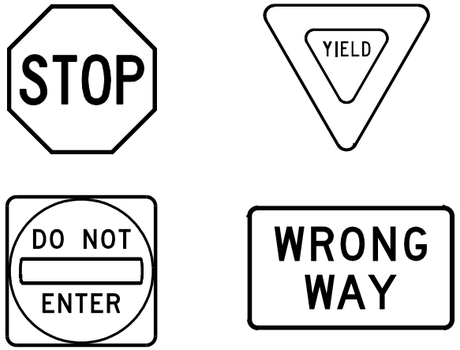
FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	ODA	REEVES		111

3

DATE:
FILE:

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

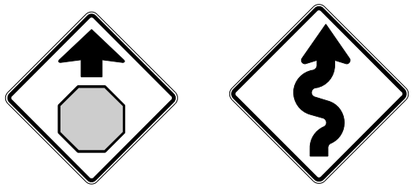
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(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
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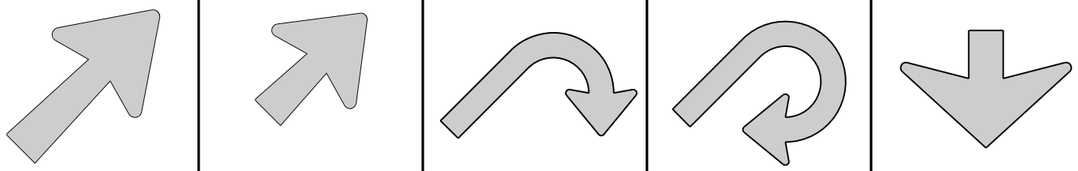
REVISIONS	0003	06	103	IH 20
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	ODA	REEVES		112

4

DATE:
FILE:

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

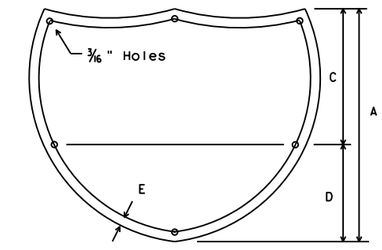
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.

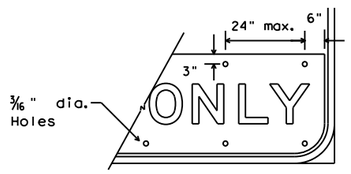
http://www.txdot.gov/

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

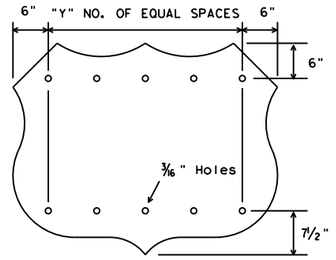


INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4

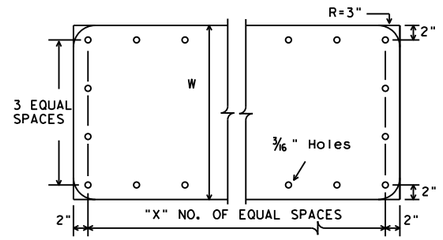


EXIT ONLY PANEL



U.S. ROUTE MARKERS

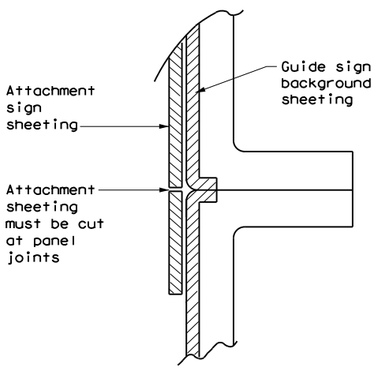
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



STATE ROUTE MARKERS

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

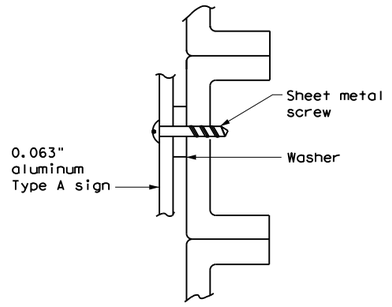
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



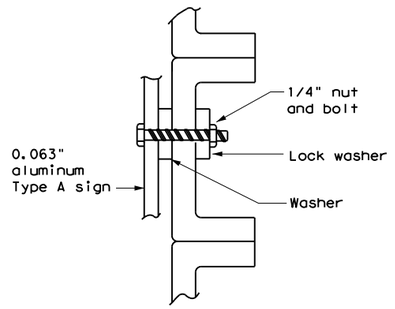
DIRECT APPLIED ATTACHMENT

NOTE:

1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".



