STATE AID PROJECT NO.			
C 922-00-75			
CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		1

DESIGN CRITERIA: SAFETY APPURTENANCES
A.D.T. (20XX): N/A
A.D.T. (20XX): N/A
% TRUCK IN ADT: N/A
FUNCTIONAL CLASS: N/A
DESIGN SPEED: N/A
TDLR REQUIRED: NO

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
SEE SHEET 2	

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

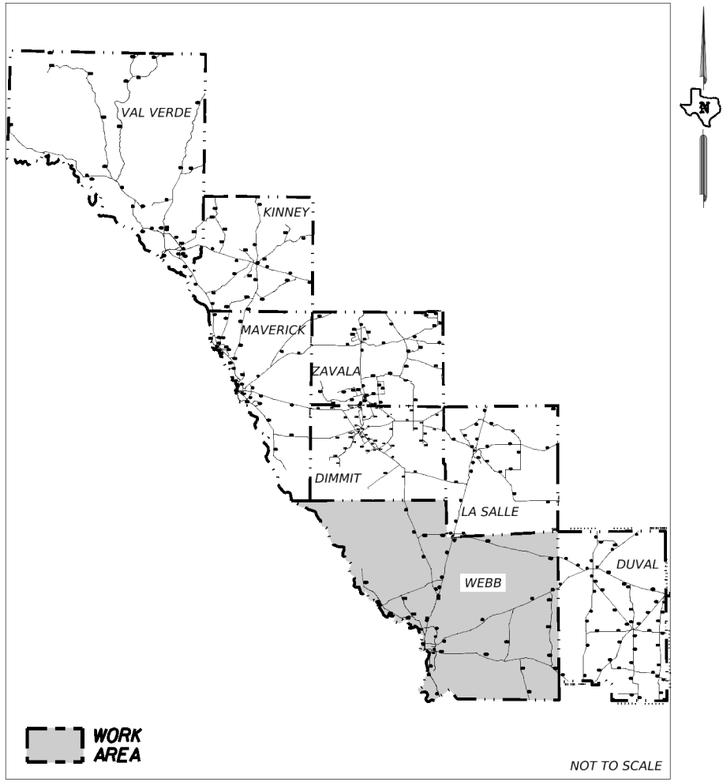
STATE AID PROJECT NO. C 922-00-75

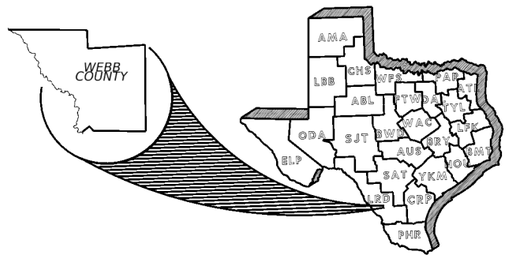
VARIOUS HIGHWAYS
WEBB
CSJ: 0922-00-075

NET LENGTH OF ROADWAY = 0.00 FT. = 0.000 MI.
NET LENGTH OF BRIDGE = 1,677.00 FT. = 0.318 MI.
NET LENGTH OF PROJECT = 1,677.00 FT. = 0.318 MI.

LIMITS: FROM: DISTRICTWIDE
TO: ----------

FOR THE CONSTRUCTION OF REMOVE & REPLACEMENT OF BRIDGE PROTECTION
CONSISTING OF UPGRADING STRUCTURE BRIDGE RAIL, INSTALLING SAFETY END TREATMENT, MBGF & SGT





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

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

FINAL PLANS

LETTING DATE: _____

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS COMPLETED & ACCEPTED: _____

FINAL CONTRACT COST: $ _____

CONTRACTOR : _____

FINAL AS BUILTS

THE CONSTRUCTION WAS PERFORMED UNDER MY SUPERVISION IN ACCORDANCE WITH THE PLANS AND CONTRACT

_____
AREA ENGINEER

_____
DATE

Texas Department of Transportation

SUBMITTED FOR LETTING: 1/29/2024
DocuSigned by: Rogelio Chapa
307945B8A8784F3...
TRANSPORTATION ENGINEER

RECOMMENDED FOR LETTING: 1/30/2024
DocuSigned by:
A54CD9F7317...
AREA ENGINEER

RECOMMENDED FOR LETTING: 1/30/2024
DocuSigned by: Roberto Rodriguez III
B6BED6A1058648E...
DISTRICT DIRECTOR OF TRANSPORTATION
PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: 1/30/2024
DocuSigned by:
A5A9883ED1E4F7...
DISTRICT ENGINEER

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

DocuSigned by:
Rogelio Chapa, P.E.
307945B8A8784F3...

1/31/2024
DATE

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

INDEX OF SHEETS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		2

DATE: 1/31/2024 4:47:31 PM
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PROJECT REFERENCE INFORMATION

COUNTY	LOCATION NUMBER	BRIDGE PSN#	FEATURE CROSSING	HWY	DESCRIPTION	BRIDGE TYPE	APPROX. REFERENCE MARKER	PROPOSED WORK LT SIDE	PROPOSED WORK RT SIDE	BRIDGE LENGTH FEET
WEBB	1	222400001806082	DRAINAGE DITCH	IH 35 NB ON RAMP	4 BOX CONCRETE BOX (5' W X 5' H X 148') WITH 75° RIGHT FORWARD SKEW	CULVERT	3 +0.268	MBGF	MBGF	89.00
	2	222400001806076	EAST FORK MANADAS CREEK	IH 35 EFR/WFR	4 BOX CONCRETE CULVERT (10' W X 10' H X 254') WIDENED WITH (12' W X 10' H), VARIABLE SKEW	CULVERT	5 +0.699	LOW-FILL	MBGF	53.00
	3	222400001806034	DRAW	IH 35 EFR/WFR	3 BOX CONCRETE CULVERT (8' X 7' X 282') VARIABLE SKEW	CULVERT	10 +0.956	MBGF	MBGF	26.00
	4	222400001805068	DRAW	IH 35 EFR	3 BOX CONCRETE CULVERT (6' X 3' X 375') 45º L.F. SKEW	CULVERT	15 +0.498	N/A	BCS	28.00
	5	222400001805067	DRAW	IH 35 EFR	3 BOX CONC CULVERT (8' X 8' X 268') NO SKEW	CULVERT	16 +0.891	N/A	LOW-FILL	27.00
	6	222400001804153	WEBB INTERCHANGE	IH 35 NBML	3 SIMPLE P.S. CONCRETE GIRDER SPANS ON CONCRETE CAPS, COLUMNS & DRILLED SHAFTS, NO SKEW	SPAN	21 +0.421	HSS	HSS	130.00
	7	222400001804154	CALLAGHAN INTERCHANGE	IH 35 SBML	3 SIMPLE P.S. CONC GIRDER SPANS ON CONC CAPS, COLUMNS & DRILLED SHAFTS, NO SKEW	SPAN	27 +0.396	HSS	HSS	130.00
	8	222400215003015	DRAINAGE DITCH	FM 1472	4 - 7' x 4' Concrete Multiple Box Culvert	CULVERT	414 +1.831	MBGF	MBGF	31.00
	9	222400215003014	LLAVE CREEK	FM 1472	3 - 10' x 6' Concrete Multiple Box Culvert	CULVERT	416 +0.264	MBGF	MBGF	34.00
	10	222400215003009	DRAW	FM 1472	4 - 8' x 6' Concrete Multiple Box Culvert at 45° Right Forward Skew	CULVERT	418 +1.214	LOW-FILL	LOW-FILL	48.00
	11	222400215003010	SANTO TOMAS CREEK	FM 1472	3 Simple Span Concrete Pan Girder Bridge on Concrete Bents	SPAN	420 +0.983	T631	T631	120.00
	12	222400215003011	DRAW	FM 1472	5 - 6' x 5' Concrete Multiple Box Culvert	CULVERT	422 +0.155	MBGF	MBGF	34.00
	13	222400215004022	DRAW	FM 1472	6 BOX CONCRETE CULVERT (6' W X 4' H X 113') NO SKEW	CULVERT	438 +0.969	C221w/HSS	C221w/RAC	39.00
	14	222400298802003	CALICHE CREEK	FM 2895	2 BOX CONC CULVERT (10' X 10' X 41.3') NO SKEW	CULVERT	620 +0.814	LOW-FILL	LOW-FILL	22.00
	15	222400298802004	DRAW	FM 2895	2 BOX CONC CULVERT (10' X 10' X 41.3') NO SKEW	CULVERT	620 +0.893	LOW-FILL	LOW-FILL	22.00
	16	222400298802002	DRAW	FM 2895	4 BOX CONC CULVERT (3 - 6' X 6' & 1 - 10' X 6' X 37.3')	CULVERT	622 +0.276	LOW-FILL	LOW-FILL	32.00
	17	222400298802005	GATO CREEK	FM 2895	3 BOX CONC CULVERT (6' X 5' & 1 - 54 IN. DIAMETER CURRUGATED METAL PIPE X 43.3')	CULVERT	626 +0.349	LOW-FILL	LOW-FILL	27.00
	18	222400298802006	DRAW	FM 2895	4 BOX CONC CULVERT (6' X 4' X 45.3') NO SKEW	CULVERT	628 +1.016	BCS	BCS	27.00
	19	222400298802001	REISER CREEK	FM 2895	4 BOX CONC CULVERT (6' X 6' X 41.3') NO SKEW	CULVERT	632 +1.798	LOW-FILL	LOW-FILL	28.00
	20	222400008614005	DRAW	LP 20 FRTG	11 BOX PRECAST CONCRETE CULVERT (10- 10' x 7' x 430.4' and 1- 6' x 4' x 430.4') 30° L.F. SKEW	CULVERT	422 -0.096	C221 w/RAC	C221 w/RAC	136.00
	21	222400008614182	DRAIN	LP 20 FRTG	7 BOX PRECAST CONCRETE CULVERT (10' X 7' X 392') 15º L.F. SKEW	CULVERT	422 -2.413	C221 w/RAC	C221 w/RAC	78.00
	22	222400001804065	DRAW	IH35 WFR	3 BOX CONC CULVERT (9' X 8' X 316') 7º L.F. SKEW	CULVERT	21+0.842	T631	N/A	30.00
	23	222400001804064	DRAW	IH35 WFR	4 BOX CONC CULVERT (10' X 7' X 259') NO SKEW	CULVERT	22+0.278	T631	N/A	43.00
	24	222400001804062	DRAW	IH35 WFR	3 BOX CONC CULVERT (8' X 6' X 261') NO SKEW	CULVERT	24+0.905	T631	N/A	26.00
	25	222400001804061	DRAW	IH35 WFR	4 BOX CONC CULVERT (9' X 5' X 264') NO SKEW	CULVERT	25+0.071	T631	N/A	39.00
	26	222400001804060	DRAW	IH35 WFR	4 BOX CONC CULVERT (10' X 8' X 257') NO SKEW	CULVERT	25+0.626	T631	N/A	43.00
	27	222400001804059	DRAW	IH35 WFR	3 BOX CONC CULVERT (7' X 4' X 243') NO SKEW	CULVERT	25+0.342	T631	N/A	23.00
	28	222400001803056	DRAW	IH35 WFR	3 BOX CONC CULVERT (8' X 5' X 269') NO SKEW	CULVERT	29+0.414	T631	N/A	26.00
	29	222400001803055	DOLORES CREEK	IH35 WFR	4 BOX CONC CULVERT (9' X 9' X 261') NO SKEW	CULVERT	29+0.756	T631	N/A	39.00
	30	222400001803054	DRAW	IH35 WFR	5 BOX CONC CULVERT (8' X 4' X 253') NO SKEW	CULVERT	30+0.436	T631	N/A	43.00
	31	222400001803053	DRAW	IH35 WFR	4 BOX CONC CULVERT (9' X 9' X 254') NO SKEW	CULVERT	31+0.392	T631	N/A	39.00
	32	222400001803052	DRAW	IH35 WFR	3 BOX CONC CULVERT (10' X 9' X 254') NO SKEW	CULVERT	31+0.577	T631	N/A	33.00
	33	222400001803051	DRAW	IH35 WFR	4 - 10' x 8' x 258' MBC	CULVERT	31+0.739	T631	N/A	43.00
	34	222400001803050	DRAW	IH35 WFR	3 - 7' x 4' x 255' MBC	CULVERT	33+0.457	T631	N/A	23.00
	35	222400001803049	DRAW	IH35 WFR	3 - 7' x 4' x 255' MBC	CULVERT	33+0.752	T631	N/A	23.00
	36	222400001803047	DRAW	IH35 WFR	4 - 10' x 6' x 255' MBC	CULVERT	36+0.121	T631	N/A	43.00
					TOTAL					1,677.00

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
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2/1/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

PROJECT LOCATION REFERENCE

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		3

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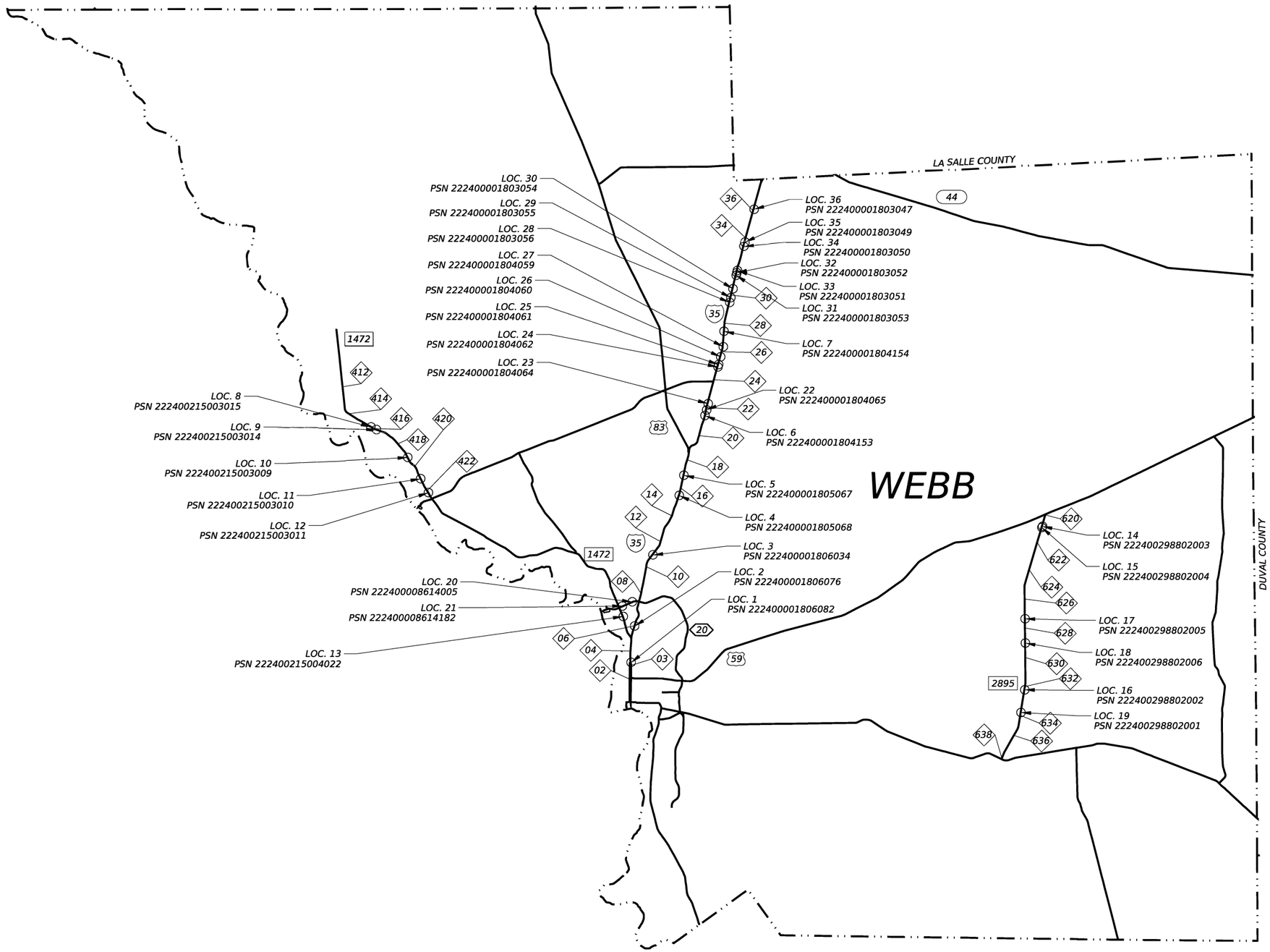

LEGEND

○ EXISTING BRIDGE

N

0 20,000 40,000

SCALE IN FEET

NOTES:
REFER TO "PROJECT LOCATION REFERENCE" SHEET FOR MORE PROJECT INFORMATION NOT SHOWN.

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
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DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

WEBB COUNTY

NOT TO SCALE

Texas Department of Transportation

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LOCATION MAP

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		4

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BRIDGE LOCATION INFORMATION

COUNTY	LOCATION NUMBER	BRIDGE PSN#	HWY	BRIDGE LOCATION	APPROX. REFERENCE MARKER	LATITUDE	LONGITUDE	BRIDGE LENGTH FEET
WEBB	1	222400001806082	IH 35 NB ON RAMP	1.10 MI N OF US 59	3 +0.268	27°32'48.02"N	99°30'11.11"W	89.00
	2	222400001806076	IH 35 EFR/WFR	0.85 MI N OF FM 1472	5 +0.699	27°34'59.41"N	99°29'57.53"W	53.00
	3	222400001806034	IH 35 EFR/WFR	3.40 MI N OF LP 20	10 +0.956	27°39'16.60"N	99°28'44.45"W	26.00
	4	222400001805068	IH 35 EFR	7.95 MI N OF LP 20	15 +0.498	27°42'51.65"N	99°26'58.29"W	28.00
	5	222400001805067	IH 35 EFR	1.65 MI S OF US 83	16 +0.891	27°44'4.63"N	99°26'39.99"W	27.00
	6	222400001804153	IH 35 NBML	2.80 MI N OF US 83	21 +0.421	27°47'40.71"N	99°25'15.05"W	130.00
	7	222400001804154	IH 35 SBML	8.90 MI N OF US 83	27 +0.396	27°52'45.77"N	99°23'59.78"W	130.00
	8	222400215003015	FM 1472	26.35 MI NW OF IH 35	414 +1.831	27°46'53.03"N	99°47'51.71"W	31.00
	9	222400215003014	FM 1472	25.90 MI NW OF IH 35	416 +0.264	27°46'43.46"N	99°47'29.06"W	34.00
	10	222400215003009	FM 1472	22.90 MI NW OF IH 35	418 +1.214	27°45'3.53"N	99°45'21.14"W	48.00
	11	222400215003010	FM 1472	21.15 MI NW OF IH 35	420 +0.983	27°43'47.29"N	99°44'28.79"W	120.00
	12	222400215003011	FM 1472	20.00 MI NW OF IH 35	422 +0.155	27°42'57.29"N	99°43'56.97"W	34.00
	13	222400215004022	FM 1472	1.75 MI NW OF IH 35	438 +0.969	27°35'34.29"N	99°30'44.45"W	39.00
	14	222400298802003	FM 2895	0.85 MI S OF US 59	620 +0.814	27°41'3.07"N	99° 2'25.24"W	22.00
	15	222400298802004	FM 2895	0.95 MI S OF US 59	620 +0.893	27°40'59.21"N	99° 2'26.73"W	22.00
	16	222400298802002	FM 2895	12.50 MI S OF US 59	622 +0.276	27°31'12.92"N	99° 3'35.99"W	32.00
	17	222400298802005	FM 2895	7.50 MI S OF US 59	626 +0.349	27°35'29.45"N	99° 3'34.55"W	27.00
	18	222400298802006	FM 2895	9.20 MI S OF US 59	628 +1.016	27°34'1.90"N	99° 3'33.36"W	27.00
	19	222400298802001	FM 2895	14.05 MI S OF US 59	632 +1.798	27°29'50.98"N	99° 3'51.18"W	28.00
	20	222400008614005	LP 20 FRTG	0.50 MI W OF IH 35	422 -0.096	27°36'27.24"N	99°30'7.81"W	136.00
	21	222400008614182	LP 20 FRTG	1.25 MI W OF IH 35	422 -2.413	27°36'11.90"N	99°30'47.89"W	78.00
	22	222400001804065	IH35 WFR	3.35 MI N OF US 83	21+0.842	27° 48' 2.16'' N	99° 25' 9.24'' W	30.00
	23	222400001804064	IH35 WFR	3.80 MI N OF US 83	22+0.278	27° 48' 24.48'' N	99° 25' 3.27'' W	43.00
	24	222400001804062	IH35 WFR	6.40 MI N OF US 83	24+0.905	27° 50' 36.99'' N	99° 24' 23.55'' W	26.00
	25	222400001804061	IH35 WFR	6.60 MI N OF US 83	25+0.071	27° 50' 45.63'' N	99° 24' 21.00'' W	39.00
	26	222400001804060	IH35 WFR	7.15 MI N OF US 83	25+0.626	27° 51' 13.47'' N	99° 24' 12.66'' W	43.00
	27	222400001804059	IH35 WFR	7.85 MI N OF US 83	25+0.342	27° 51' 49.80'' N	99° 24' 2.25'' W	23.00
	28	222400001803056	IH35 WFR	8.85 MI S OF LASALLE C/L	29+0.414	27° 54' 30.17'' N	99° 23' 36.77'' W	26.00
	29	222400001803055	IH35 WFR	8.55 MI S OF LASALLE C/L	29+0.756	27° 54' 47.50'' N	99° 23' 32.15'' W	39.00
	30	222400001803054	IH35 WFR	7.90 MI S OF LASALLE C/L	30+0.436	27° 55' 19.59'' N	99° 23' 23.64'' W	43.00
	31	222400001803053	IH35 WFR	6.95 MI S OF LASALLE C/L	31+0.392	27° 56' 8.19'' N	99° 23' 10.63'' W	39.00
	32	222400001803052	IH35 WFR	6.75 MI S OF LASALLE C/L	31+0.577	27° 56' 17.55'' N	99° 23' 8.14'' W	33.00
	33	222400001803051	IH35 WFR	6.55 MI S OF LASALLE C/L	31+0.739	27° 56' 25.75'' N	99° 23' 5.98'' W	43.00
	34	222400001803050	IH35 WFR	4.85 MI S OF LASALLE C/L	33+0.457	27° 57' 53.36'' N	99° 22' 39.67'' W	23.00
	35	222400001803049	IH35 WFR	4.55 MI S OF LASALLE C/L	33+0.752	27° 58' 8.28'' N	99° 22' 35.16'' W	23.00
	36	222400001803047	IH35 WFR	2.15 MI S OF LASALLE C/L	36+0.121	28° 0' 6.80'' N	99° 21' 58.68'' W	43.00

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
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DocuSigned by:
Rogelio Chapa
307945B8A8784F3...