SCREW ATTACHMENT



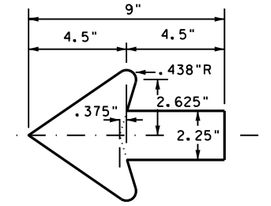
NUT/BOLT ATTACHMENT

NOTE:

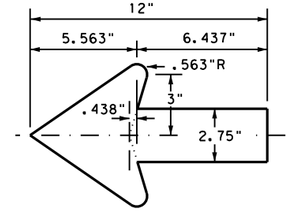
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5) -13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	ODA	REEVES		113

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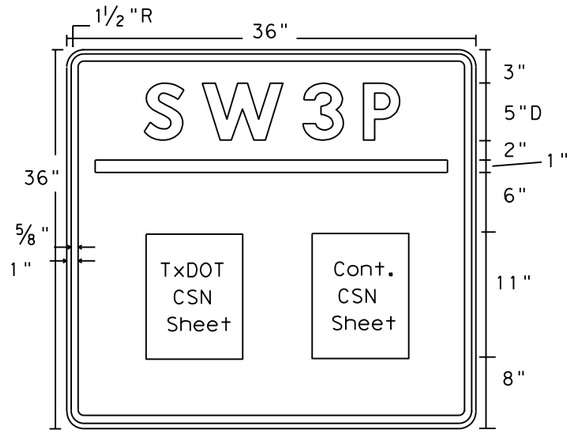


SW3P SIGN

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.

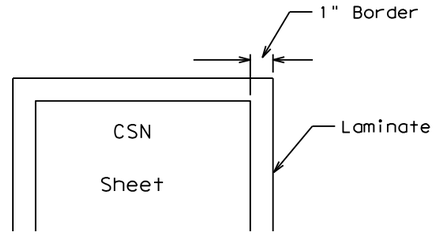
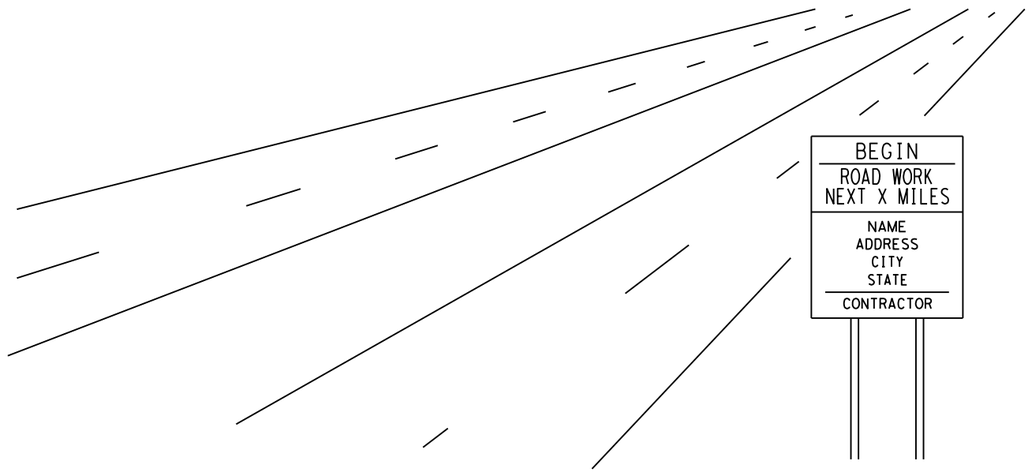
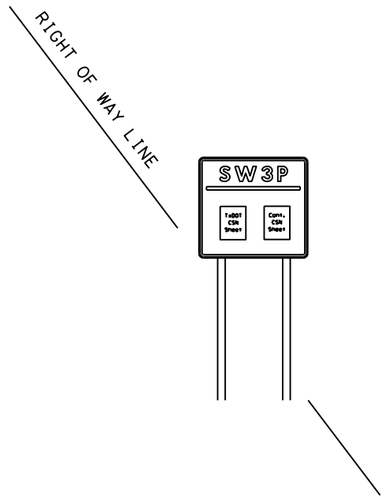


Figure 1





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
	6			114
REVISION DATE: 10-16-15	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	REEVES	0003	06	103	IH 20

LEVELS DISPLAYED
1
PATH:

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0003-06-103

1.2 PROJECT LIMITS:

From: 3.5 MI W of FM 2903

To: 0.35 MI W OF CR 210

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 31.28,(Long) -103.83

END: (Lat) 31.69,(Long) -103.66

1.4 TOTAL PROJECT AREA (Acres): 262 ACRES

1.5 TOTAL AREA TO BE DISTURBED (Acres): 111.6 Acres

1.6 NATURE OF CONSTRUCTION ACTIVITY:

SEE TITLE SHEET

1.7 MAJOR SOIL TYPES:

Soil Type	Description
FINE SANDY LOAM	Average slopes,with 10% vegetation consisting of native grasses.

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- ☐ PSLs determined during preconstruction meeting
- ☐ PSLs determined during construction
- ☒ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:
(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.5.)