2/1/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

LOCATION MAP

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS

DIST	COUNTY	SHEET NO.
22	WEBB	5

DATE: 2/1/2024 3:08:37 PM
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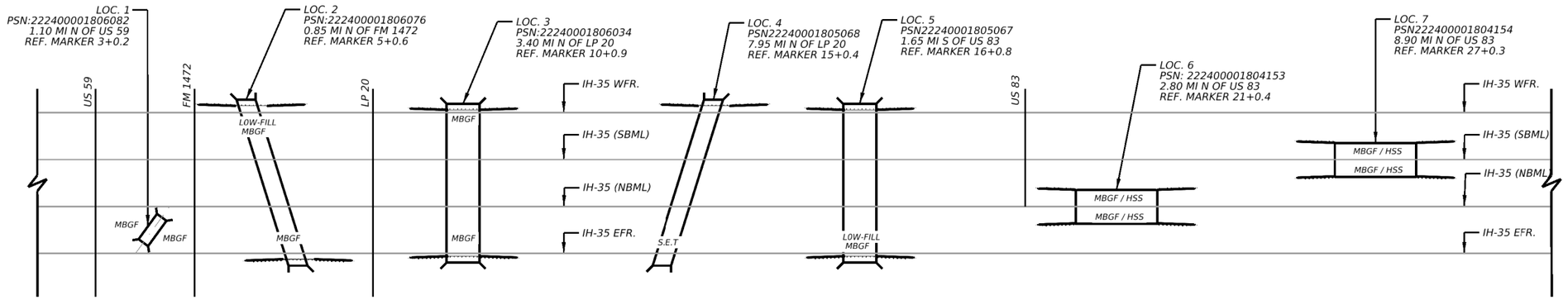
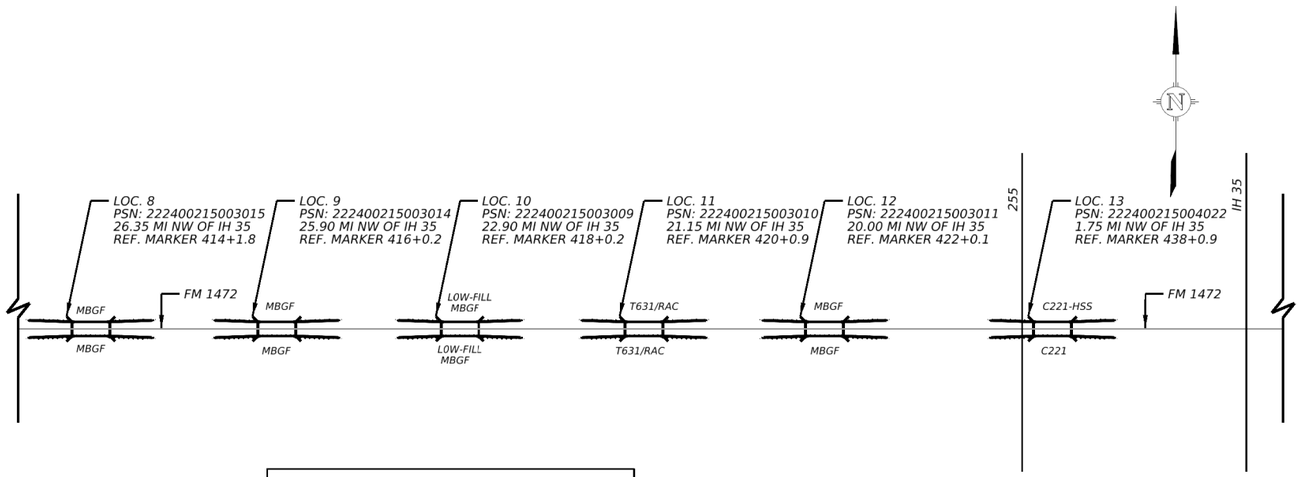
LEGEND

- BRIDGE

- METAL BEAM GUARD FENCE



CSJ: 0922-00-075 (IH 35)
WEBB LOCATIONS 1-7



CSJ: 0922-00-075 (FM 1472)
WEBB LOCATIONS 8-13

NOT TO SCALE

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
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DocuSigned by:
Rogelio Chapa
3079A5B8A8784F3...
1/30/2024

Texas Department of Transportation

IH 35, ETC

DIAGRAMMATIC LAYOUT

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		6

DATE: 1/30/2024 3:20:47 PM
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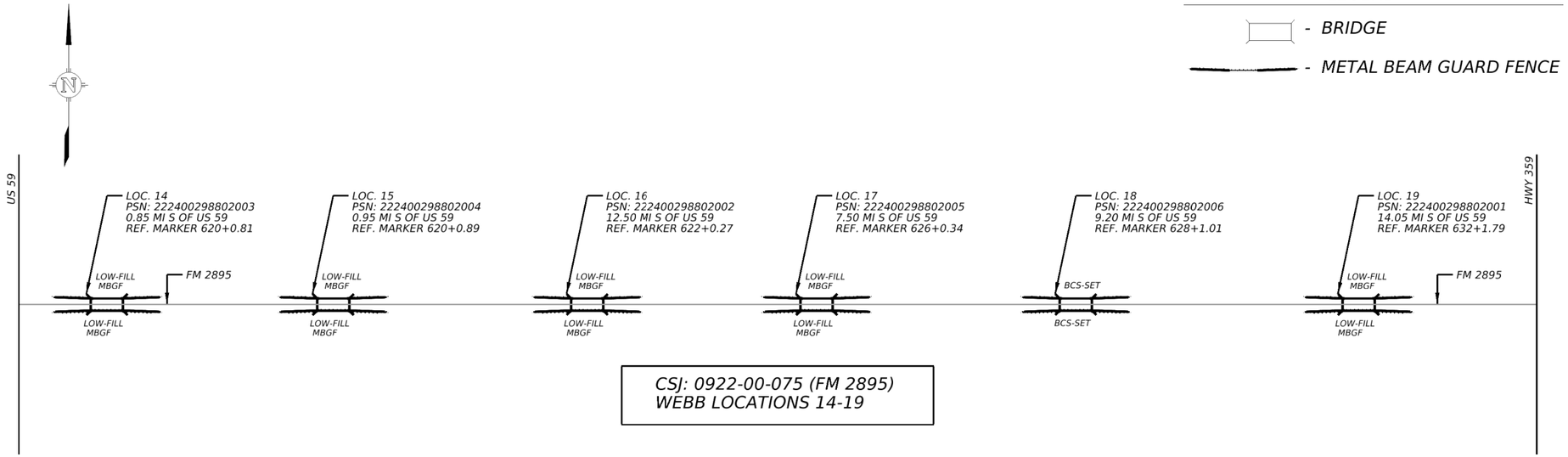
LEGEND

- BRIDGE

- METAL BEAM GUARD FENCE



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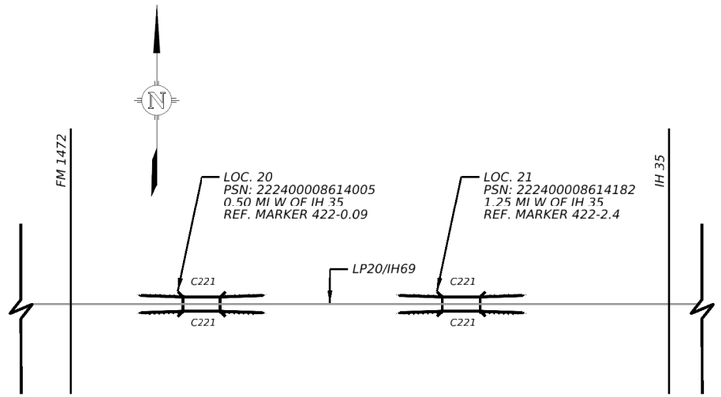
WEBB LOCATIONS 14-19



CSJ: 0922-00-075 (LP20 FRTG)
WEBB LOCATIONS 20-21

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
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PROFESSIONAL ENGINEER

DocuSigned by:
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1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

DIAGRAMMATIC LAYOUT

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		7

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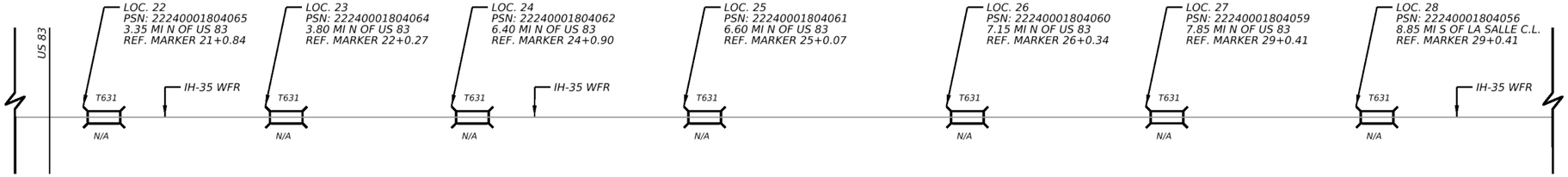
LEGEND

- BRIDGE
- METAL BEAM GUARD FENCE



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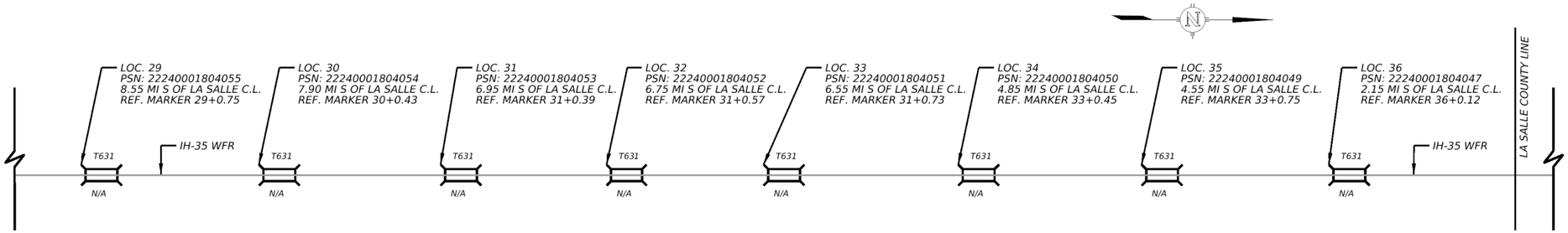

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WEBB LOCATIONS 29-36

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

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1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

DIAGRAMMATIC LAYOUT

SHEET 3 OF 3

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		8

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

Project Manager – Rogelio.Chapa@txdot.gov

Angel Martinez – Angel.Martinez@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 webpage 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 Contractor shall maintain and preserve the integrity of all “existing survey markers” by avoiding the disturbance of such markers, which include all control points (horizontal and/or vertical), stakes, marks, and right-of-way markers. The Department will repair all Contractor disturbed control points, stakes, marks, and right-of-way markers. The cost for any and all repairs to the “existing survey markers” will be deducted from money due or to become due to the Contractor. Prior to construction must call 811 to verify any utilities located within project limits. Contractor will also coordinate with utility owners listed below for any adjustments needed to sanitary sewer manholes, water valves, gas valve, telecommunication, television manhole located within project limits. The utility company is responsible for any adjustment when necessary. The work should be performed in a manner as to not delay construction contractor work activity.

Contractor will make necessary arrangements with the utility owner(s) when utility adjustments are required, as a result of construction activities.

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with “Standard Operating Procedure for Alternate Precast Proposal Submission” found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design.
Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

To comply with the latest provisions of Build America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit a notarized original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product.

Refer to the Buy America Material Classification Sheet for clarification on material categorization.

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

No significant traffic generator events identified.

Roadway closures during the following key dates and/or special events are prohibited (list the dates and events road closures will be prohibited).

Jurisdictional Waters of the United States and Project Specific Locations (PSL) Coordination - This project requires permit(s) with environmental resource agencies. There is a high probability that environmentally sensitive areas will be encountered on contractor designated project specific locations (PSLS) for the project (including but not limited to haul roads, equipment staging areas, parking areas, etc.).
Requirements for Work within Jurisdictional Waters of the United States:
The department has been authorized to perform work within designated areas of the project under U.S. Army Corps of Engineers (USACE) nationwide permit (NWP) #14 and/or #3a and/or #3b.

The contractor will not initiate activities in a project specific location (PSL) associated with a U.S. Army Corps of Engineers (USACE) permit area (i.e. an area where the USACE has jurisdiction) that has not been previously evaluated by the USACE as part of the permitting for this project. Such activities include, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Associated defined here includes materials delivered to or from the PSL. The permit area includes all waters of the U.S. and their associated wetlands affected by activities associated with this project. Special restrictions may be required for such work in these USACE jurisdictional areas. The contractor will be responsible for any and all consultations with the USACE regarding activities, including PSLs, which have not been previously evaluated by the USACE. The Contractor will provide the department with a copy of all consultation(s) or approval(s) from the USACE prior to initiating activities.

The contractor may proceed with activities in PSLs that do not affect a USACE permit area if a self-determination has been made that the PSL is non-jurisdictional or proper USACE clearances have been obtained in jurisdictional areas or have been previously evaluated by the USACE as part of the permit review of this project. The contractor is solely responsible for documenting any determination(s) that their activities do not affect a USACE permit area. The contractor will maintain copies of their determination(s) for review by the department and/or any regulatory agency.

The disturbed area for all project locations in the Contract, and the Contractor project specific locations (PSLs) within 1 mile of the project limits for the Contract, will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the ROW. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, the Contractor shall provide a copy of the Contractor Notice of Intent (NOI) for the PSLs to the Engineer and to the local government operating a municipal separate storm sewer system (MS4) if applicable. If the total area of project disturbed areas and PSLs total between 1-acre but less than 5-acres, the Contractor shall post the appropriate Contractor Construction Site Notice for all Contractor PSLs to be in compliance with TCEQ storm water regulations.

In order to expedite the approval process for PSLs or to eliminate or minimize potential impacts to project progress, initiate coordination efforts with the U.S.A.C.E. within 30 days from the date of “authorization to begin work” for all

PSLs that are in areas where the USACE has jurisdiction (i.e. USACE permit areas). If this is not done, the contractor waives the right to request any contract time considerations if project progress is impacted and PSL’S approval is still pending.

Requests submitted to the area engineer will be evaluated on this basis and will require documentation showing substantial early coordination efforts to expedite the approval process as herein stated. The request will include a detailed chronological summary status with dates of coordination activities with the resource agencies, including those occurring after the initial coordination, to be reviewed and confirmed by the district’s environmental section.

For PSLs that fall within USACE permit areas, the Contractor must document and coordinate with the USACE, if required, before any excavation hauled from or embankment hauled into a USACE permit area by either (1) or (2) below.

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

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

Storm Water Regulations Requirements:
The Contractor shall be responsible for (off ROW) PSLs applicable to the TCEQ Construction General Permit (CGP) requirements and will notify the Engineer of the disturbed acreage within one (1) mile of the project limits. The Contractor shall obtain any required authorization form the TCEQ for any Contractor PSLs for construction support activities on or off ROW.

The total disturbed areas within the ROW are anticipated at less than one (1) acre and/or this project is classified as "surface work" consisting of an asphalt overlay of an existing roadway without shoulder-up disturbances. Due to this type of construction, the project qualifies for exclusion under the *Construction General Permit* (CGP) issued by the Texas Commission on Environmental Quality (TCEQ) on March 5, 2018 and amended on January 28, 2022. However, should the sum of the Engineer's anticipated disturbances and all of the Contractor's (On ROW and off ROW) PSLs equal or exceed the one (1) acre threshold, both TxDOT and the Contractor shall have project responsibilities under the CGP that reverts to non-exclusion status. To ensure project compliance with all applicable water quality regulations, the Contractor shall obtain Engineer approval for all non-depicted areas of disturbance that increases the Engineer's initial soil and vegetation disturbed area estimates before associated work operations start.

Item 8 - Prosecution and Progress

Before starting work, provide a sequence of work and estimated progress schedule meeting the requirements of Section 8.5.2, "Progress Schedule."

No closures will be allowed on the weekends which include the following holidays: January 1, the last Monday in May, July 4, the first Monday in September, the fourth Thursday in November, December 25 and Easter weekend.

Item 9 - Measurement and Payment

Coordinate and provide off-duty law enforcement officers with officially marked vehicles (if patrol cruisers are available from the enforcement agency involved) during the following operations: PTB Installation. For payment through TxDOT state force account method, complete the weekly tracking forms provided by the department and submit invoices that agree with the tracking form for payment at the end of each month approved services were provided.

Submit Material on hand (MOH) payment requests at least 5 working days prior to the end of the month for payment on that month's estimate. For out-of-town MOH submit requests at least 10 working days prior to the end of the month.

Item 134 - Backfilling Pavement Edges

TY "A" material will meet the following testing requirements:

Property	Test Method	Specification Limit
Liquid limit	Tex-104-E	≤45
Plasticity index (PI)	Tex-106-E	≤15
Bar linear shrinkage	Tex-107-E	≥2

Or as directed by the Engineer.

Item 420 - Concrete Substructures

Sulfate resistant concrete shall be used in all situations for concrete structures in contact with the natural ground.

Check the sign plans for locations of clearance signs and brackets on structures which will require inserts in the pre-stressed beams. Forward such locations to the beam fabricator.

Item 421 - Hydraulic Cement Concrete

Sulfate resistant cement concrete shall be used in all situations for structural elements in contact with the natural ground. These includes, but is not limited to, all reinforced concrete pipe, concrete box culverts, drill shafts, bridge columns, bridge abutments, wingwalls, approach slabs, inlets, manholes, junction boxes, ground boxes and all concrete riprap.

Air entrainment is not required. If concrete is supplied with air entrainment, the concrete must adhere to the requirements of item 421.4.2.4.

Item 496 - Removing Structures

The structure(s) to be removed have surface coatings which may contain hazardous materials. Provide for the safety and health of employees and abide by all OSHA Standards and Regulations.

Item 500 - Mobilization

"Materials-on-Hand" payments will not be considered in determining percentages used to compute mobilization payments.

Item 502 - Barricades, Signs, and Traffic Handling

Designate, as the Contractor Responsible Person (CRP), an English-speaking employee on-call nights and weekends (or any other time that work is not in progress) with a local address and telephone number for maintenance of signs and barricades. This employee will be located within one (1) hour of traveling time to the project site. Notify the Engineer in writing of the name, address and telephone number of this employee. Furnish this information to local law enforcement officials.

When advanced warning flashing arrow panel(s) is/are specified, maintain one standby unit in good condition at the job site ready for immediate use is required.

Provide two-way radios in areas where flagmen do not have visual contact with one another or cannot communicate with one another.

Limit lane closures to a maximum of 2 miles. If more than one lane closure location is desired, provide a minimum of a 2 mile passing zone between locations. Provide a separate sign set up for each location.

Ensure equipment not in use, stockpile aggregate, and other working materials are:
A minimum of 30 feet from the edge of the travel lane;
Do not obstruct traffic or sight distance;
Do not interfere with the access from abutting property; or
Do not interfere with roadway drainage.

Erect signs in locations not obstructing the traveling public's view of the normal roadway signing or necessary sight distance at intersections and curves.

During the holiday time frame of December 21st through January 1st, every effort should be taken to ensure that all travel lanes remain open where possible.

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be utilized for work zone enhancements, to improve the effectiveness of the Traffic Control Plan, that could not be foreseen in the project planning and design stage. These enhancements will be mutually agreed upon by

the Engineer and the Contractor's Responsible Person based on weekly or more frequent traffic management reviews on the project. The Engineer may choose to use existing bid items if it does not slow the implementation of enhancement.

Item 506 - Temporary Erosion, Sedimentation, and Environmental Controls

Concrete washout area(s) shall be installed prior to concrete placement on site. The concrete washout area(s) shall be entirely self-contained. Location must be Approved by the Engineer. Concrete washout area(s) are subsidiary to pertinent Items.

Item 512 - Portable Traffic Barrier

Do not use different types of Portable Traffic Barriers in a single continuous installation.

Place PTB at ½" GAP over SPAN BRIDGE DECKS for Expansion to AVOID THERMAL SLAB vs. PTB Extreme THERMAL Movement.

Item 540 – Metal Beam Guard Fence

Install cast-in place concrete curb Type II in the metal beam guard fence transition (Thrie-Beam Transition). Pre-cast concrete curb will not be allowed.

Item 542 – Removing Metal Beam Guard Fence

Salvageable material consisting of W-Beams, Block Outs, and Thrie-Beams to be delivered to TxDOT Laredo District Headquarters yard.
1817 Bob Bullock Loop, Laredo, TX 78043

Item 658 – Delineator and Object Marker Assemblies

Proposed delineators for this project will consist of oval shape tube flexible post with a quick release embedded anchor insert stub only, such as Flexstake Inc. – 650 series or Shur-Tite – SD series or equal flexible driveable delineators.

Provide and place delineator Type 1, 2, 3, 4, object markers/chevrons and large arrows signs project 4' or 7' above the pavement surface and not the ground line. (Provide adequate length for proper anchor and projection above ground line).