- ☒ Mobilization
- ☒ Install sediment and erosion controls
- ☐ Blade existing topsoil into windrows, prep ROW, clear and grub
- ☒ Remove existing pavement
- ☐ Grading operations, excavation, and embankment
- ☐ Excavate and prepare subgrade for proposed pavement widening
- ☐ Remove existing culverts, safety end treatments (SETs)
- ☐ Remove existing metal beam guard fence (MBGF), bridge rail
- ☒ Install proposed pavement per plans
- ☐ Install culverts, culvert extensions, SETs
- ☐ Install mow strip, MBGF, bridge rail
- ☐ Place flex base
- ☐ Rework slopes, grade ditches
- ☒ Blade windrowed material back across slopes
- ☐ Revegetation of unpaved areas
- ☒ Achieve site stabilization and remove sediment and erosion control measures
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- ☒ Sediment laden stormwater from stormwater conveyance over disturbed area
- ☒ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- ☐ Solvents, paints, adhesives, etc. from various construction activities
- ☒ Transported soils from offsite vehicle tracking
- ☒ Construction debris and waste from various construction activities
- ☐ Contaminated water from excavation or dewatering pump-out water
- ☒ Sanitary waste from onsite restroom facilities
- ☒ Trash from various construction activities/receptacles
- ☐ Long-term stockpiles of material and waste
- ☒
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.11 RECEIVING WATERS:

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- X Development of plans and specifications
- X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- X Post Construction Site Notice
- ☐ Submit NOI/CSN to local MS4
- X Perform SWP3 inspections
- X Maintain SWP3 records and update to reflect daily operations
- X Complete and submit Notice of Termination to TCEQ
- X Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

DocuSigned by:
Nestor T Mendoza, P.E.
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10/1/2024

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- X Day To Day Operational Control
- X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- X Post Construction Site Notice
- ☐ Submit NOI/CSN to local MS4
- X Maintain schedule of major construction activities
- X Install, maintain and modify BMPs
- X Complete and submit Notice of Termination to TCEQ
- X Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED
PROFESSIONAL ENGINEER

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

 July 2023 Sheet 1 of 2

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	06	103	IH 20

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ ☐ Permanent Planting, Sodding or Seeding
- ☒ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☐ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

- ☒ ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☐ ☐ Sediment Control Fence
- ☐ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- ☐ ☐ Sedimentation Basin
  - ☐ Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 3,600 cubic feet of storage per acre drained
  - ☐ Required (>10 acres), but not feasible due to:
    - ☐ Available area/Site geometry
    - ☐ Site slope/Drainage patterns
    - ☐ Site soils/Geotechnical factors
    - ☐ Public safety
    - ☐ Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- ☐ Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☐ Loaded haul trucks to be covered with tarpaulin
- ☐ Stabilized construction exit
- ☐ Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- ☐ Concrete and Materials Waste Management
- ☐ Debris and Trash Management
- ☐ Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- X Fire hydrant flushings
- X Irrigation drainage
- X Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- X Potable water sources
- X Springs
- X Uncontaminated groundwater
- X Water used to wash vehicles or control dust
- X Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

When dewatering activities are present, a daily inspection will be conducted once per day during those activities and documented in accordance with CGP and TxDOT requirements.

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
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STORMWATER POLLUTION PREVENTION PLAN (SWP3)

July 2024 Sheet 2 of 2

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	06	103	IH 20

LEGEND	
SYMBOL	DESCRIPTION
LOG	EROSION CONTROL LOG
	BRIDGE/HYDRAULIC STRUCTURE
	GRATE INLET

STA 1015+81	
DATE INSTALLED	
DATE REMOVED	
EST LF (10' EA)	60

STA 1099+45	
DATE INSTALLED	
DATE REMOVED	
EST LF (10' EA)	100

STA 1119+80	
DATE INSTALLED	
DATE REMOVED	
EST LF (10' EA)	60

STA 1144+88	
DATE INSTALLED	
DATE REMOVED	
EST LF (10' EA)	100

STA 1158+88	
DATE INSTALLED	
DATE REMOVED	
EST LF (10' EA)	100

STA 1216+67	
DATE INSTALLED	
DATE REMOVED	
EST LF (10' EA)	60

NBI
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061950000306146

NBI
061950000306049

NBI
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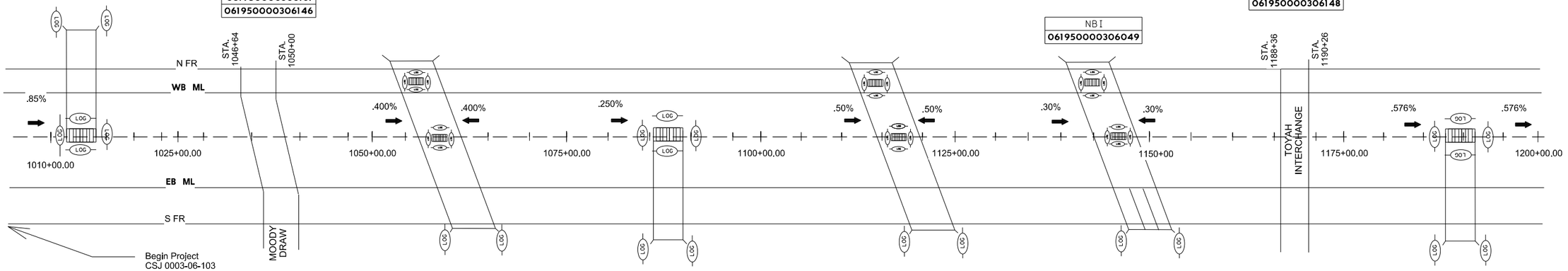