Project Number: **Sheet** **Sheet 9D**

County: Webb **Control:** 0922-00-075

Highway: Various

Item 6001 - Portable Changeable Message Sign

Provide two (2) electronic portable changeable message signs as required by the Engineer. Provide backups and keep operational and available on the jobsite at all times during traffic control operations. The electronic portable changeable message signs will be made available for utilization for the entire duration of the project, including all alternative locations.

Item 6185 – Truck Mounted Attenuator (TMA) and Trailer

Provide 1 Truck Mounted Attenuator as required by the Engineer. Provide backup and keep operational and available on the jobsite at all times during traffic control operations. The Truck Mounted Attenuator will be made available for utilization for the entire duration of the project, including all alternative locations.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0922-00-075 **DISTRICT** Laredo **COUNTY** Webb
HIGHWAY Various

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0922-00-075**			
		PROJECT ID		**A00189827**			
		COUNTY		**Webb**			
		HIGHWAY		**Various**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	104-6028	REMOVING CONC (MISC)	SY	14.000		14.000	
	104-6054	REMOVING CONCRETE(MOW STRIP)	LF	1,025.000		1,025.000	
	132-6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	30.000		30.000	
	134-6001	BACKFILL (TY A)	STA	172.000		172.000	
	158-6002	SPEC EXCAV WORK (BACKHOE)	HR	98.000		98.000	
	420-6136	CL C CONC (RAC-R)	CY	101.000		101.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY	31.300		31.300	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	640.000		640.000	
	451-6019	RETROFIT RAIL (TY T631)	LF	862.500		862.500	
	451-6031	RETROFIT RAIL (TY C221)	LF	487.000		487.000	
	451-6048	RETROFIT RAIL (ADD HSS)	LF	592.000		592.000	
	451-6052	RETROFIT RAIL (ADD PEDESTRIAN HSS)	LF	69.000		69.000	
	467-6219	SET (TY I)(S= 6 FT)(HW= 5 FT)(4:1) (C)	EA	11.000		11.000	
	480-6001	CLEAN EXIST CULVERTS	EA	33.000		33.000	
	496-6005	REMOV STR (WINGWALL)	EA	3.000		3.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	24.000		24.000	
	506-6003	ROCK FILTER DAMS (INSTALL) (TY 3)	LF	709.000		709.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	709.000		709.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	413.000		413.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	413.000		413.000	
	506-6030	BACKHOE WORK (EROSION & SEDMT CONT)	HR	8.000		8.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	240.000		240.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	240.000		240.000	
	510-6001	ONE-WAY TRAF CONT (FLAGGER CONT)	HR	1,152.000		1,152.000	
	510-6004	ONE-WAY TRAFFIC CONTROL (PORT TRAF SIG)	DAY	100.000		100.000	
	512-6089	PTB(FRN&INSTL)(SSCB OR CSB)(TY1)OR(STL)	LF	120.000		120.000	
	512-6090	PTB(MOVE)(SSCB OR CSB)(TY1)OR(STL)	LF	5,040.000		5,040.000	
	512-6091	PTB(REMOVE)(SSCB OR CSB)(TY1)OR(STL)	LF	120.000		120.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	12,812.500		12,812.500	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	19.000		19.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	16.000		16.000	
	540-6020	MTL W - BEAM GD FEN (LOW FILL CULVERT)	LF	450.000		450.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	8,825.000		8,825.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA	44.000		44.000	
	542-6003	REMOVE DOWNSTREAM ANCHOR TERMINAL	EA	1.000		1.000	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	5.000		5.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0922-00-075 **DISTRICT** Laredo **COUNTY** Webb
HIGHWAY Various

			CONTROL SECTION JOB		**0922-00-075**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00189827**		
			COUNTY		**Webb**		
			HIGHWAY		**Various**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	83.000		83.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	26.000		26.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	84.000		84.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA	2.000		2.000	
	545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	2.000		2.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	489.000		489.000	
	658-6100	INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)	EA	144.000		144.000	
	662-6050	WK ZN PAV MRK REMOV (REFL) TY II-A-A	EA	800.000		800.000	
	662-6067	WK ZN PAV MRK REMOV (W)6"(SLD)	LF	9,880.000		9,880.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	312.000		312.000	
	662-6098	WK ZN PAV MRK REMOV (Y)6"(SLD)	LF	32,000.000		32,000.000	
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	64.000		64.000	
	662-6110	WK ZN PAV MRK SHT TERM (TAB)TY Y	EA	988.000		988.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	480.000		480.000	
	08	CONTRACTOR FORCE ACCOUNT LAW ENFORCEMENT (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING)	LS	1.000		1.000	

SUMMARY OF MOBILIZATION ITEMS		
LOCATION - CSJ	500 6001 MOBILIZATION	502 6001 BARRICADES, SIGNS AND TRAFFIC HANDLING
	LS	MO
1 - 0922-00-075	1.00	24.00
PROJECT TOTALS	1	24

SUMMARY OF WORKZONE PAVEMENT MARKING ITEMS						
LOCATION - CSJ	662 6050 WK ZN PAV MRK REMOV (REFL) TY II-A-A	662 6067 WK ZN PAV MRK REMOV (W)6"(SLD)	662 6098 WK ZN PAV MRK REMOV (Y)6"(SLD)	662 6075 WK ZN PAV MRK REMOV (W)24"(SLD)	662 6110 WK ZN PAV MRK SHT TERM (TAB)TY Y	662 6109 WK ZN PAV MRK SHT TERM (TAB)TY W
	EA	LF	LF	LF	EA	EA
1 - 0922-00-075	800	9880	32000	312	988	64
PROJECT TOTALS	800	9880	32000	312	988	64

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS												
LOCATION - CSJ	510 6001 ONE-WAY TRAF CONT (FLAGGER CONT)	510 6004 ONE-WAY TRAFFIC CONTROL (PORT TRAF SIG)	512 6089 PTB(FRN&INSTL)(SSCB OR CSB)(TY1)OR (STL)	512 6090 PTB(MOVE)(SSCB OR CSB)(TY1)OR (STL)	512 6091 PTB(REMOVE)(SSCB OR CSB)(TY1)OR (STL)	6001 6002 PORTABLE CHANGEABLE MESSAGE SIGN	6185 6002 TMA (STATIONARY)	545 6003 CRASH CUSH ATTEN (MOVE & RESET)	545 6005 CRASH CUSH ATTEN (REMOVE)	545 6019 CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	658 6062 INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	658 6100 INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)
	HR	DAY	LF	LF	LF	EA	DAY	EA	EA	EA	EA	EA
1 - 0922-00-075	1152	100	120	5040	120	2	480	84	2	2	490	144
PROJECT TOTALS	1152	100	120	5040	120	2	480	84	2	2	490	144

STATE OF TEXAS
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NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

SUMMARY OF QUANTITIES

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		11

DATE: 1/30/2024 3:34:16 PM
FILE: c:\txdot\pw_online\txdot5\ricardo.gonzalez.jr\d0980956\075 summ qty.dgn

SUMMARY OF MBGF

BRIDGE LOCATIONS		432	134	540	540	542	540	542	542	542	544	544
		6045	6001	6001	6006	6003	6016	6001	6002	6004	6001	6003
		RIPRAP (MOW STRIP)(4 IN)	BACKFILL (TY A)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	REMOVE DOWNSTREAM ANCHOR TERMINAL	DOWNSTREAM ANCHOR TERMINAL SECTION	REMOVE METAL BEAM GUARD FENCE	REMOVE TERMINAL ANCHOR SECTION	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)
		CY	STA	LF	EA	EA	EA	LF	EA	EA	EA	EA
CSJ: 0922-00-075												
LOC. #	PSN:											
1	222400001806082	9.4	3.3	125			2	400	2		2	2
2	222400001806076	15.4	4.6	262.5			2	300	2		2	2
3	222400001806034	47.2	12.0	1000			2	1075	2		2	2
4	222400001805068	0	0.0					100	2			
5	222400001805067	11.5	3.0	200				175	2		2	
6	222400001804153	31.8	8.3	625	4		2	550		2	2	2
7	222400001804154	84.8	20.5	1850	4	1	2	1775		3	2	2
8	222400215003015	26.7	7.5	550							4	
9	222400215003014	47.2	12.3	1025				587.5			4	4
10	222400215003009	26.7	7.5	550							4	
11	222400215003010	26.7	7.5	550				100			4	4
12	222400215003011	19.1	5.8	375				500	4		4	
13	222400215004022	7	2.0	50	3		2				1	
14	222400298802003	33.1	8.0	700				550			2	4
15	222400298802004	28.8	7.0	600				550			2	4
16	222400298802002	24.5	7.0	500							4	
17	222400298802005	24.5	7.0	500							4	
18	222400298802006	0										
19	222400298802001	24.5	7.0	500							4	
20	222400008614005	11.3	3.5	150	4		2				2	
21	222400008614182	11.3	3.5	150	4		2				2	
22	222400001804065	8.3	2.3	125				150	2		2	
23	222400001804064	7.2	2.0	100				150	2		2	
24	222400001804062	8.3	2.3	125				150	2		2	
25	222400001804061	8.3	2.3	125				150	2		2	
26	222400001804060	8.3	2.3	125				150	2		2	
27	222400001804059	12.6	3.3	225				150	2		2	
28	222400001803056	9.4	2.5	150				125	2		2	
29	222400001803055	8.3	2.3	125				100	2		2	
30	222400001803054	7.2	2.0	100				150	2		2	
31	222400001803053	9.4	2.5	150				150	2		2	
32	222400001803052	9.4	2.5	150				137.5	2		2	
33	222400001803051	9.9	2.6	162.5				150	2		2	
34	222400001803050	7.8	2.1	112.5				150	2		2	
35	222400001803049	8.3	2.3	125				150	2		2	
36	222400001803047	8.3	2.3	125				150	2		2	
TOTAL		643	173	12,287.5	19	1	16	8,825	44	5	83	26

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IH 35, ETC

SUMMARY OF QUANTITIES

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		12

SUMMARY OF BRIDGE ITEMS								
LOCATION - PSN		451 6019	451 6031	540 6020	451 6048	467 6219	540 6001	451 6052
		RETROFIT RAIL (TY T631)	RETROFIT RAIL (TY C221)	MTL W - BEAM GD FEN (LOW FILL CULVERT)	RETROFIT RAIL (ADD HSS)	SET (TY I)(S= 6 FT)(HW= 5 FT)(4:1) (C)	MTL W-BEAM GD FEN (TIM POST)	RETROFIT RAIL (ADD PEDESTRIAN HSS)
		LF	LF	LF	LF	EA	LF	LF
1	222400001806082						275	
2	222400001806076			50			50	
3	222400001806034						50	
4	222400001805068					3		
5	222400001805067			25				
6	222400001804153				296			
7	222400001804154				296			
8	222400215003015						75	
9	222400215003014						75	
10	222400215003009			100				
11	222400215003010	250						
12	222400215003011						75	
13	222400215004022		59					69
14	222400298802003			50				
15	222400298802004			50				
16	222400298802002			75				
17	222400298802005			50				
18	222400298802006					8		
19	222400298802001			50				
20	222400008614005		272					
21	222400008614182		156					
22	222400001804065	37.5						
23	222400001804064	50						
24	222400001804062	37.5						
25	222400001804061	50						
26	222400001804060	50						
27	222400001804059	25						
28	222400001803056	25						
29	222400001803055	50						
30	222400001803054	50						
31	222400001803053	50						
32	222400001803052	37.5						
33	222400001803051	50						
34	222400001803050	25						
35	222400001803049	25						
36	222400001803047	50						
PROJECT TOTALS		862.5	487	450	592	11	600	69

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SUMMARY OF QUANTITIES

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		13

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SUMMARY OF EROSION CONTROL ITEMS							
LOCATION - PSN	506	506	506	506	506	506	506
	6003	6011	6020	6024	6030	6038	6039
	ROCK FILTER DAMS (INSTALL) (TY 3)	ROCK FILTER DAMS (REMOVE)	CONSTRUCT ION EXITS (INSTALL) (TY 1)	CONSTRUCT ION EXITS (REMOVE)	BACKHOE WORK (EROSION & SEDMT CONT)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
	LF	LF	SY	SY	HR	LF	LF
4	48	48	77	77	1	80	80
13	59	59	79	79	1	40	40
18	94	94	84	84	2	40	40
20	312	312	86	86	2	40	40
21	196	196	87	87	2	40	40
PROJECT TOTALS	709	709	413	413	8	240	240

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SUMMARY OF QUANTITIES

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		14

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SUMMARY OF ROADWAY ITEMS

LOCATION - PSN		104 6054	104 6028	132 6001	420 6136	480 6001	496 6005	158 6002	432 6002
		REMOVING CONCRETE (MOW STRIP)	REMOVING CONC (MISC)	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CL C CONC (RAC-R)	CLEAN EXIST CULVERTS	REMOV STR (WINGWALL)	SPEC EXCAV WORK (BACKHOE)	RIPRAP (CONC)(5 IN)
		LF	SY	CY	CY	EA	EA	HR	CY
1	222400001806082					1		4	
2	222400001806076					1		4	
3	222400001806034	1025				1		4	
4	222400001805068			10		1	1	2	11.5
5	222400001805067					1		2	
8	222400215003015					1		4	
9	222400215003014					1		4	
10	222400215003009					1		4	
12	222400215003011					1		4	
13	222400215004022		14		7	1		4	
14	222400298802003					1		4	
15	222400298802004					1		4	
16	222400298802002					1		4	
17	222400298802005					1		4	
18	222400298802006			20		1	2	4	19.8
19	222400298802001					1		4	
20	222400008614005				68	1		4	
21	222400008614182				26	1		4	
22	222400001804065					1		2	
23	222400001804064					1		2	
24	222400001804062					1		2	
25	222400001804061					1		2	
26	222400001804060					1		2	
27	222400001804059					1		2	
28	222400001803056					1		2	
29	222400001803055					1		2	
30	222400001803054					1		2	
31	222400001803053					1		2	
32	222400001803052					1		2	
33	222400001803051					1		2	
34	222400001803050					1		2	
35	222400001803049					1		2	
36	222400001803047					1		2	
	PROJECT TOTALS	1025	14	30	101	33	3	98	31.3

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SUMMARY OF QUANTITIES

SHEET 5 OF 5

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		15

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SUMMARY OF LARGE DRAINAGE STRUCTURES

HWY	STRUCTURE ID	SIDE	DESCRIPTION OF CULVERTS			TABLE OF DIMENSIONS	
			EXISTING STRUCTURE	DETAIL TYPE	PROPOSED STRUCTURE	A	C
						FT	FT
IH 35	22-240-0-0018-05-068	RT	3 - 6' X 3' X 375' @ 45º L.F. SKEW W/ WINGWALL TO BE REMOVED	3	3 - 6' X 3' X 375' @ 45º L.F. SKEW W/ 3 -SET (TY-I)(4:1)(C)	18.50	(#)
FM 2895	22-240-0-2988-02-006	LT	4 - 6' X 4' X 45.3' MBC W/ WINGWALL TO BE REMOVED	3	4 - 6' X 4' X 45.3' MBC W/ 4 -SET (TY-I)(4:1)(C)	23.16	(#)
FM 2895	22-240-0-2988-02-006	RT	4 - 6' X 4' X 45.3' MBC W/ WINGWALL TO BE REMOVED	3	4 - 6' X 4' X 45.3' MBC W/ 4 -SET (TY-I)(4:1)(C)	22.16	(#)
TOTALS							

GENERAL NOTES:
CONTRACTOR WILL FIELD VERIFY THE SIZE OF ALL STRUCTURES TO BE EXTENDED/BREAK BACK BEFORE FABRICATING AND/OR ACQUIRING MATERIALS.

REMOVAL OF HEADWALL/WINGWALL WILL CONSIST OF REMOVING CURBWALL, HEADWALLS, WINGWALLS & RIPRAP APRON, IF APPLICABLE.

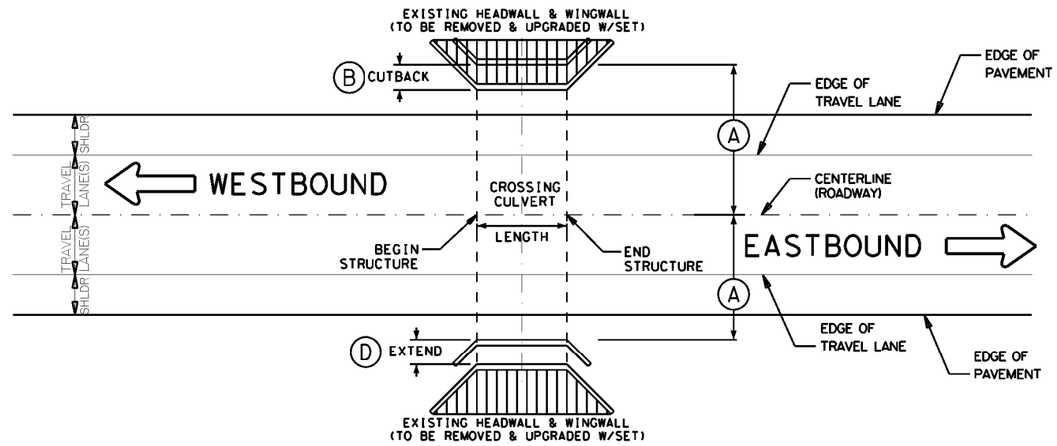
CONTRACTOR TO VERIFY EXISTING SLOPE 1% AND WIDEN CULVERT EXTENSIONS AT SAME SLOPE.

ALL EXCAVATION, SHAPING, BEDDING, AND BACKFILLING REQUIRED FOR PROPER INSTALLATION OF S.E.T.'s ALONG WITH ANY WORK REQUIRED TO PROVIDE A SMOOTH DRAINAGE TRANSITION IN ADJACENT AREAS WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 467 "SAFETY END TREATMENT".

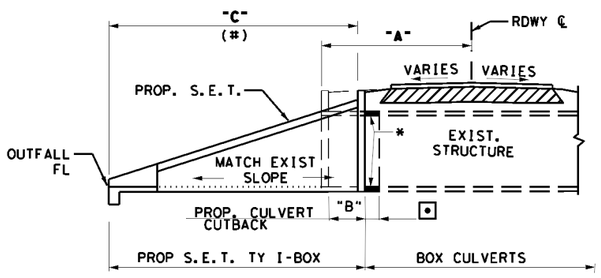
⊡ BREAK BACK DIMENSION WILL VARY FROM THE EXISTING HEADWALL/WINGWALLS EDGE (REFER TO BREAK BACK TYPICAL DETAIL) AND WILL BE DETERMINED BY THE ENGINEER AS PER FIELD CONDITIONS. BREAK BACK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM(S):
467 "SAFETY END TREATMENT"
496 "REMOVE STR"

* ANY REINFORCEMENT THAT CURRENTLY BENDS OUT OF THE CULVERT'S TOP SLAB AND INTO IT'S CURB WILL BE CLEANED, STRAIGHTENED, AND INCORPORATED INTO THE CULVERT EXTENSION OR BREAK BACK CALLOUT.

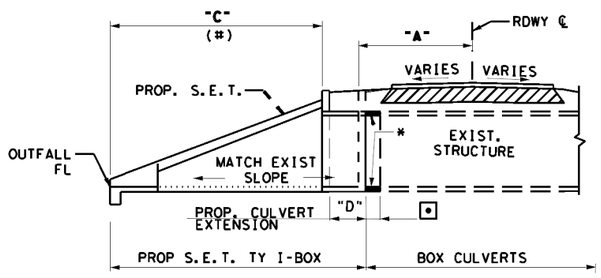
\# ON PROPOSED BRIDGE & DRAINAGE STRUCTURES, SEE BCS & SETB-CD STANDARD DETAILS FOR MORE INFORMATION



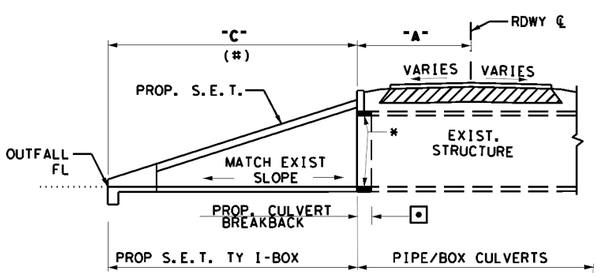
PROPOSED LARGE STRUCTURE LAYOUT
(SAFETY END TREATMENT) 4:1



① DETAIL FOR CROSSING BOX CULVERT(S) WITH CUTBACK



② DETAIL FOR CROSSING BOX CULVERT(S) WITH EXTENSION



③ DETAIL FOR CROSSING CULVERT(S) WITH "NO" EXTENSION

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SUMMARY OF DRAINAGE STRUCTURES

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		16

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TCP GENERAL NOTES:

1. THIS IS A SUGGESTED TRAFFIC CONTROL PLAN (TCP). THE CONTRACTOR MAY SUBMIT AN ALTERNATE TRAFFIC CONTROL PLAN, SIGNED AND SEALED BY A LICENSED PROFESSIONAL ENGINEER IN TEXAS, FOR APPROVAL BY THE ENGINEER. WHEN MUTUALLY BENEFICIAL CHANGES ARE PROPOSED TO THE EXISTING TRAFFIC CONTROL PLAN AND ARE AGREED UPON BY THE CONTRACTOR AND THE DEPARTMENT, THE PLAN SHEETS MAY BE DEVELOPED AND SIGNED AND SEALED BY THE ENGINEER.

2. REFER TO ITEM 8 PROSECUTION AND PROGRESS AND PROJECT GENERAL NOTES FOR ADDITIONAL INFORMATION REGARDING THE TRAFFIC CONTROL PLAN.

3. FURNISH AND INSTALL ALL TRAFFIC CONTROL PLANS DEVICES, INCLUDING BUT NOT LIMITED TO BARRICADES, SIGNS, AND WORK ZONE MARKINGS, IN COMPLIANCE WITH THE LATEST VERSION OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TXMUTCD), THE STATE STANDARD TRAFFIC CONTROL PLANS (TCP) SHEETS, AND THE BARRICADES AND CONSTRUCTION (BC) SHEETS. REFER TO THE PROJECT GENERAL NOTES FOR ADDITIONAL INFORMATION REGARDING THE TRAFFIC CONTROL PLAN.