SHEET TOTALS		
	0506 7045	0506 7046
	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF
CULVERT STA 1015+90	60	60
CULVERT STA 1099+45	100	100
CULVERT STA 1119+80	60	60
CULVERT STA 1144+88	100	100
CULVERT STA 1155+88	100	100
CULVERT STA 1216+67	100	100
SHEET TOTAL	520	520

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...

10/1/2024

SWP3 SITE PLAN

SHEET 1 OF 2

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	06	103	IH 20

DATE: $DATE$ $TIME$
FILE: $FILE$

LEGEND	
SYMBOL	DESCRIPTION
LOG	EROSION CONTROL LOG
	BRIDGE/HYDRAULIC STRUCTURE
	GRATE INLET

STA 1263+86	
DATE INSTALLED	
DATE REMOVED	
EST LF (10' EA)	80

STA 1297+29	
DATE INSTALLED	
DATE REMOVED	
EST LF (10' EA)	80

STA 1282+24	
DATE INSTALLED	
DATE REMOVED	
EST LF (10' EA)	80

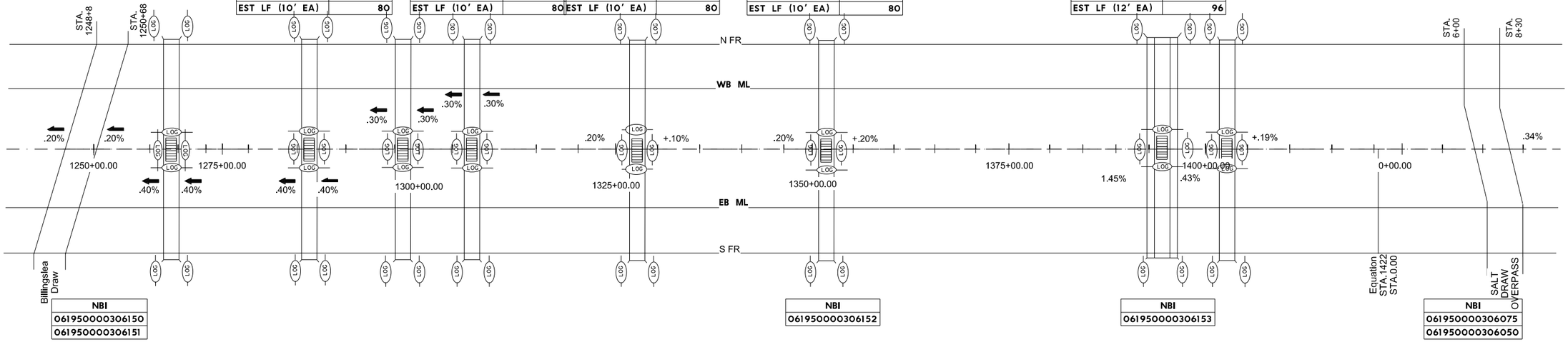
STA 1311+65	
DATE INSTALLED	
DATE REMOVED	
EST LF (10' EA)	80

STA 1325+32	
DATE INSTALLED	
DATE REMOVED	
EST LF (10' EA)	80

STA 1356+16	
DATE INSTALLED	
DATE REMOVED	
EST LF (10' EA)	80

STA 1407+64	
DATE INSTALLED	
DATE REMOVED	
EST LF (12' EA)	96

STA 1393+07	
DATE INSTALLED	
DATE REMOVED	
EST LF (12' EA)	96



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NBI
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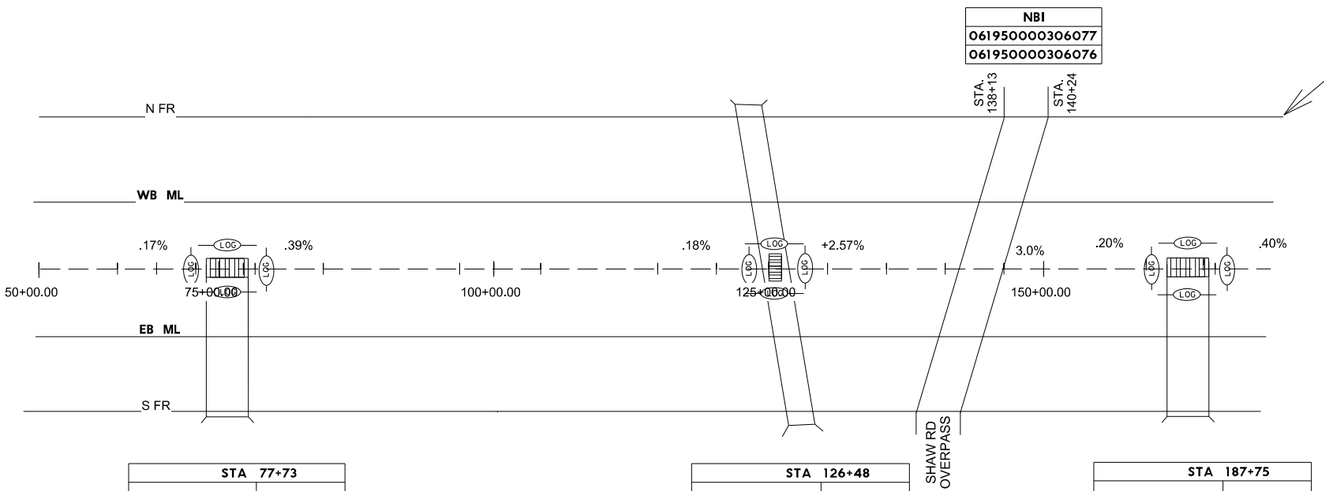

NBI
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061950000306076

End Project
CSJ 0003-06-103
IH 20
STA 217+80.04

STA 77+73	
DATE INSTALLED	
DATE REMOVED	
EST LF (12' EA)	48

STA 126+48	
DATE INSTALLED	
DATE REMOVED	
EST LF (10' EA)	40

STA 187+75	
DATE INSTALLED	
DATE REMOVED	
EST LF (10' EA)	40

SHEET TOTALS	0506 7045	0506 7046
	BIODEG EROSN CONT LOGS (INSTL) (18")	BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF
CULVERT STA 1263+86	80	80
CULVERT STA 1282+24	80	80
CULVERT STA 1297+29	80	80
CULVERT STA 1311+65	80	80
CULVERT STA 1325+32	80	80
CULVERT STA 1358+16	80	80
CULVERT STA 1393+07	96	96
CULVERT STA 1407+64	96	96
CULVERT STA 77+73	48	48
CULVERT STA 126+48	40	40
CULVERT STA 187+75	40	40
SUBTOTAL	800	800
SHEET TOTALS		1320

STATE OF TEXAS
NESTOR MENDOZA
139194
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Nestor T Mendoza, P.E.
9104D8EB1809444...

10/1/2024

SWP3 SITE PLAN

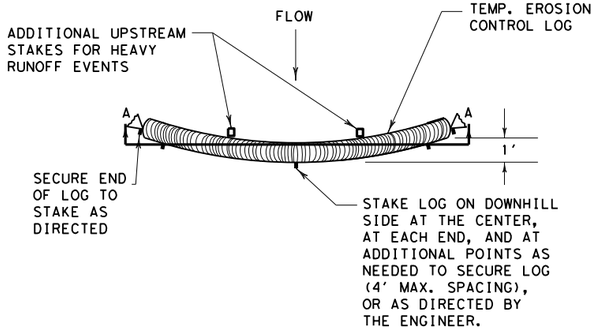
SHEET 2 OF 2

Texas Department of Transportation

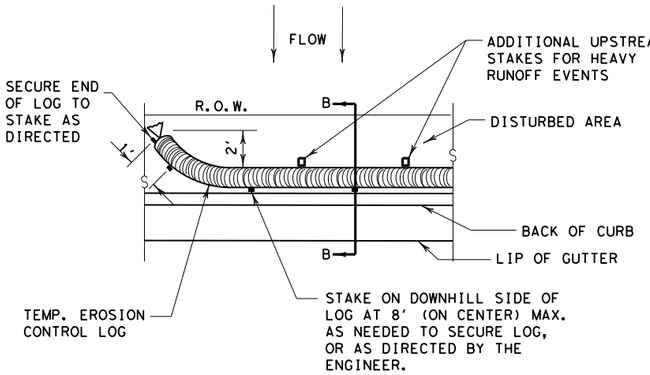
FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6			118
STATE	STATE DIST.	COUNTY	
TEXAS	ODA	REEVES	
CONT.	SECT.	JOB	HIGHWAY NO.
0003	06	103	IH 20