4. ALLOW FOR ALL LANES OPEN TO TRAFFIC DURING NONWORKING HOURS UNLESS OTHERWISE SPECIFIED IN THE SEQUENCE OF CONSTRUCTION. ANY ADDITIONAL OVERNIGHT LANE CLOSURES NOT SPECIFIED IN THE SEQUENCE OF CONSTRUCTION WILL REQUIRE APPROVAL BY THE ENGINEER.

5. VERIFY THE LOCATION AND SPACING OF SIGNS, BARRICADES, AND CHANNELIZING DEVICES PRIOR TO THEIR PLACEMENT ALONG VERTICAL CURVES, HORIZONTAL CURVES, AND OTHER GEOMETRIC CONSTRAINTS TO ASSURE VISIBILITY TO ALL MOTORISTS.

6. PLACE THE TRAFFIC CONTROL DEVICES ONLY WHILE WORK IS ACTUALLY IN PROGRESS OR A DEFINITE NEED EXISTS. ALWAYS HAVE ENOUGH BARRICADES, CHANNELIZING DEVICES, AND SIGNS AT ALL TIMES TO REPLACE THOSE DAMAGED.

7. COVER ALL EXISTING SIGNS THAT CONFLICT WITH THE TRAFFIC CONTROL PLAN AND UNCOVER DURING NON-WORKING HOURS OR AS DIRECTED BY THE ENGINEER. PARTIAL COVERAGE OF THE SIGN OR COVERAGE BY MATERIAL THAT WILL NOT COVER THE ENTIRE SIGN ALL THE TIME IS NOT PERMITTED.

8. VARY THE SPACING OF SIGNS TO MEET TRAFFIC CONDITIONS OR AS DIRECTED BY THE ENGINEER AND ASSURE THAT ALL TRAFFIC CONTROL DEVICES AND WORK ZONE PAVEMENT MARKINGS ARE KEPT IN A HIGHLY VISIBLE CONDITION (CLEAN, UPRIGHT AND AT PROPER LOCATION).

9. MAINTAIN THE ROADWAY SURFACE AND WORK ZONE STRIPING WITHIN THE PROJECT WHILE THE TRAFFIC CONTROL PLAN IS IN EFFECT. PLACE AND BE RESPONSIBLE FOR ALL WORK ZONE PAVEMENT MARKINGS IN ACCORDANCE WITH STANDARD SHEETS WZ(STPM)-23, BC (12)- 21, BC (11)- 21 AND THE TXMUTCD.

10. PLACE ALL STOCKPILED MATERIAL, WASTE MATERIAL, SIGNS, BARRICADES, CHANNELIZING DEVICES AND WORK VEHICLES NOT IN USE, AT A MINIMUM OF 30 FEET FROM THE OUTER EDGE OF THE NEAREST TRAVEL LANE.

11. MAINTAIN ALL EXISTING DRAINAGE CONDITIONS DURING ALL CONSTRUCTION PHASES UNTIL THE PERMANENT DRAINAGE FACILITIES ARE CONSTRUCTED AND READY TO USE. HANDLE EXCAVATED AND STOCKPILED MATERIAL IN SUCH A WAY THAT IT WILL NOT BLOCK DRAINAGE.

12. REGULATE ALL CONSTRUCTION TRAFFIC SO AS TO CAUSE A MINIMAL INCONVENIENCE TO THE TRAVELING PUBLIC. AT THE TIMES WHEN IT IS NECESSARY FOR TRUCKS TO STOP, UNLOAD OR CROSS ROADWAYS UNDER TRAFFIC, PROVIDE WARNING SIGNS AND FLAGGERS AS NEEDED TO ADEQUATELY PROTECT THE TRAVELING PUBLIC.

13. NOTIFY THE ENGINEER IN WRITING TWO WEEKS PRIOR TO SHIFTING OF TRAFFIC WITHIN EACH PHASE OF THE TRAFFIC CONTROL PLAN.

14. DURING THE HOLIDAY TIME FRAME OF DECEMBER 21ST THROUGH JANUARY 1ST, EVERY EFFORT SHOULD BE TAKEN TO ENSURE THAT ALL TRAVEL LANES REMAIN OPEN WHERE POSSIBLE.

15. REMOVE FROM THE WORK AREA ALL LOOSE MATERIALS AND DEBRIS RESULTING FROM CONSTRUCTION OPERATIONS AT THE END OF EACH WORK DAY.

16. ADDITIONAL SIGNS, BARRICADES AND CHANNELIZING DEVICES MAY BE REQUIRED TO MAINTAIN TRAFFIC DURING CONSTRUCTION, AS SHOWN ON TCP STANDARDS. ADDITIONAL SIGNS, BARRICADES, ETC. (IF ANY), WILL BE SUBSIDIARY TO ITEMS 502 BARRICADES, SIGNS AND TRAFFIC HANDLING .

17. IF THE CONTRACTOR CHOOSES TO WORK MULTIPLE LOCATIONS IN URBAN/RURAL AREAS SIMULTANEOUSLY, CONTRACTOR WILL BE RESPONSIBLE FOR PROVIDING ALL APPLICABLE TRAFFIC CONTROL DEVICES, INCLUDING PORTABLE CHANGEABLE MESSAGE BOARDS, PORTABLE TRAFFIC BARRIER ,AND CRASH CUSHIONS, AT THEIR OWN EXPENSE.

18. REFER TO BC(6)-21 PORTABLE CHANGEABLE MESSAGE SIGN (PCMS) STANDARDS FOR A LISTING OF ABBREVIATED WORDS AND TWO-WORD PHRASES THAT ARE ACCEPTABLE FOR USE ON PCMS. SUBMIT THE SUGGESTED MESSAGE FOR THE BOARD TO THE ENGINEER FOR APPROVAL.

19. PLACE PORTABLE CHANGEABLE MESSAGE BOARDS AT LOCATIONS REQUIRING LANE CLOSURES FOR ONE WEEK BEFORE THE CLOSURES OR AS DIRECTED BY THE ENGINEER.

20. PROVIDE FULL-TIME OFF-DUTY UNIFORMED PEACE OFFICERS IN OFFICIALLY MARKED VEHICLES AS PART OF TRAFFIC CONTROL OPERATIONS AS APPROVED OR DIRECTED BY THE ENGINEER. THE PEACE OFFICER MUST SUPPLY PROOF OF CERTIFICATION BY THE TEXAS COMMISSION ON LAW ENFORCEMENT STANDARDS. THIS WORK WILL BE PAID FOR UNDER THE PROVISIONS OF ITEM 9.

21. USE PLASTIC DRUMS TO CHANNELIZE TRAFFIC WHEN EXISTING PAVEMENT MARKINGS HAVE BEEN OBLITERATED.

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TCP
GENERAL NOTES

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS

DIST	COUNTY	SHEET NO.
22	WEBB	17

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SEQUENCE OF CONSTRUCTION

GENERAL INSTRUCTIONS

THE FOLLOWING WORK WILL BE PERFORMED ON THE ROADWAY. PLEASE REFER TO THE TCP PHASES, TCP GENERAL NOTES AND CORRESPONDING PLAN SHEETS FOR MORE DETAILED INFORMATION.

INSTALL ALL APPLICABLE BARRICADES, SIGNS, WORK ZONE MARKINGS IN ACCORDANCE WITH TCP, BC AND WZ TxDOT STANDARD SHEETS FOR TRAFFIC CONTROL SETUP.

ONCE WORK HAS BEGUN AT A REFERENCE LOCATION, THE ENTIRE SEQUENCE MUST BE WORKED ON CONTINUOUSLY TO COMPLETION. ADJACENT LOCATIONS (SAME DIRECTION OF TRAVEL) MAY BE COMBINED.

INCORPORATE AND INSTALL NEEDED SIGNS FOR CONSTRUCTION SPEED REDUCTION AND PORTABLE CHANGABLE MESSAGE SIGNS AS SHOWN ON PLANS.

GENERAL SEQUENCE OF WORK

WORK FOR THIS PROJECT LOCATION SHALL BE PERFORMED IN THREE (3) PHASES.

PHASE I - INSTALLATION OF BRIDGE RAIL / S.E.Ts WITH PORTABLE TRAFFIC BARRIER
PHASE II - INSTALLATION OF METAL BEAM GUARD FENCE WITHOUT PORTABLE TRAFFIC BARRIER
PHASE III - FINAL CLEAN UP

PHASE I - INSTALLATION OF BRIDGE RAIL / S.E.T.(s) WITH PORTABLE TRAFFIC BARRIER

PLACE ALL TEMPORARY TRAFFIC CONTROL SIGNS AND DEVICES BEFORE BEGINNING CONSTRUCTION.

REFER TO TCP- PTB INSTALLATION LAYOUT SHEET(S), TCP(2-1)-18, TCP(2-2)-18, AND WZ(RS)-22 FOR MORE INFORMATION.

THE FOLLOWING STAGES WILL BE USED FOR THE FOLLOWING LOCATIONS CONSECUTIVELY IN NEED OF UPGRADE SET(S) AND RETROFIT BRIDGE RAILING:

TCP - PTB INSTALLATION LAYOUT 1 - (LANE CLOSURE)
LOCATION= (SIDES): =2(RT), =3(BOTH), =4(RT), =5(RT), =11(BOTH), =14(BOTH), =15(BOTH), =27(LT)
TCP - PTB INSTALLATION LAYOUT 2 - (SHOULDER CLOSURE)
LOCATION= (SIDES): =2(LT), =8(BOTH), =9(BOTH), =10(BOTH), =12(BOTH), =16(BOTH), =17(BOTH), =18(BOTH), =19(BOTH), =22(LT)-=26(LT), =28(LT)-=36(LT)

STAGE 1
INSTALL TEMPORARY PTB(s) BARRIER, CRASH CUSHION ATTENUATOR SYSTEMS TO REMOVE EXISTING MBGF AND INSTALL BRIDGE RAIL AS SHOWN ON PLANS. REFER TO TCP PTB INSTALLATION DETAIL SHEET.

ALL PTB(S) SET-UP'S ARE TO REMAIN IN PLACE OVERNIGHT UNTIL WORK IS COMPLETE AT EACH LOCATION.

PROVIDE OFF-DUTY UNIFORMED PEACE OFFICERS IN OFFICIALLY MARKED VEHICLES AS PART OF TRAFFIC CONTROL OPERATIONS AS APPROVED OR DIRECTED BY THE ENGINEER.

STAGE 2
REMOVE EXISTING MBGF/BRIDGE RAIL OR WINGWALLS AT LOCATION AS SHOWN ON PLANS. CONSTRUCT BRIDGE RAIL/INSTALL MBGF OR INSTALL S.E.T.s AS SHOWN IN PLANS, AS APPLICABLE.

STAGE 3
ONCE THE BRIDGE END HAS BEEN FULLY COMPLETED AT ONE SIDE COMMENCE THE OPPOSITE SIDE OF THE LOCATION AND FOLLOW STAGE 1 FOR INSTALLATION OF TEMPORARY PTB BARRIER AND STAGE 2 FOR REMOVAL OF EXISTING MBGF AND INSTALLATION OF BRIDGE RAIL/MBGF OR PROPOSED S.E.T.s AS SHOWN ON PLANS.

STAGE 4
MOVE AND RESET CRASH CUSHION AND PTB AS SHOWN ON PLANS ONCE WORK HAS BEEN COMPLETED ON LOCATION AND COMMENCE CONSECUTIVE LOCATION.

EACH LOCATION MUST BE COMPLETED BEFORE COMMENCING CONSECUTIVE LOCATIONS.

ONCE ALL CONSECUTIVE LOCATIONS HAVE BEEN COMPLETED, COMMENCE PHASE II.

PHASE II - INSTALLATION OF MBGF WITHOUT PORTABLE TRAFFIC BARRIER

PLACE ALL TEMPORARY TRAFFIC CONTROL SIGNS AND DEVICES BEFORE BEGINNING CONSTRUCTION. REFER TO TCP (2-1)-18, TCP(5-1)18, TCP(6-1)-12, TCP(6-2)-12(MOD) BC(10)-21 FOR MORE INFORMATION.

TCP (6-1)-12 - (FREWAY LANE CLOSURES)
LOCATION= (SIDE): =6(LT), =7(RT)

TCP (6-2)-12(MOD) - (WORK AREA NEAR RAMP)
LOCATION= (SIDE): =1(BOTH)

TCP (5-1)-18 - (SHOULDER WORK FOR FREEWAYS/EXPRESSWAYS)
LOCATION= (SIDE): =6(RT), =7(LT)

TCP (2-1)-18 - (CONVENTIONAL ROAD SHOULDER WORK)
LOCATION= (SIDE): =13(RT), =20(BOTH), =21(BOTH)

REMOVE EXISTING STRUCTURE METAL BEAM GUARD FENCE, AND CONSTRUCT PROPOSED STRUCTURE MBGF ON CROSSINGS AND PARALLEL STRUCTURES, AS APPLICABLE.

TRAFFIC CONTROL ITEMS USED WILL REMAIN IN PLACE UNTIL MBGF IS COMPLETED PER DAY OR AS DIRECTED BY THE ENGINEER.

ONCE THE LAST LOCATION HAS BEEN COMPLETED, COMMENCE PHASE III.

CONTRACTOR HAS THE OPTION TO WORK ON TWO LOCATIONS SIMUTANEOUSLY WHEN BOTH LOCATIONS ARE IN THE SAME DIRECTION AND WITHIN 2 MILES OF EACH OTHER WITH APPROVAL OF THE ENGINEER.

ONCE, ONE SIDE OF LOCATION IS COMPLETE, ALL TRAFFIC CONTROL WILL BE RESET TO THE OTHER SIDE OF LOCATION WHERE APPLICABLE OR MOVE TO NEXT LOCATION.

PHASE III - FINAL CLEAN UP

REMOVE ALL TEMPORARY TRAFFIC CONTROL SIGNS AND DEVICES.
DO FINAL CLEAN-UP AND REMOVE ALL BARRICADES.

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
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2/1/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

TCP
SEQUENCE OF
CONSTRUCTION

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		18

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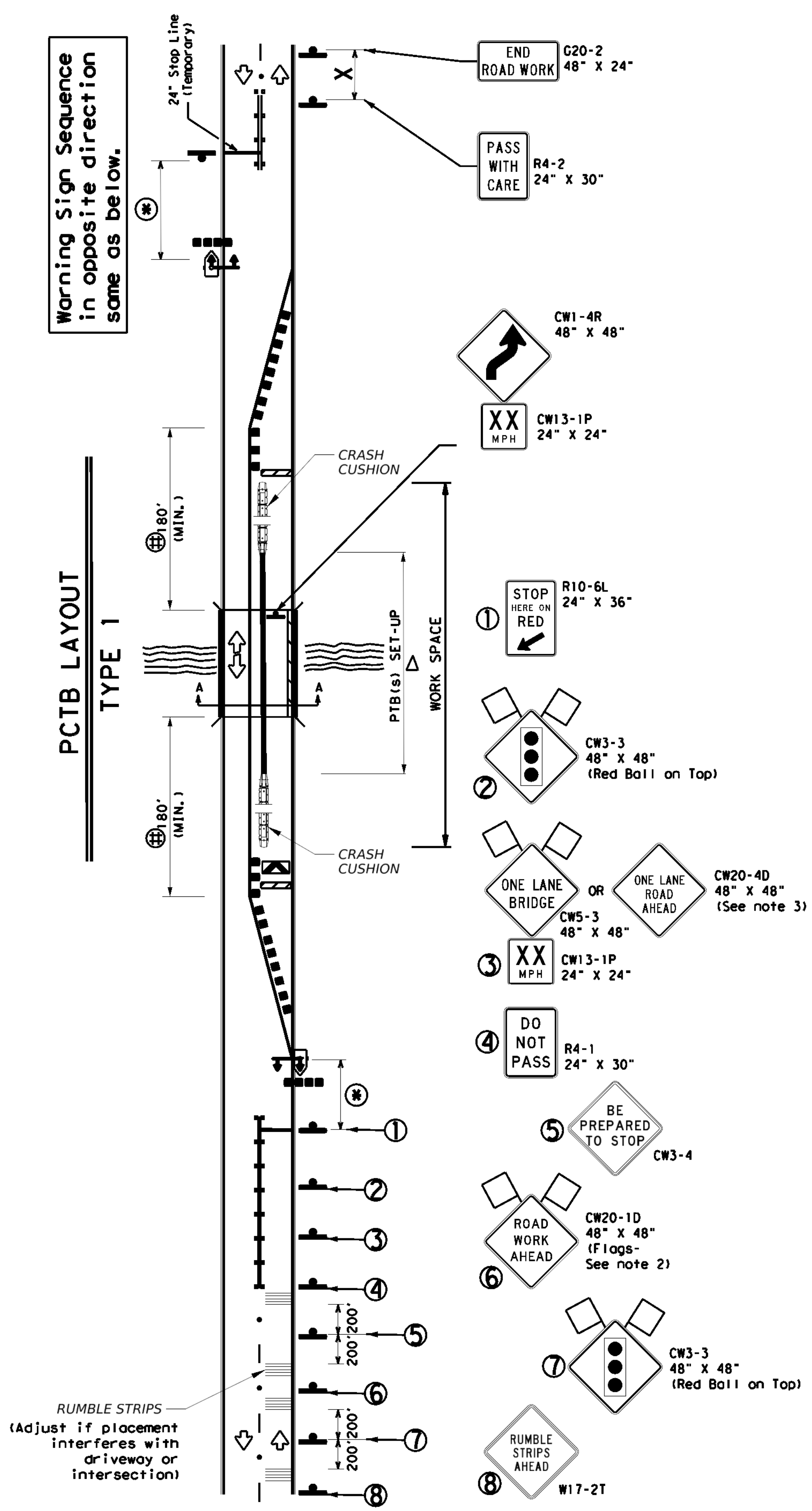
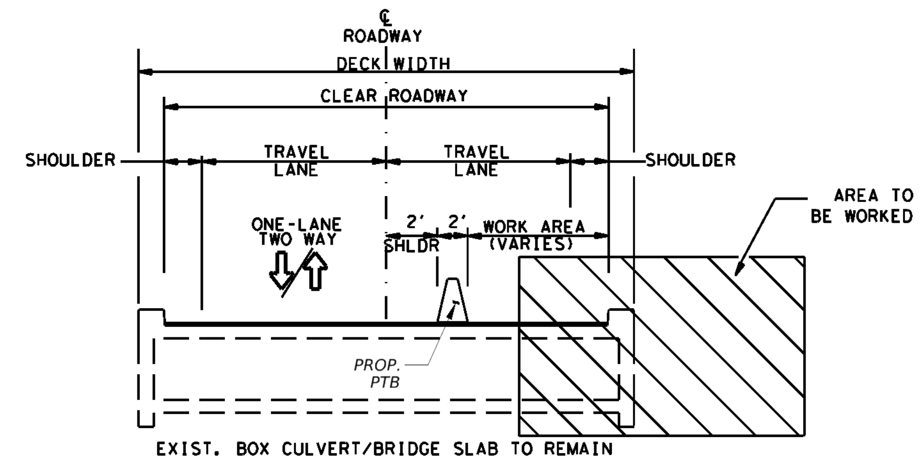


PORTABLE TRAFFIC BARRIER QUANTITIES					
			512 Δ		
			A		
LOCATION NUMBER	PSN NUMBER	SIDE	FURNISH & INSTALL	MOVE	REMOVE
			LF	LF	LF
2	222400001806076	(TY2)LT & RT	120		
3	222400001806034	LT & RT		240	
4	222400001805068	RT		120	
5	222400001805067	RT		120	
11	222400215003010	LT & RT		240	
14	222400298802003	LT & RT		240	
15	222400298802004	LT & RT		240	
27	222400001804059	LT		120	
TOTAL			120	1320	

Δ FOR CONTRACTORS INFORMATION ONLY, PTB's SET-UP INSTALLATION TO BE PROPOSED. REFER TO "CRASH CUSHION SUMMARY SHEET" FOR ADDITIONAL INFORMATION NOT SHOWN.



TYPICAL SECTION
SECTION A-A

MIRROR WORK FROM PHASE I ON THE OTHER HALF OF ROADWAY WITHIN THE SAME CONSTRUCTION LIMITS, AS APPLICABLE.

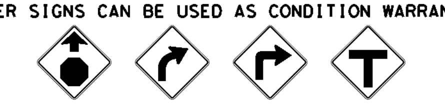
LEGEND

- CRASH CUSHION ATTENUATOR
- PORTABLE TRAFFIC BARRIER
- DIRECTION OF TRAFFIC
- WORKZONE
- CHANNELIZING DEVICES (BARREL)
- TEMPORARY OR PORTABLE TRAFFIC SIGNALS
- SIGN POST
- TYPE III BARRICADE
- RAISED PAVEMENT MARKERS TY-II A-A
- TRUCK MOUNTED ATTENUATOR (TMA)

NOTES:

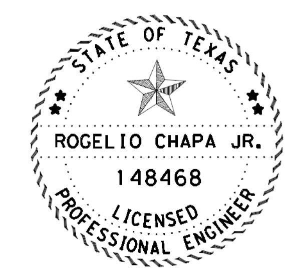
(✱) REFER TO STATE STANDARD TCP (2-8b)-23 AND RS(5)-23 FOR TRAFFIC CONTROL SET-UP, TAPER LENGTHS AND SPACING FOR SIGNS. THE WORK AREA WILL CONSIST OF THE S.E.T. AND BRIDGE RAIL INSTALLATION.

1. ALL MATERIALS & WORK REQUIRED TO INSTALL CRASH CUSHION ATTENUATOR WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 545 "CRASH CUSHION ATTENUATOR".
2. REFER TO TEXAS STANDARDS FOR ADDITONAL DETAILS ON THE PORTABLE TRAFFIC BARRIER.
3. OTHER SIGNS CAN BE USED AS CONDITION WARRANT.