DATE: $DATE$ $TIME$
FILE: $FILE$

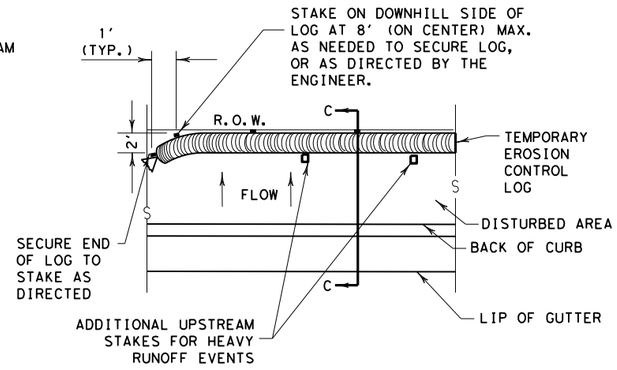
DATE:
FILE:



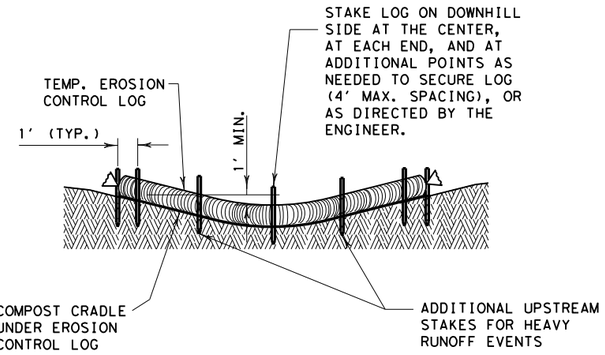
PLAN VIEW



PLAN VIEW



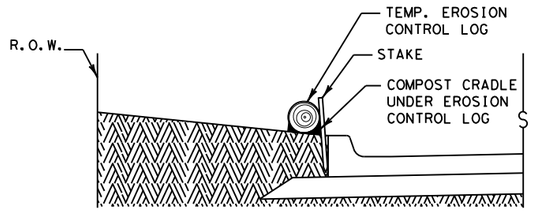
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

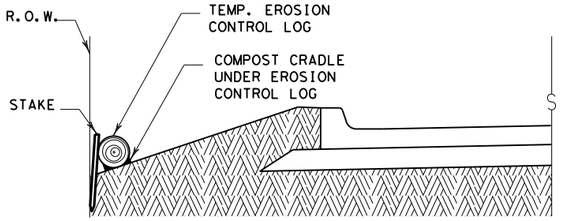
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

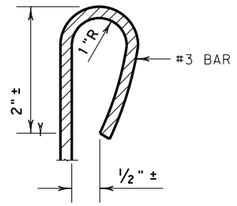
CL-BOC



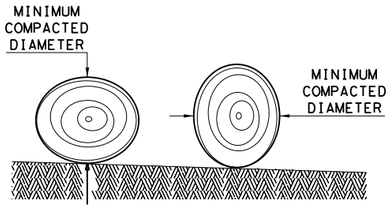
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

GENERAL NOTES:

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

LEGEND

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

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

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

Control logs should be placed in the following locations:

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

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

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

Texas Department of Transportation

Design Division Standard

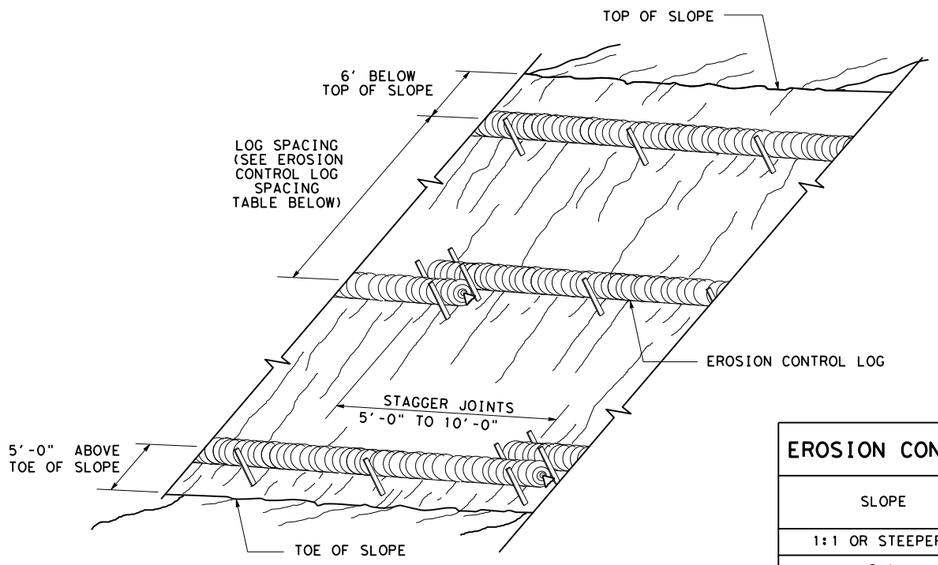
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

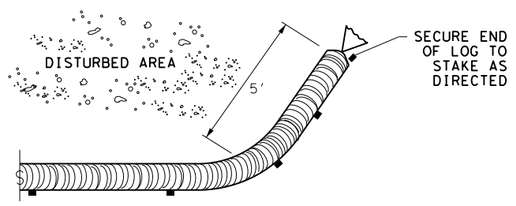
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0003	06	103	IH 20
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		119