4. FLAGS ATTACHED TO SIGNS WHERE SHOWN ARE REQUIRED.
5. THE USE OF THE "RUMBLE STRIPS AHEAD" SIGN MAY BE USED IN ADVANCE OF IN-LANE OR TRANSVERSE RUMBLE STRIPS, BASED ON ENGINEERING JUDGEMENT. THIS SIGN IS TYPICALLY NOT NECESSARY FOR RUMBLE STRIP INSTALLATIONS BUILT TO THE GUIDELINES ON THIS STANDARD SHEET. WHEN USED, THIS SIGN SHOULD BE SPACED IN ADVANCE OF THE RUMBLE STRIPS BASED ON THE GUIDELINES FOR ADVANCE PLACEMENT OF WARNING SIGN INCLUDED IN THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".
6. THE METHODS FOR REMOVAL OF THE RUMBLE STRIPS WILL BE EITHER BURN METHOD OR BLASTING METHOD, ANY DAMGE DONE TO THE EXISTING PAVEMENT WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO ITEM 677 "ELIM EXT PV MRK & MRKS (RUMBLE STRIP)".

(⊞) PORTABLE TRAFFIC SIGNALS SHOULD BE LOCATED TO PROVIDE ADEQUATE STOPPING SIGHT DISTANCE FOR APPROACHING MOTORIST OR AS DIRECTED BY THE ENGINEER.



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2/1/2024

NOT TO SCALE

Texas Department of Transportation

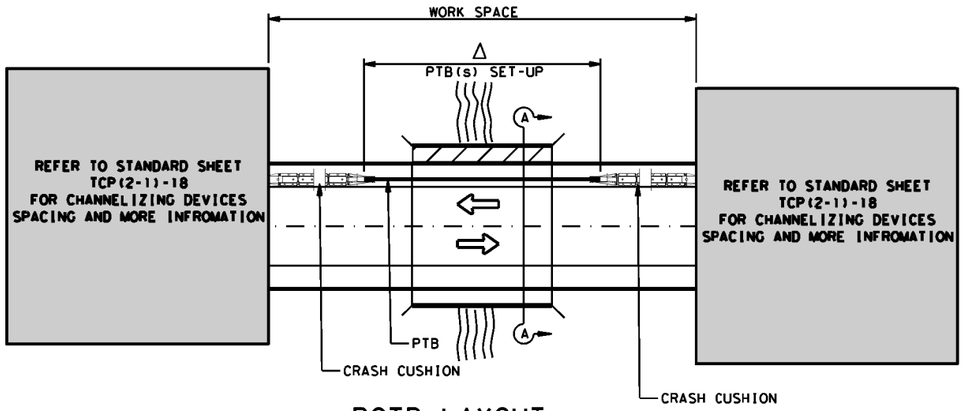
IH 35, ETC

TCP PTB
INSTALLATION DETAIL

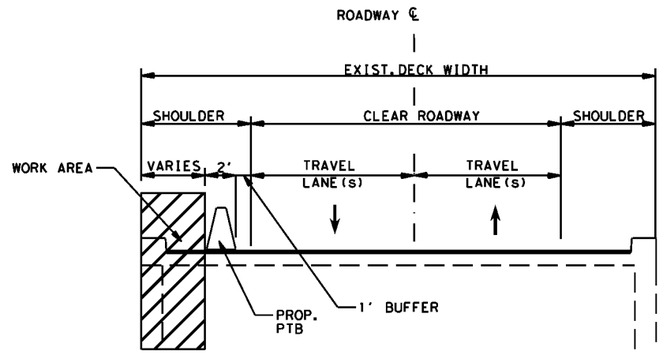
SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		19

DATE: 2024/01/29 4:19:23 PM



PCTB LAYOUT
TYPE 2



TYPICAL SECTION
SECTION A-A

MIRROR WORK FROM ONE SIDE ON THE OTHER HALF OF ROADWAY WITHIN THE SAME CONSTRUCTION LIMITS.

LEGEND

- CRASH CUSHION ATTENUATOR
- PORTABLE TRAFFIC BARRIER
- DIRECTION OF TRAFFIC
- WORKZONE
- TRUCK MOUNTED ATTENUATOR (TMA)

PORTABLE TRAFFIC BARRIER QUANTITIES

LOCATION NUMBER	PSN NUMBER	SIDE	512 Δ A		
			FURNISH & INSTALL	MOVE	REMOVE
			LF	LF	LF
2	222400001806076	LT & RT(TY1)		120	
8	222400215003015	LT & RT		240	
9	222400215003014	LT & RT		240	
10	222400215003009	LT & RT		240	
12	222400215003011	LT & RT		240	
16	222400298802002	LT & RT		240	
17	222400298802005	LT & RT		240	
18	222400298802006	LT & RT		240	
19	222400298802001	LT & RT		240	
22	222400001804065	LT		120	
23	222400001804064	LT		120	
24	222400001804062	LT		120	
25	222400001804061	LT		120	
26	222400001804060	LT		120	
28	222400001803056	LT		120	
29	222400001803055	LT		120	
30	222400001803054	LT		120	
31	222400001803053	LT		120	
32	222400001803052	LT		120	
33	222400001803051	LT		120	
34	222400001803050	LT		120	
35	222400001803049	LT		120	
36	222400001803047	LT		120	120
TOTAL				3720	120

Δ FOR CONTRACTORS INFORMATION ONLY, PTB's SET-UP INSTALLATION TO BE PROPOSED. REFER TO "CRASH CUSHION SUMMARY SHEET" FOR ADDITIONAL INFORMATION NOT SHOWN.

NOTES

REFER TO STANDARD BC(12)-21 FOR PAVEMENT MARKINGS DETAILS SET-UP, AND SPACING.

REFER TO THE "SUMMARY OF QUANTITIES" PLAN SHEET FOR ADDITIONAL INFORMATION.

REMOVAL OF DRAINAGE STRUCTURE WILL BE LIMITED TO ONE SIDE OF THE ROADWAY AT A TIME, OR AS SPECIFIED BY THE ENGINEER.

REFER TO "BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS" SHEETS FOR ADDITIONAL NOTES

REFER TO STANDARD TCP (2-1)-18 FOR TRAFFIC CONTROL SET-UP, TAPER LENGTHS AND SPACING FOR SIGNS. THE WORK AREA WILL CONSIST OF THE REMOVAL OF BRIDGE RAIL AND GUARDRAIL ON LEFT & RIGHT SIDE OF THE ROADWAY.

ALL MATERIALS & WORK REQUIRED TO INSTALL CRASH CUSHION ATTENUATOR WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE CONSIDERED SUBSIDIARY TO ITEM 545 "CRASH CUSHION ATTENUATOR".

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...

2/1/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

TCP PTB
INSTALLATION DETAIL

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		20

DATE: 2/1/2024 4:19:25 PM
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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	22	WEBB		21
5-10 5-21				

DATE: 1/30/2024 3:36:00 PM
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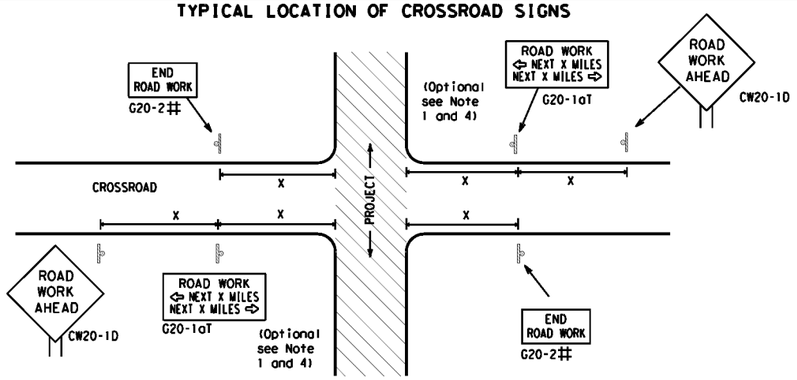
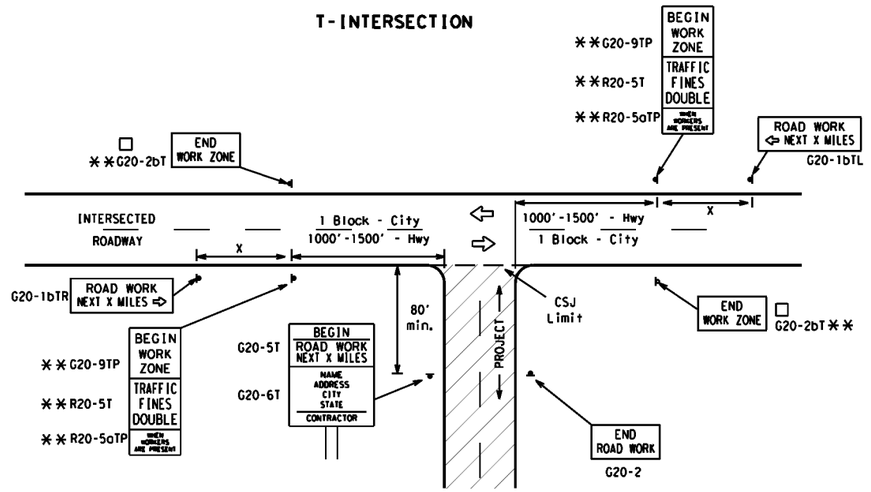
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

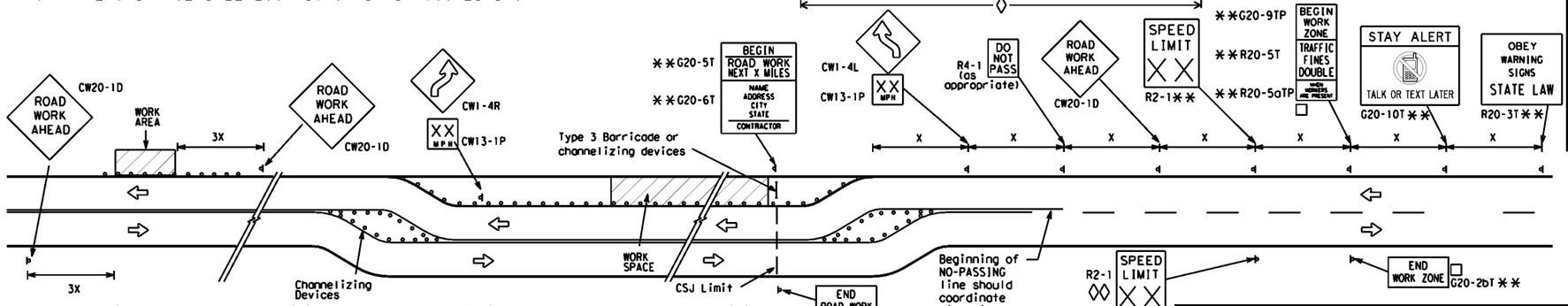
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

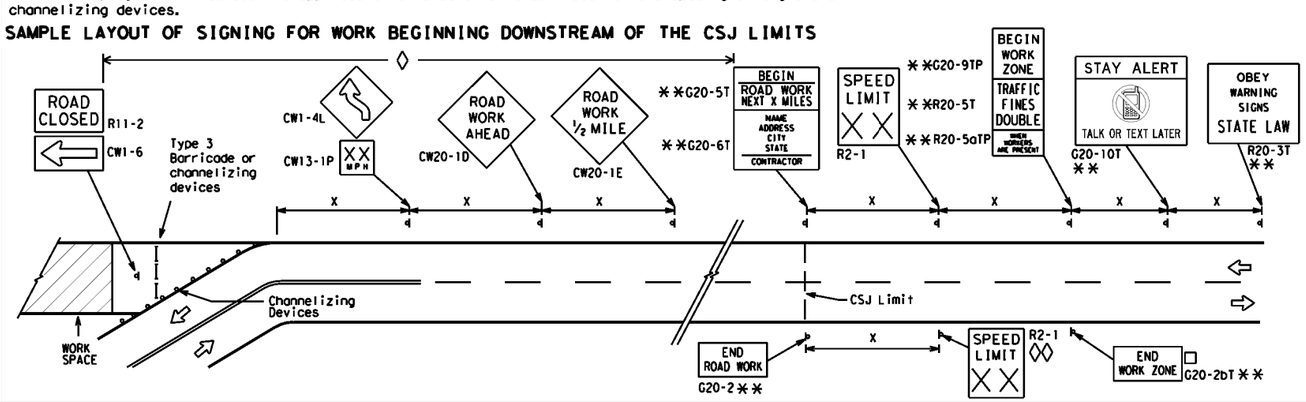
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	22	WEBB		22

DATE: 1/30/2024 3:36:02 PM
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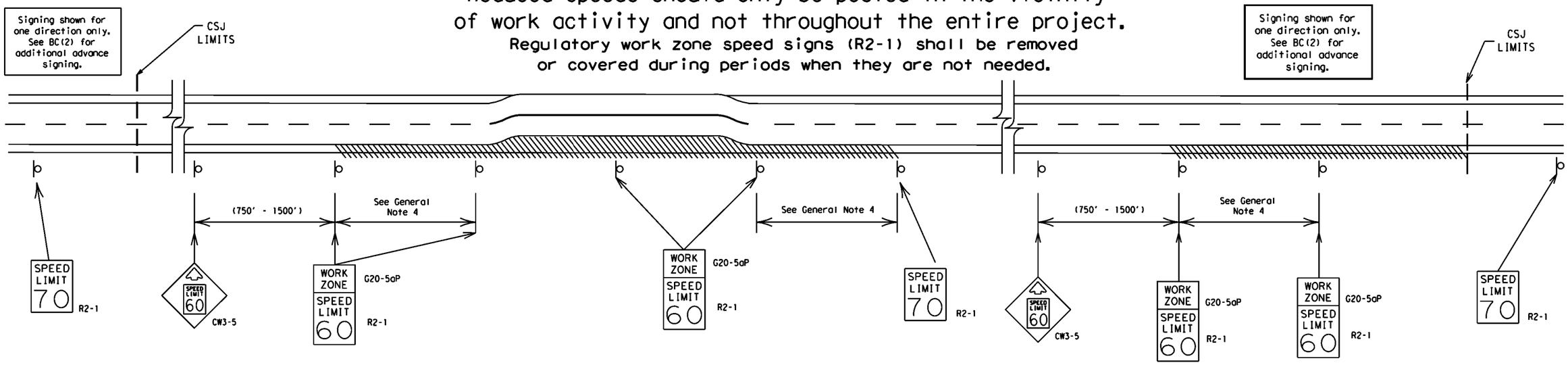
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

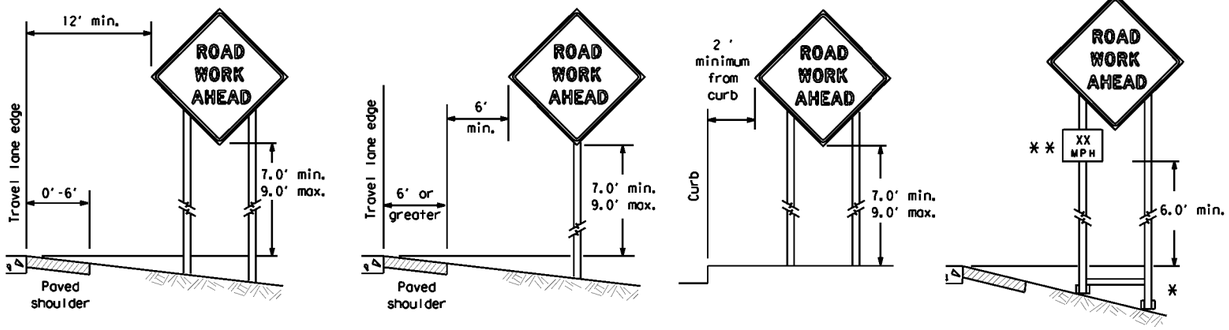
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	22	WEBB		23

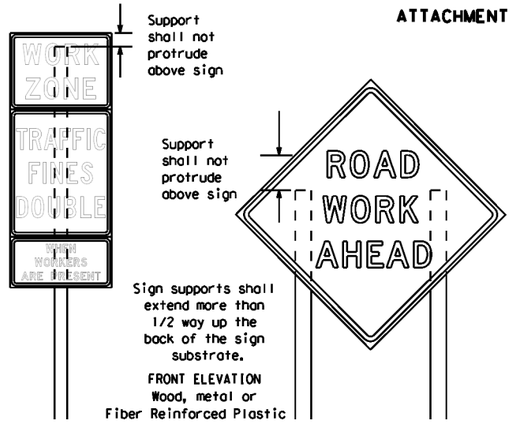
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

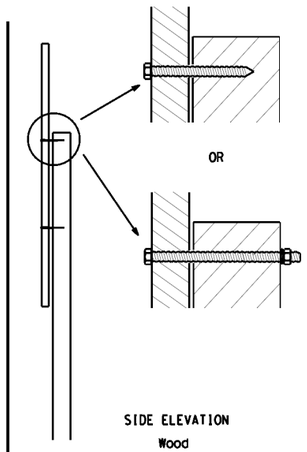


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





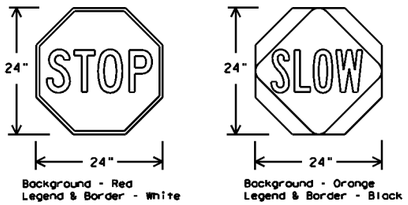
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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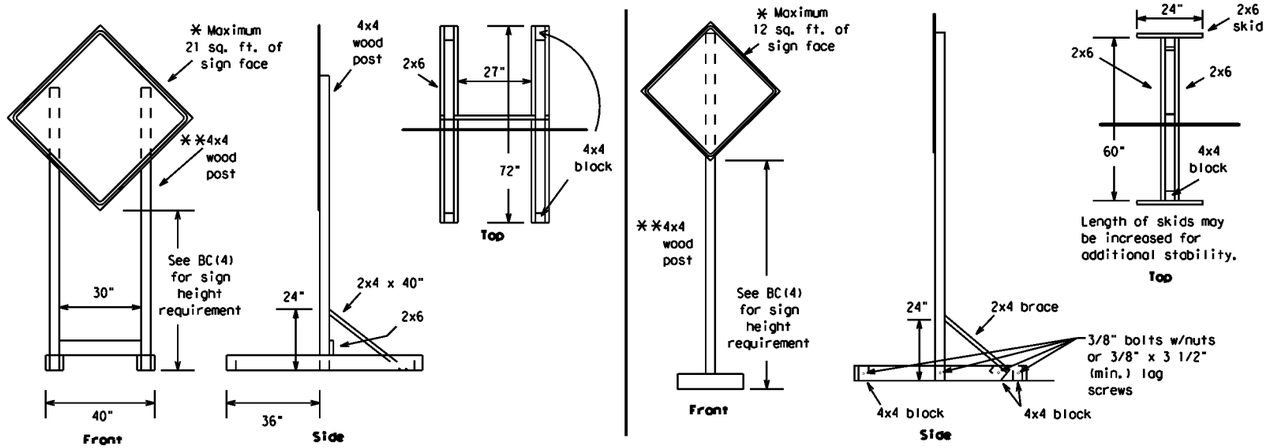
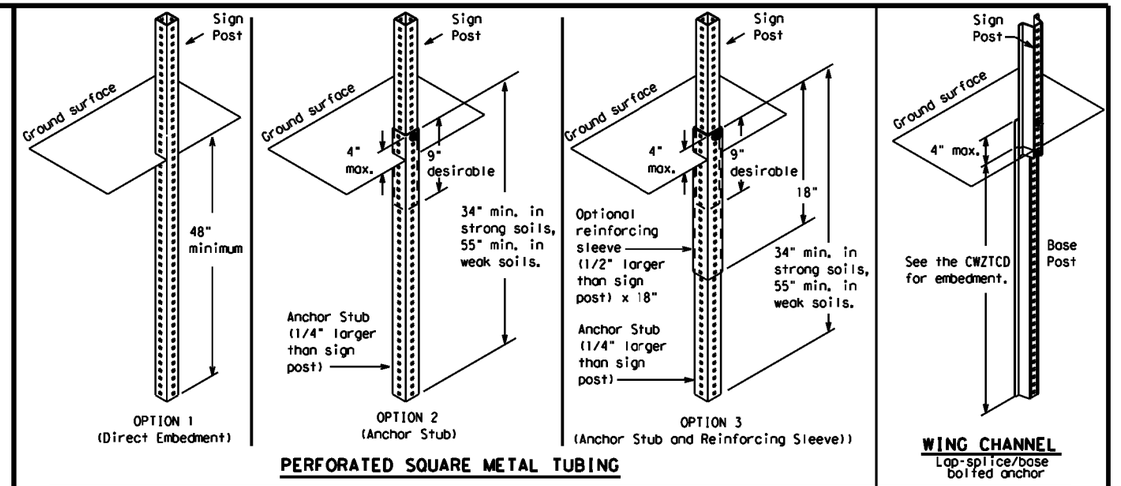
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	22	WEBB		24



SKID MOUNTED WOOD SIGN SUPPORTS

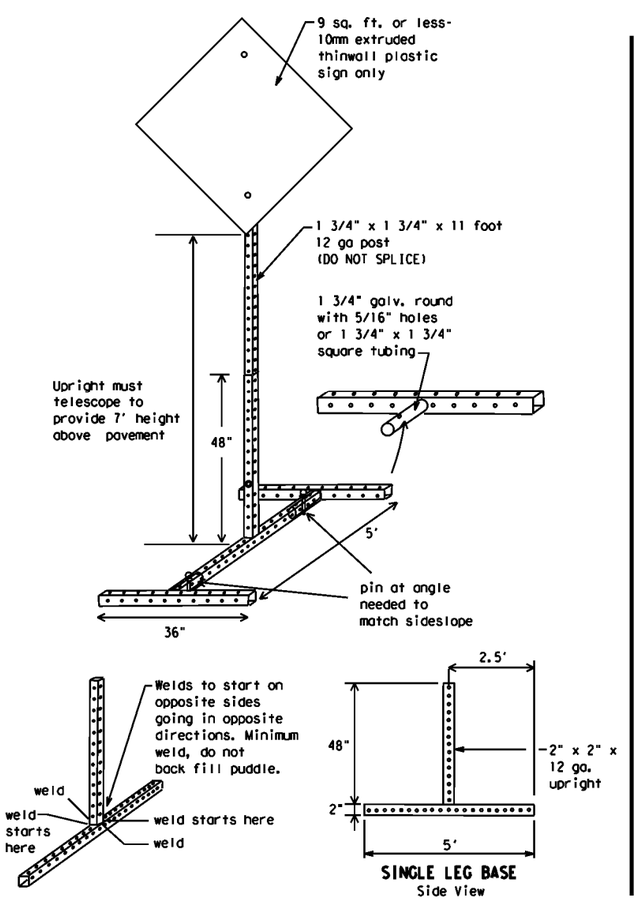
*** LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS**