DATE:
FILE:



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

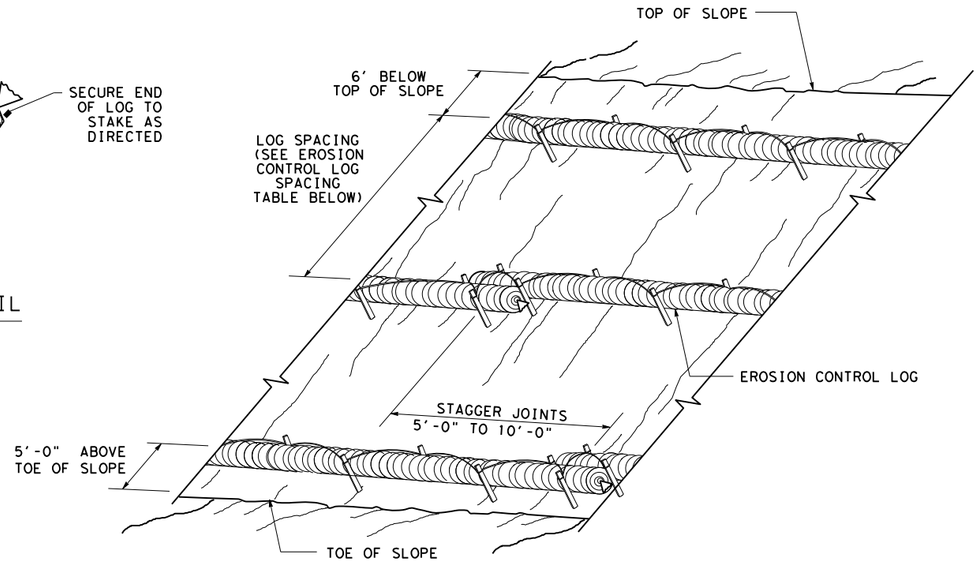
CL-SST



END SECTION RAP DETAIL

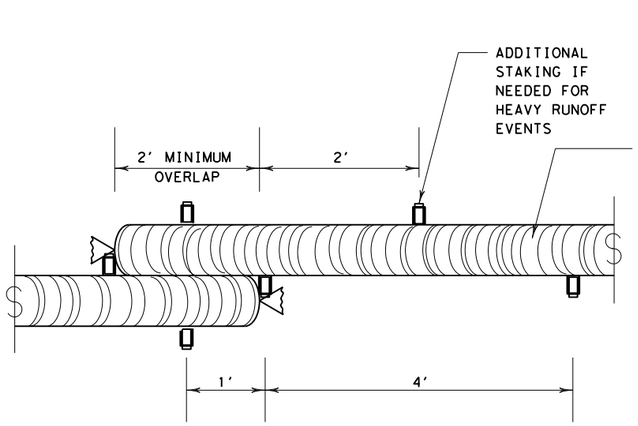
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

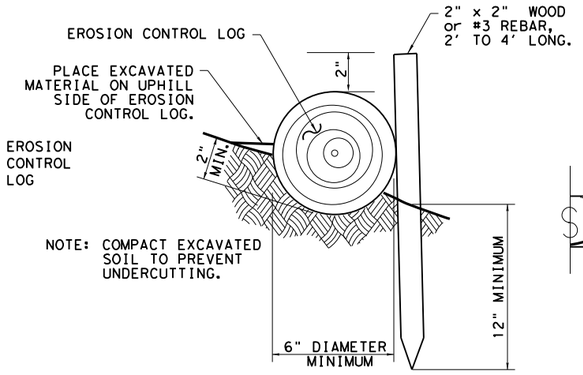
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

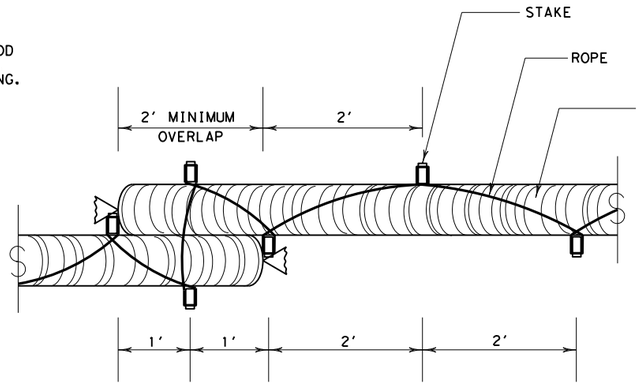


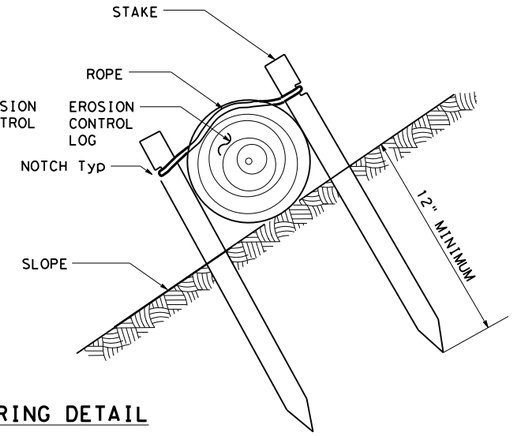


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

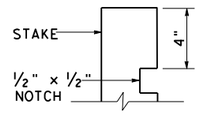
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