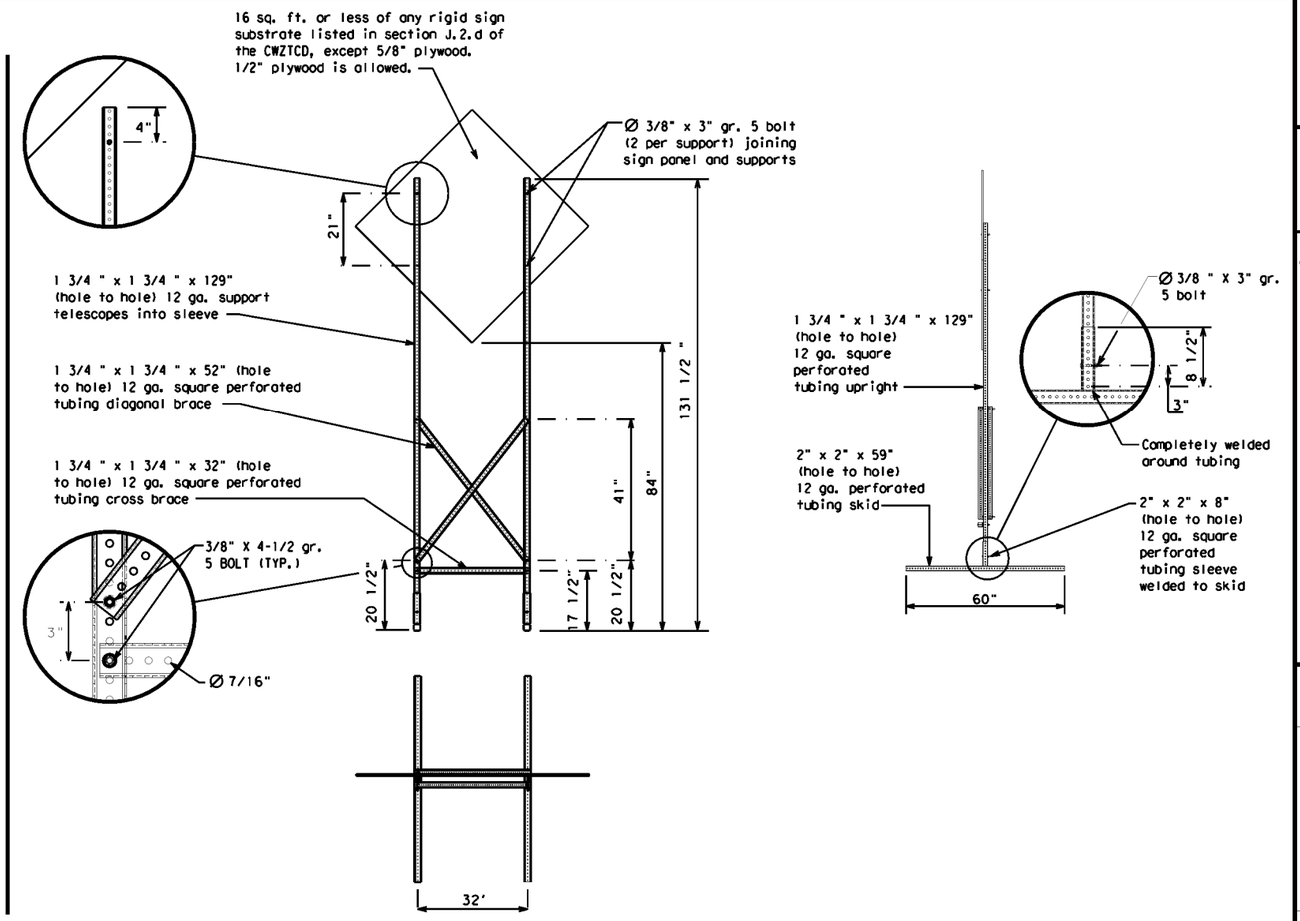


PERFORATED SQUARE METAL TUBING

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.





WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

SHEET 5 OF 12

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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
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	22	WEBB		25

SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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7-13 5-21	22	WEBB		26

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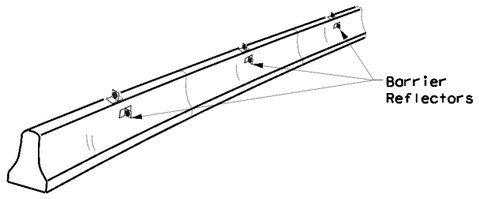
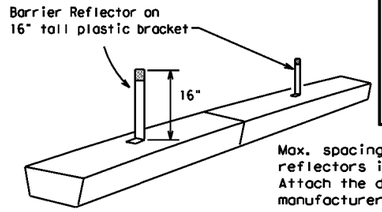
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

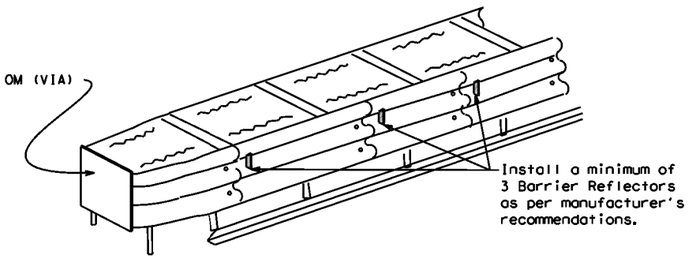


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

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)

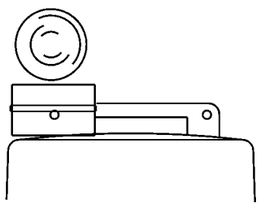


DELINEATION OF END TREATMENTS

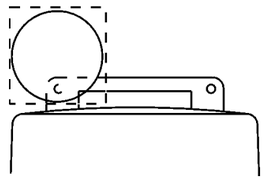
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the appropriate 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

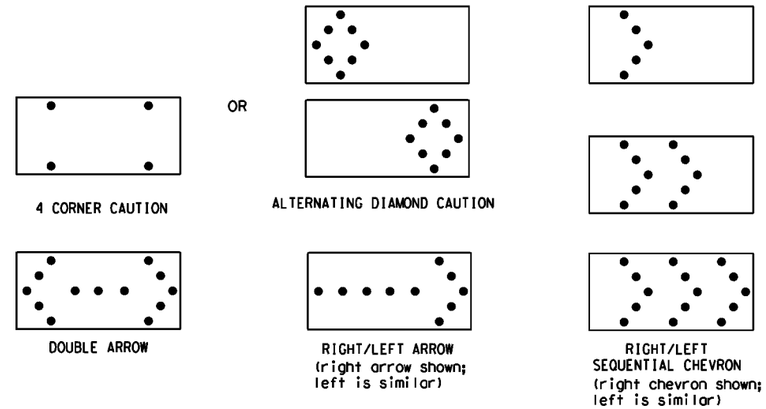
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	22	WEBB		27

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

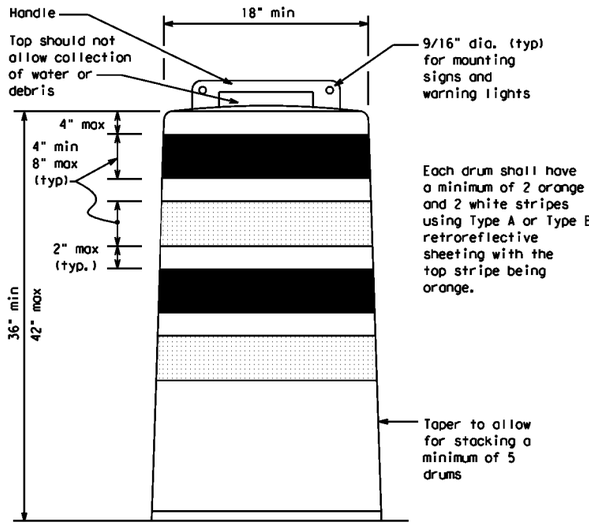
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

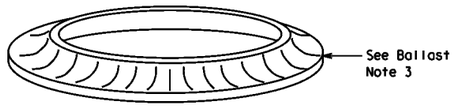
RETROREFLECTIVE SHEETING

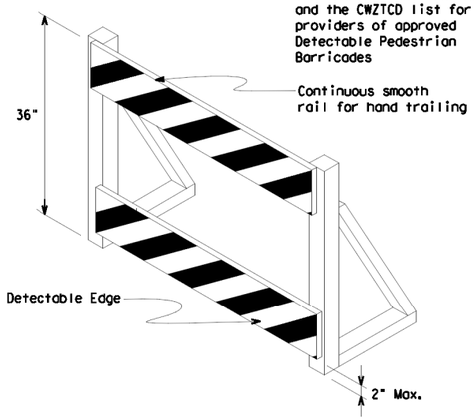
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

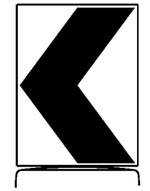




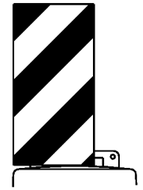


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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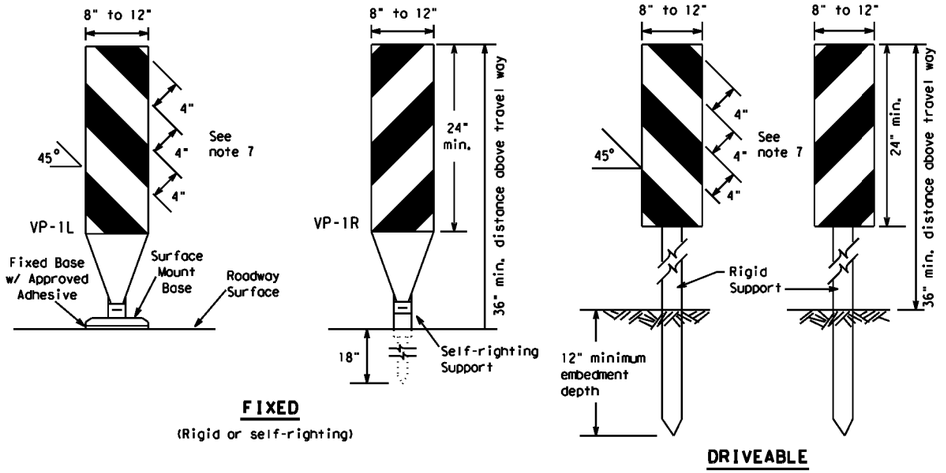
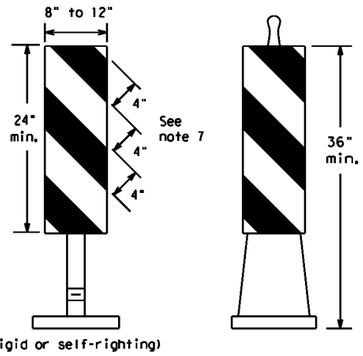
9-07 5-21	22	WEBB		28
7-13				



FIXED
(Rigid or self-righting)

DRIVEABLE

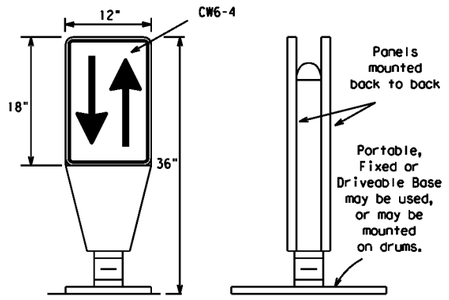


(Rigid or self-righting)

PORTABLE

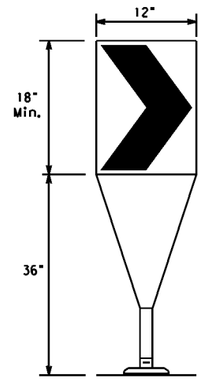
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



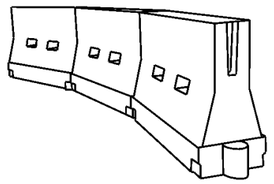
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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9-07 8-14	DIST	COUNTY		SHEET NO.
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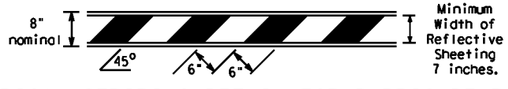
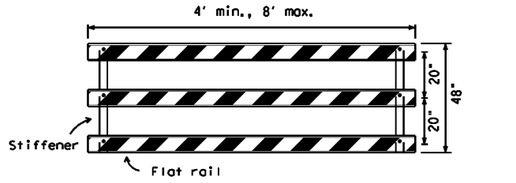
TYPE 3 BARRICADES

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 stocked 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.



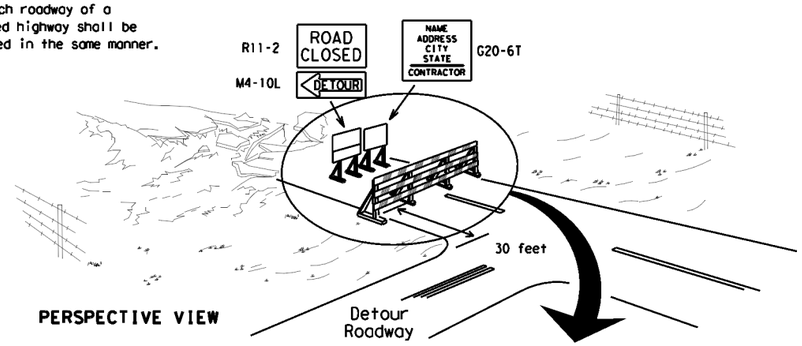
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

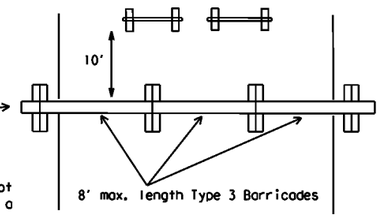
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

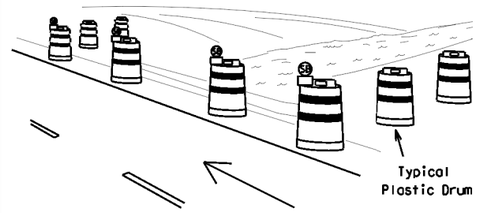
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

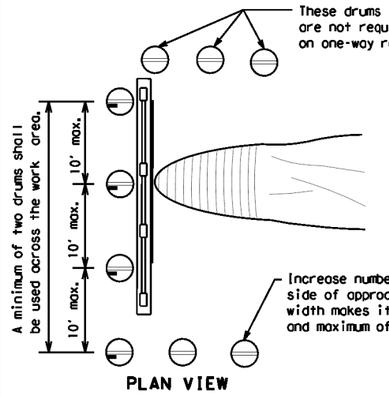
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

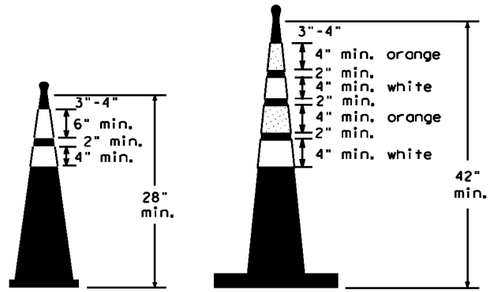
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

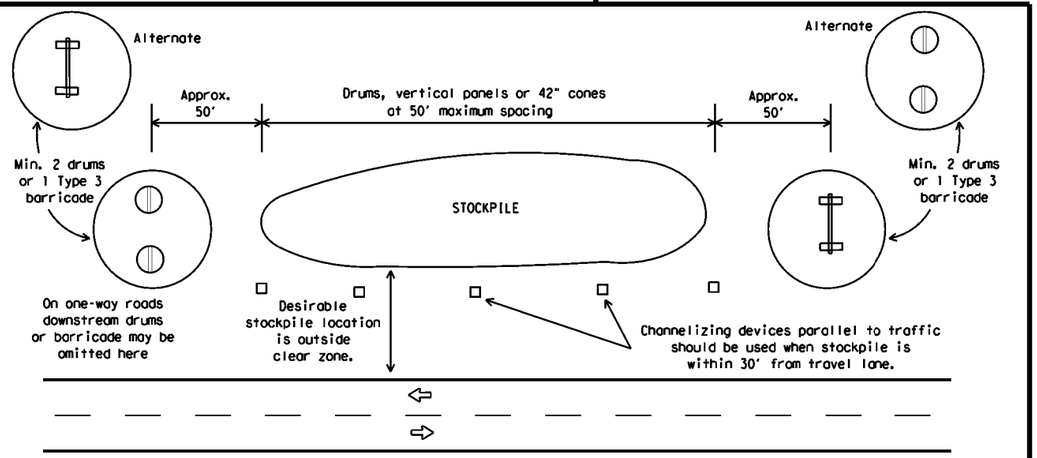
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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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.

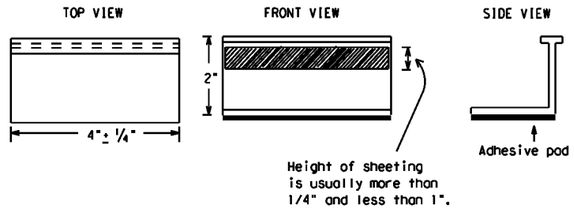
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

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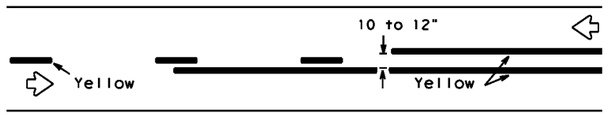
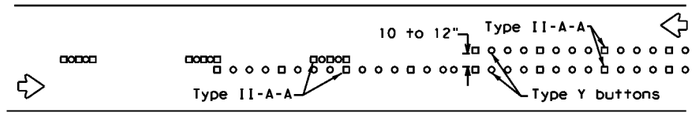
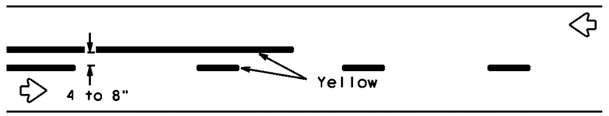
PAVEMENT MARKING PATTERNS



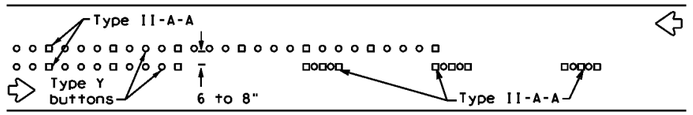
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



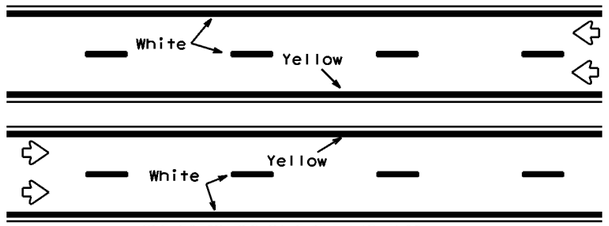
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



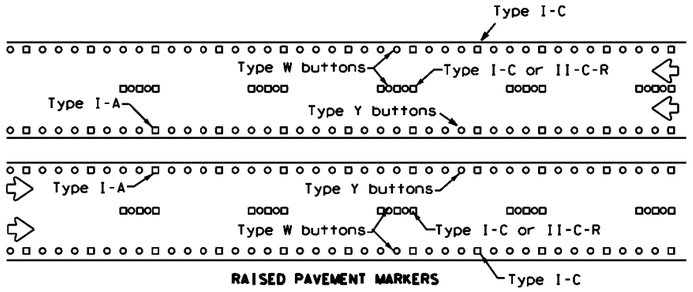
RAISED PAVEMENT MARKERS - PATTERN B

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

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



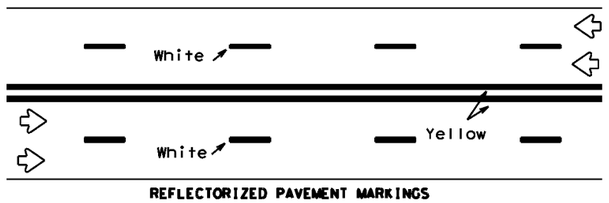
REFLECTORIZED PAVEMENT MARKINGS



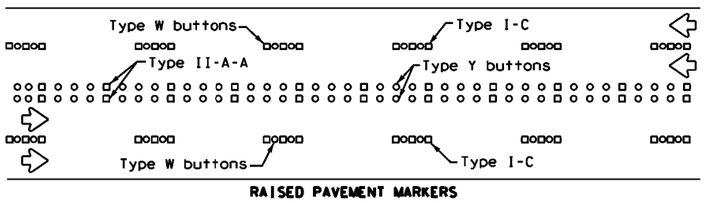
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



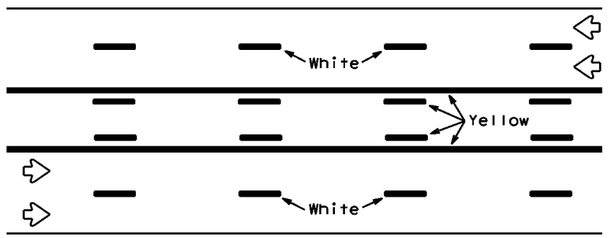
REFLECTORIZED PAVEMENT MARKINGS



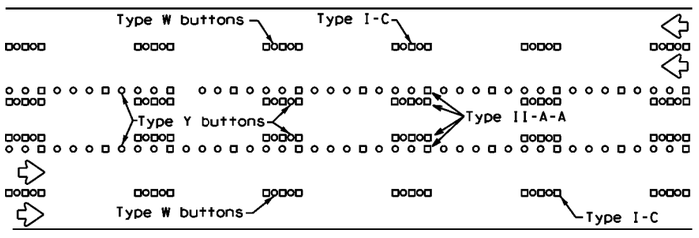
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

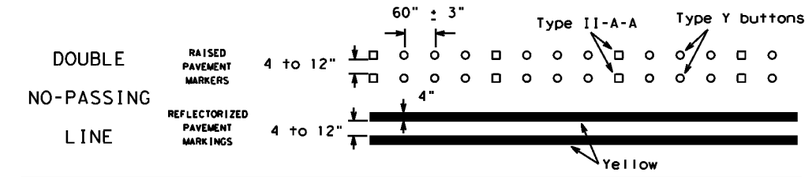
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

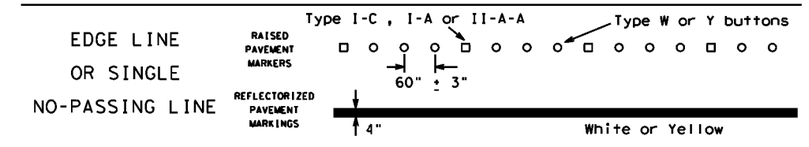
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

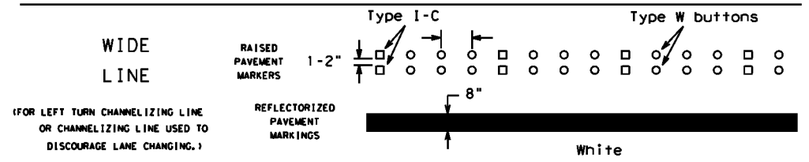


EDGE LINE OR SINGLE NO-PASSING LINE



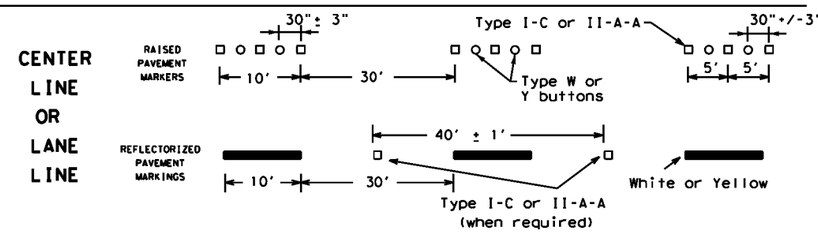
WIDE LINE

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

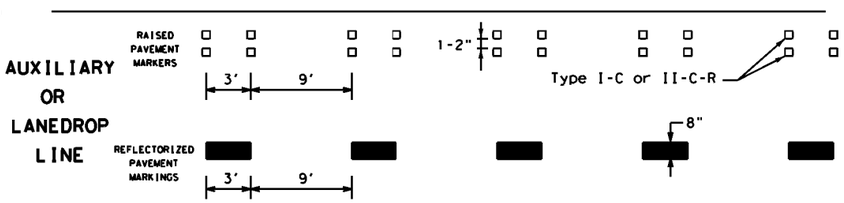


BROKEN LINES

CENTER LINE OR LANE LINE

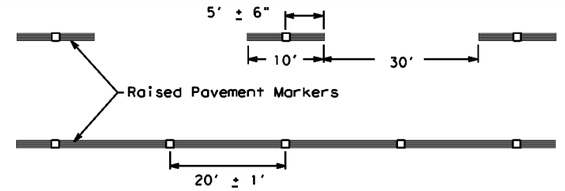


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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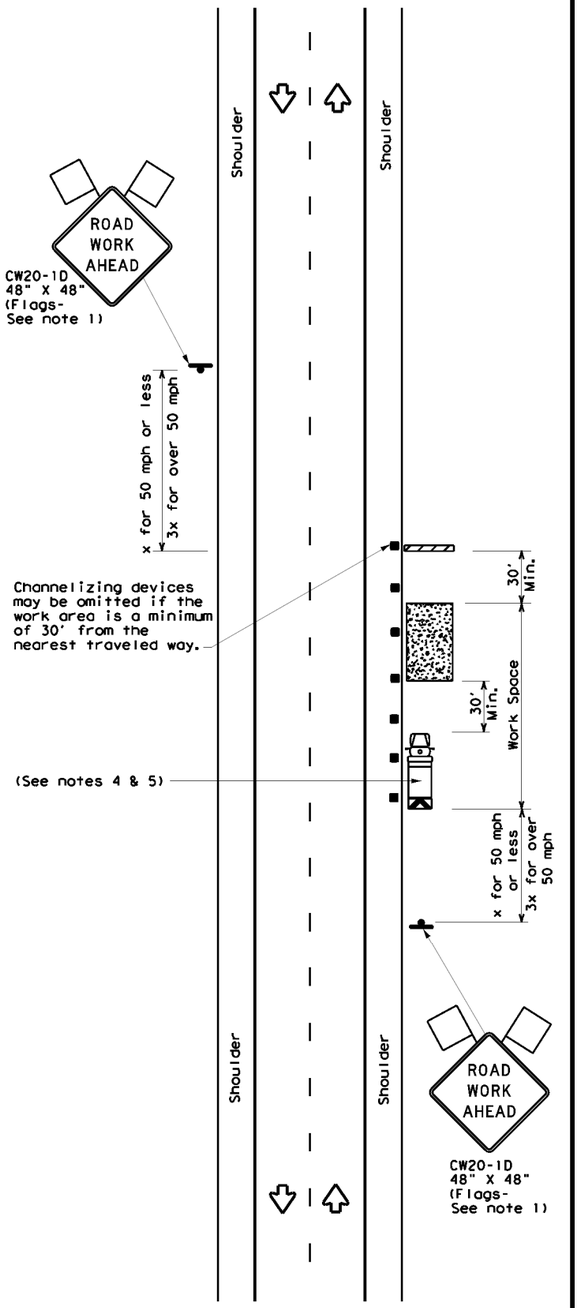
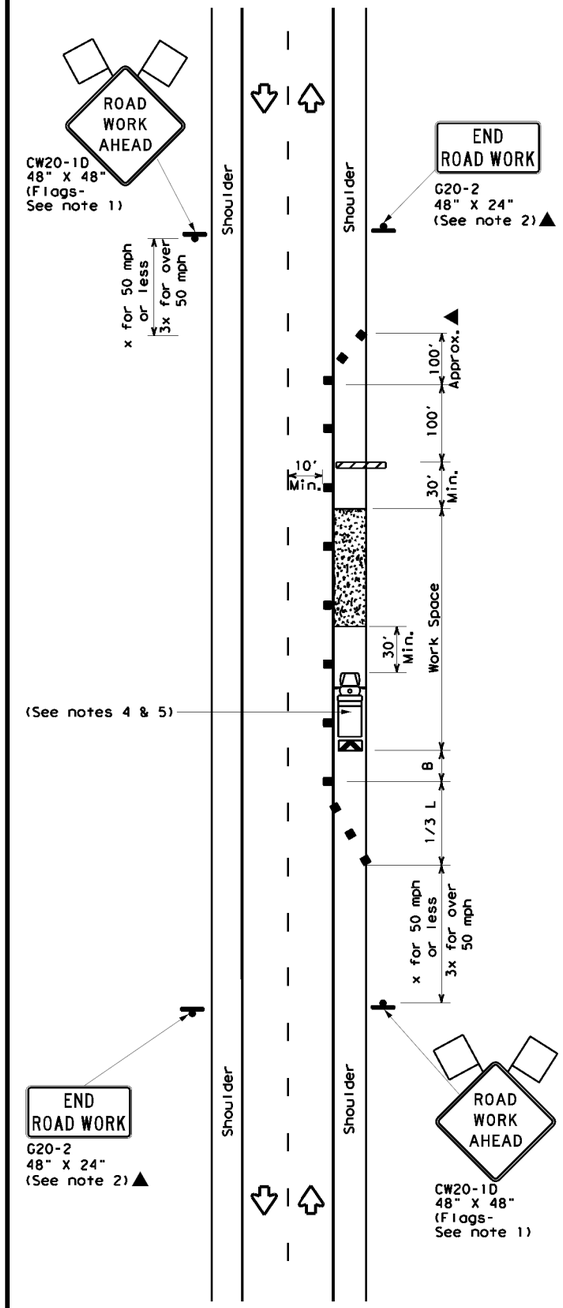


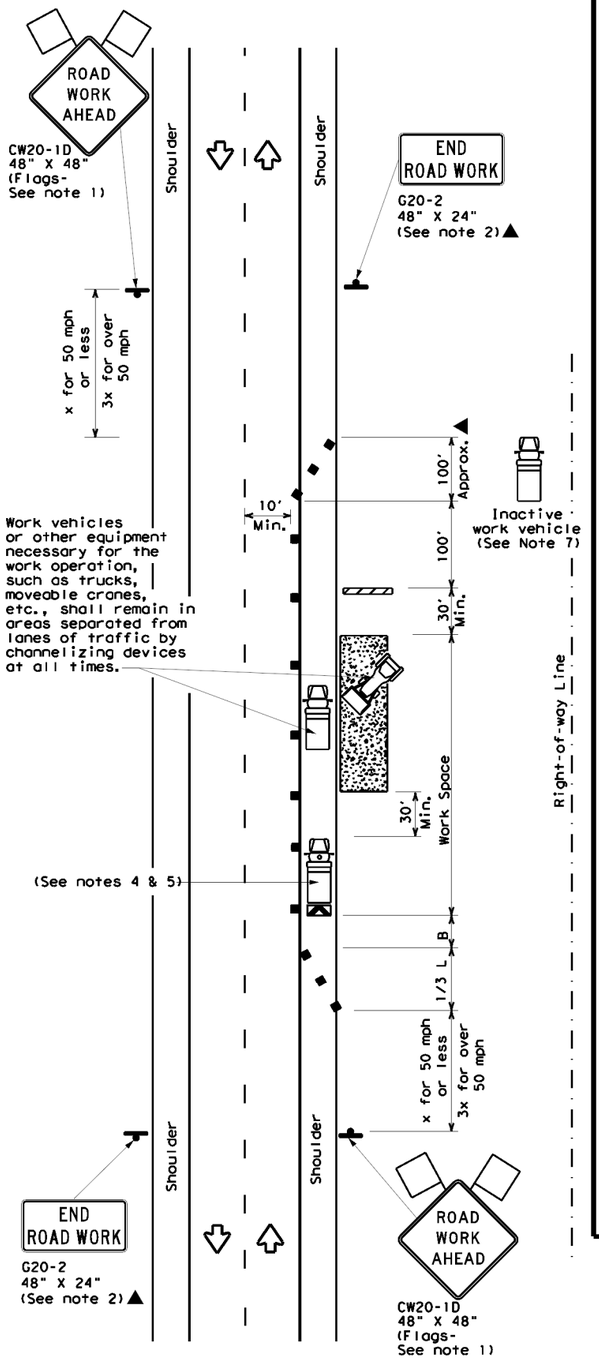
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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 in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
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 off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12				
1-97 2-18	22	WEBB		33

DATE: 1/30/2024 3:36:48 PM
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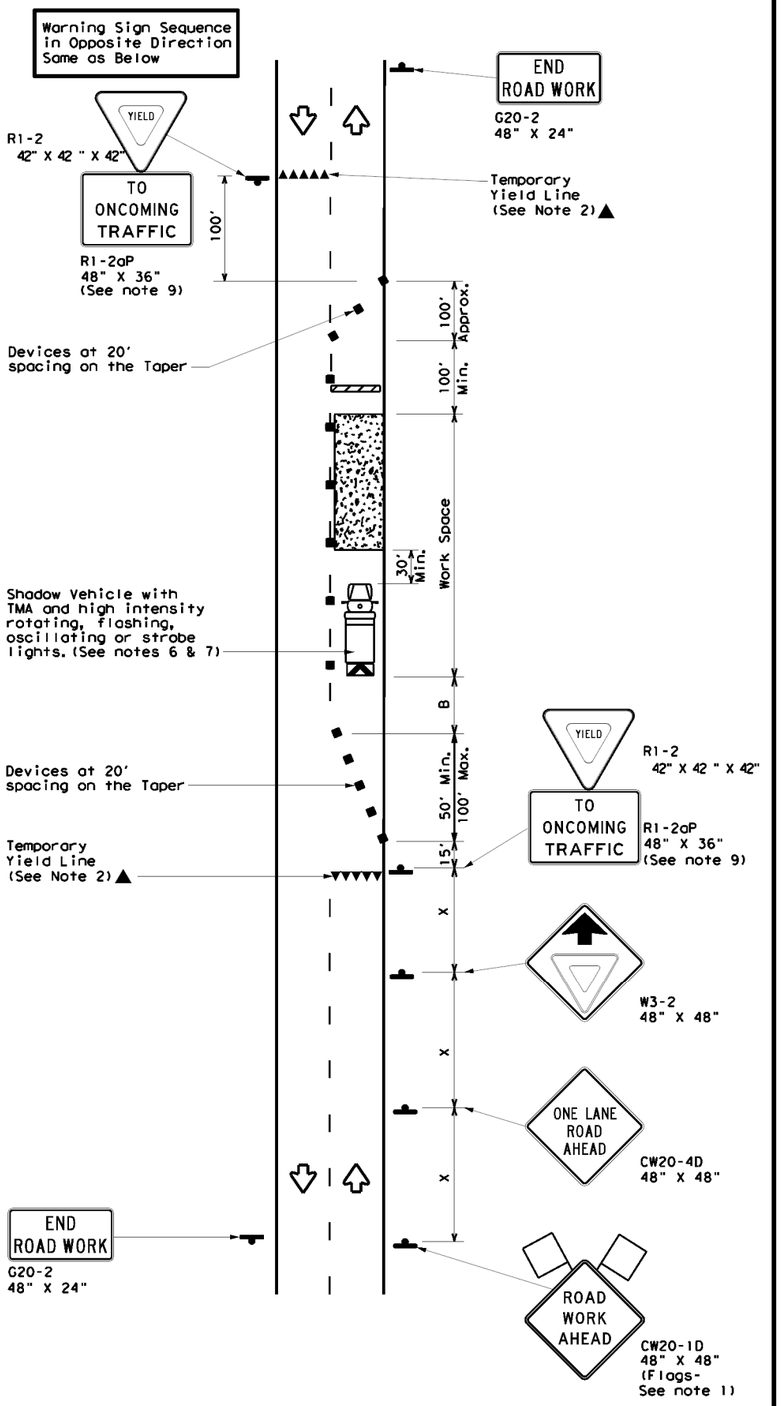
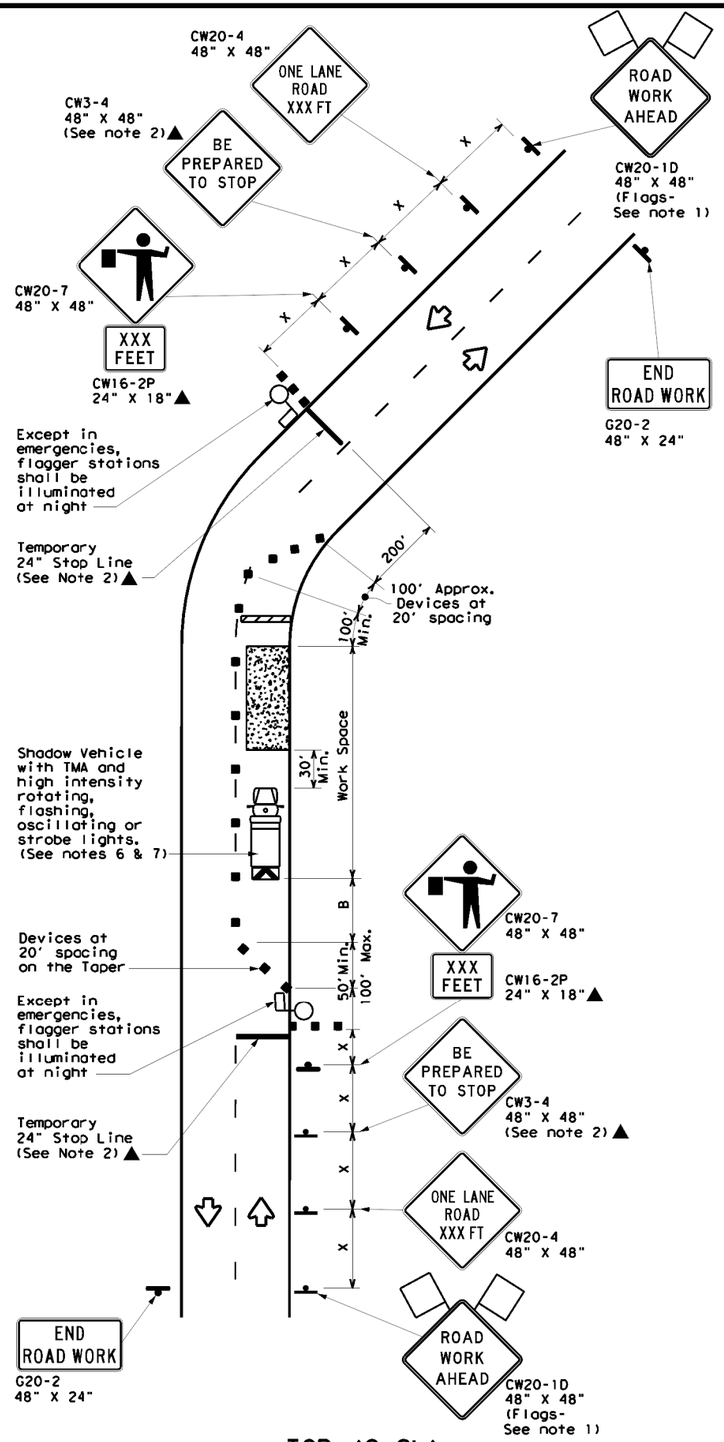


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



TCP (2-2b)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

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"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* 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. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. 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 off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

8. The R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work space should be no longer than one half city block. In rural areas, roadways with less than 2000 ADT, work space should be no longer than 400 feet.
9. The R1-2aP "YIELD TO ONCOMING TRAFFIC" sign shall be placed on a support at a 7 foot minimum mounting height.

TCP (2-2b)