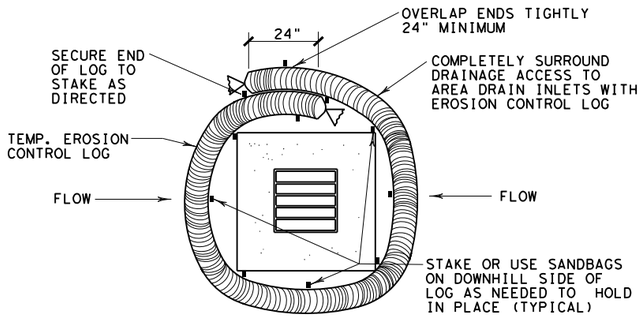
STAKE NOTCH DETAIL

Texas Department of Transportation | Design Division Standard

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

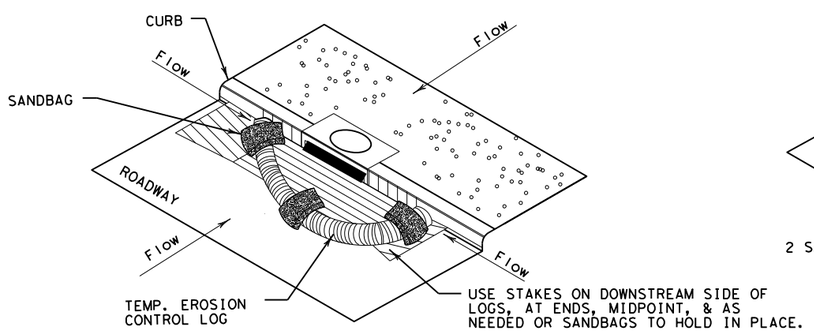
FILE: ec116	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0003	06	103		IH 20	
	DIST	COUNTY			SHEET NO.	
	ODA	REEVES			120	

DATE:
FILE:



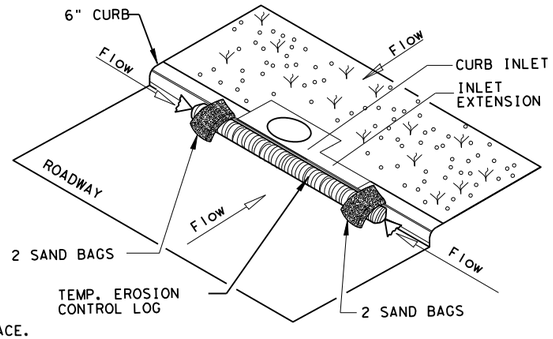
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

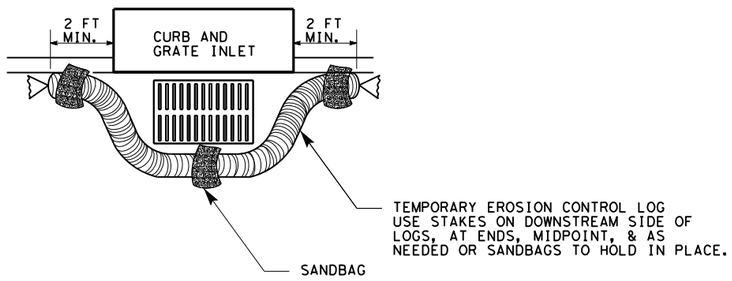
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

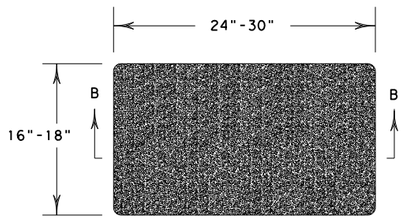
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0003	06	103		IH 20	
	DIST	COUNTY			SHEET NO.	
	ODA	REEVES			121	

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. Avoid harm to the Texas Horned Lizard if encountered in the project area and avoid Harvester Ant mounds where feasible.
2. Avoid harm to migratory birds eggs, and active nest:
   -Do not disturb, destroy, or remove active nests, including ground nesting birds, during the nesting season;
   -Inactivate nest and/or vegetation suspected to contain nests should be removed outside of nesting season (nesting season is typiccally March 15 to Septemper 15).

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

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0003	06	103	IH 20
	DIST	COUNTY		SHEET NO.
	ODA	REEVES		122