10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	22	WEBB		34
4-98 2-18				

DATE: 1/30/2024 3:37:10 PM
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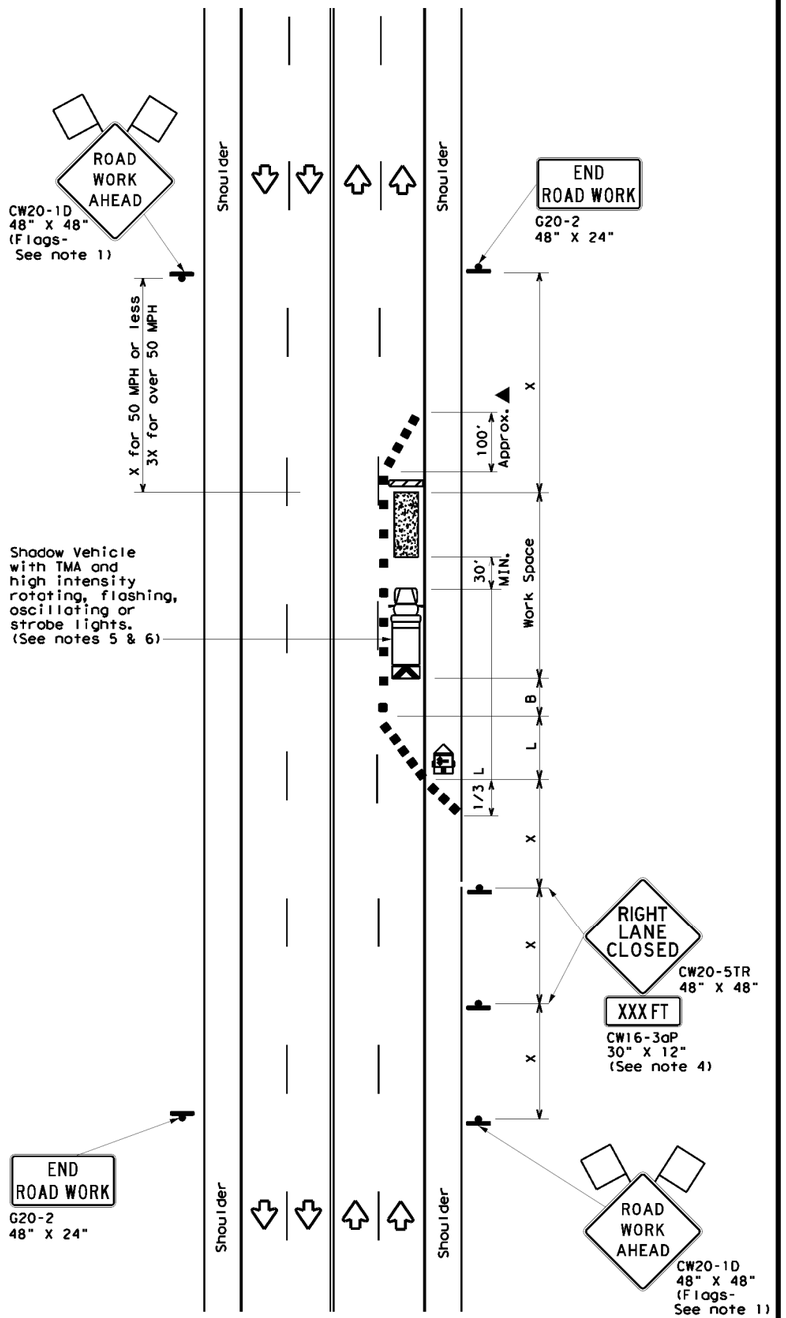
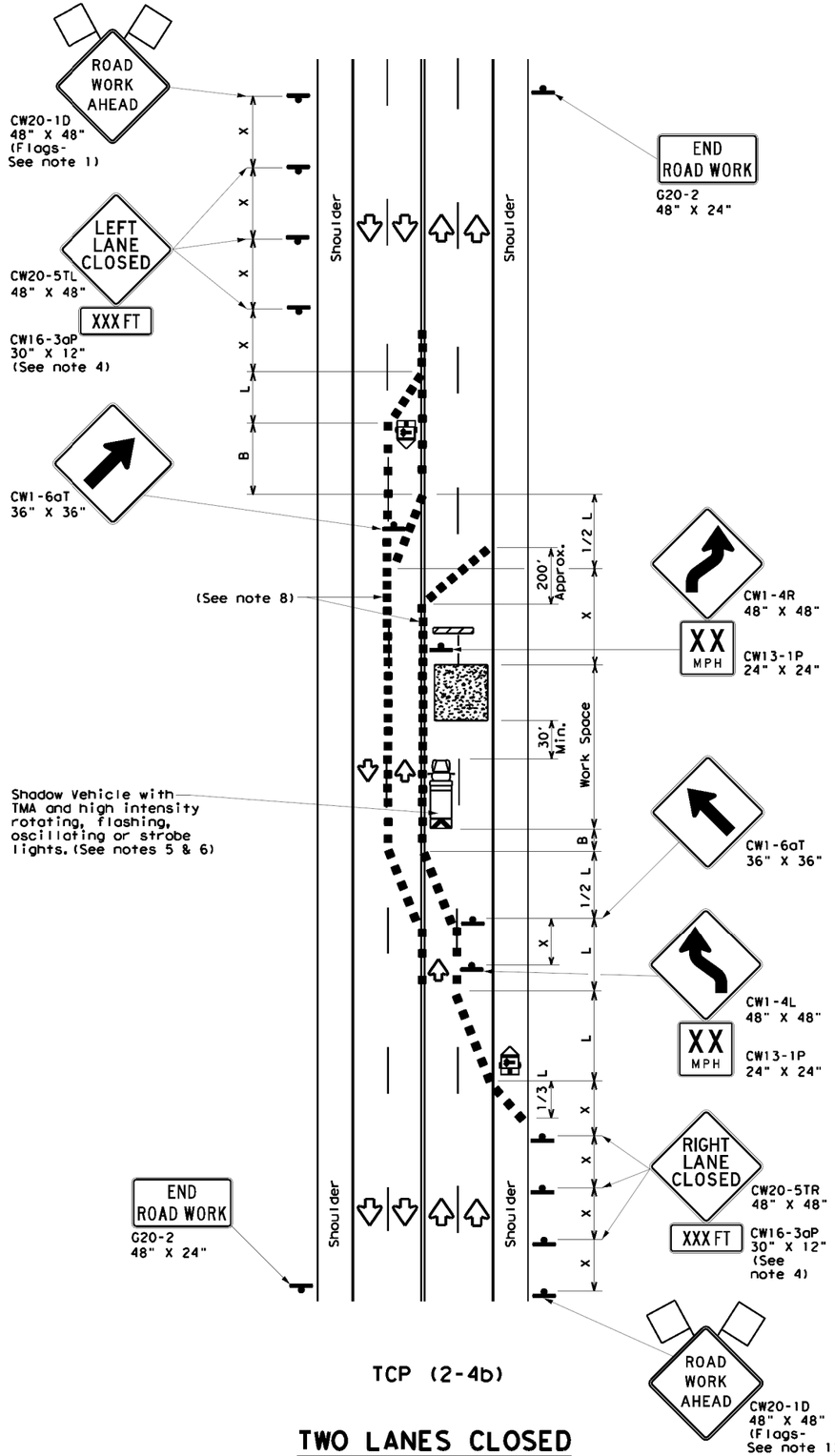


TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES 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 ** 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. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
5. 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.
6. 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.

TCP (2-4a)

7. If this TCP is used for a left lane closure, CW20-5TL "LEFT LANE CLOSED"signs shall be used and channelizing devices shall be placed on the centerline to protect the work space from opposing traffic with the arrow board placed in the closed lane near the end of the merging taper.

TCP (2-4b)

8. For shorter durations where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20' or 15' if posted speeds are 35 mph or slower, and for tangent sections, at 1/2(S) where S is the speed in mph. This tighter devices spacing is intended for the area of conflicting markings, not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0922	00	075	VARIOUS
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	22	WEBB		35

DATE: 1/30/2024 3:37:27 PM
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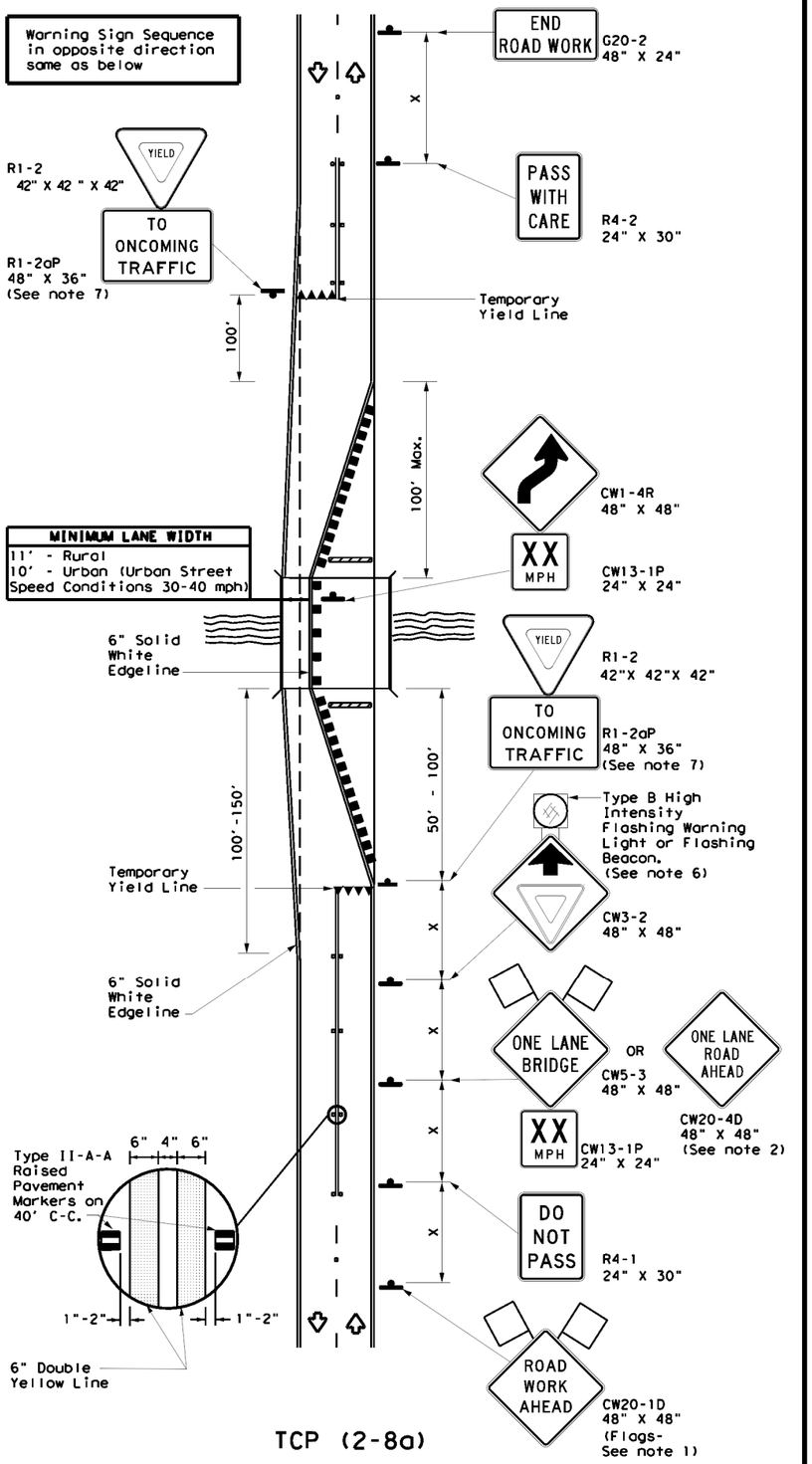
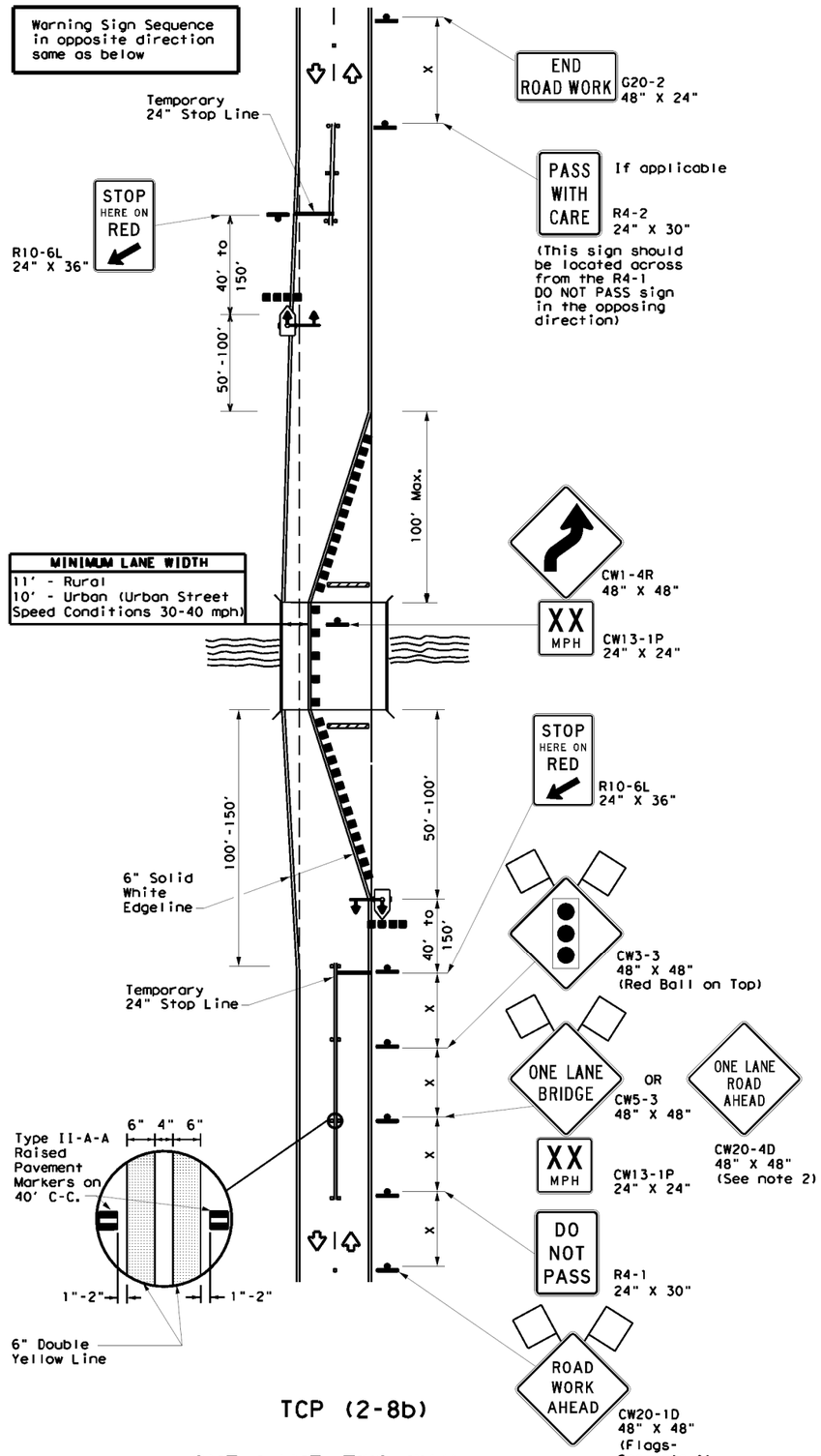


TCP (2-8a)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH YIELD SIGNS
(Less Than 2000 ADT-See Note 5)



TCP (2-8b)

ONE LANE TWO-WAY
TRAFFIC CONTROL WITH TRAFFIC SIGNAL

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Sign		Traffic Flow
	Flag		Flagger
	Raised Pavement Markers Ty II-AA		Temporary or Portable Traffic Signal

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"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* 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. When this TCP is used at a location which does not involve a bridge, a 48" x 48" CW20-4D "ONE LANE ROAD AHEAD" signs should be used in lieu of the CW5-3 "ONE LANE BRIDGE" signs. The CW13-1P Advisory Speed Plaque is required with either warning sign.
3. Raised pavement markers shall be placed 40 feet c-c on centerline between DO NOT PASS signs and stop or yield lines.
4. For intermediate term situations, when it is not feasible to remove and restore pavement markings, the channelization must be made dominant by using a very close spacing. This is especially important in locations of conflicting information, such as where traffic is directed over a double yellow centerline. In such locations a maximum channelizing device spacing of 20 feet is recommended. The 20 foot channelizing device spacing recommendation is intended for the area of conflicting information and not the entire work zone.

TCP (2-8a)

5. Traffic control by CW3-2 "YIELD AHEAD" symbol signs for one lane two-way traffic control operations should be limited to work spaces less than 400 feet long and roadways with less than 2000 ADT. Otherwise, portable traffic signals should be used.
6. If power is available, a flashing beacon should be attached to the CW3-2 "YIELD AHEAD" symbol sign for emphasis.
7. The R1-2 "YIELD" and R1-2aP "TO ONCOMING TRAFFIC" signs and other regulatory signs shall be installed at 7 foot minimum mounting height.

TCP (2-8b)

8. A list of approved Portable Traffic Signals can be found in the "Compliant Work Zone Traffic Control Devices" list.
9. Portable traffic signals should be located to provide adequate stopping sight distance for approaching motorist (See table above).

Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC CONTROL PLAN
LONG TERM ONE-LANE TWO-WAY CONTROL

TCP(2-8)-23

FILE: tcp2-8-23.dgn	DN:	CK:	DW:	CK:
© TxDOT April 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-85 4-98 2-18 8-95 3-03 4-23 1-97 2-12	0922	00	075	VARIOUS
	DIST	COUNTY		SHEET NO.
	22	WEBB		36

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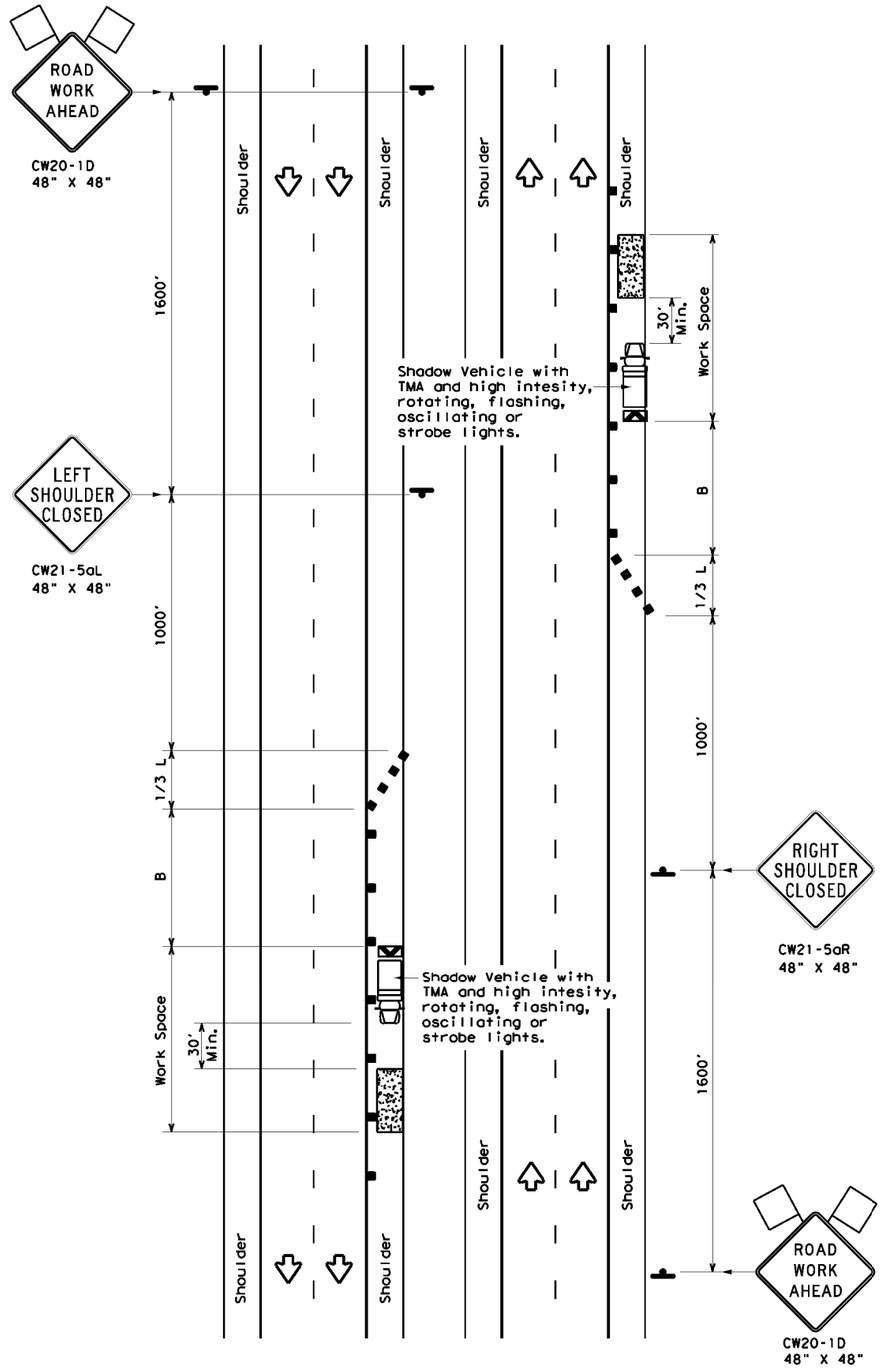
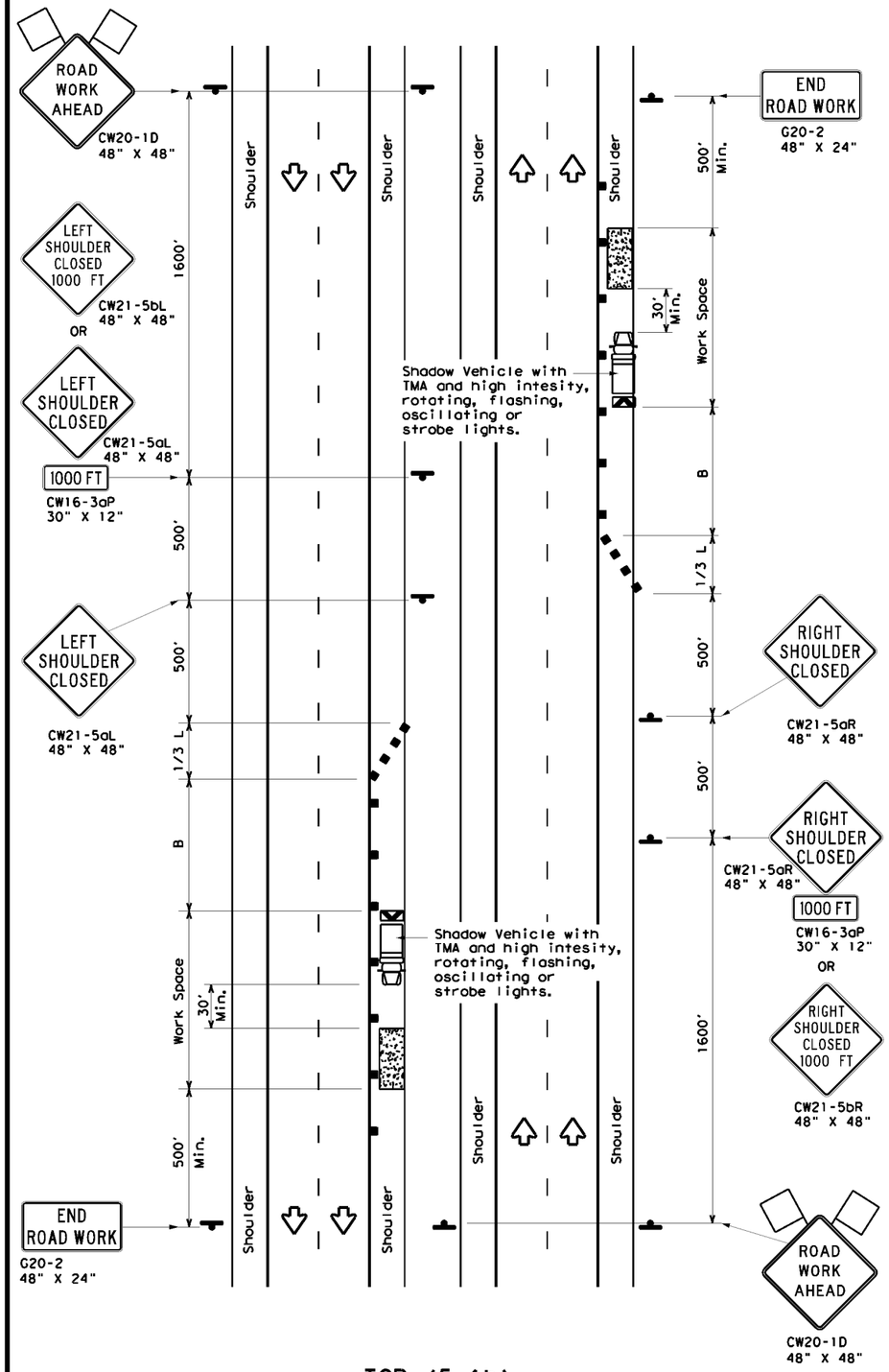


TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
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2-18	DIST	COUNTY		SHEET NO.
	22	WEBB		37

DATE: 1/30/2024 3:38:06 PM
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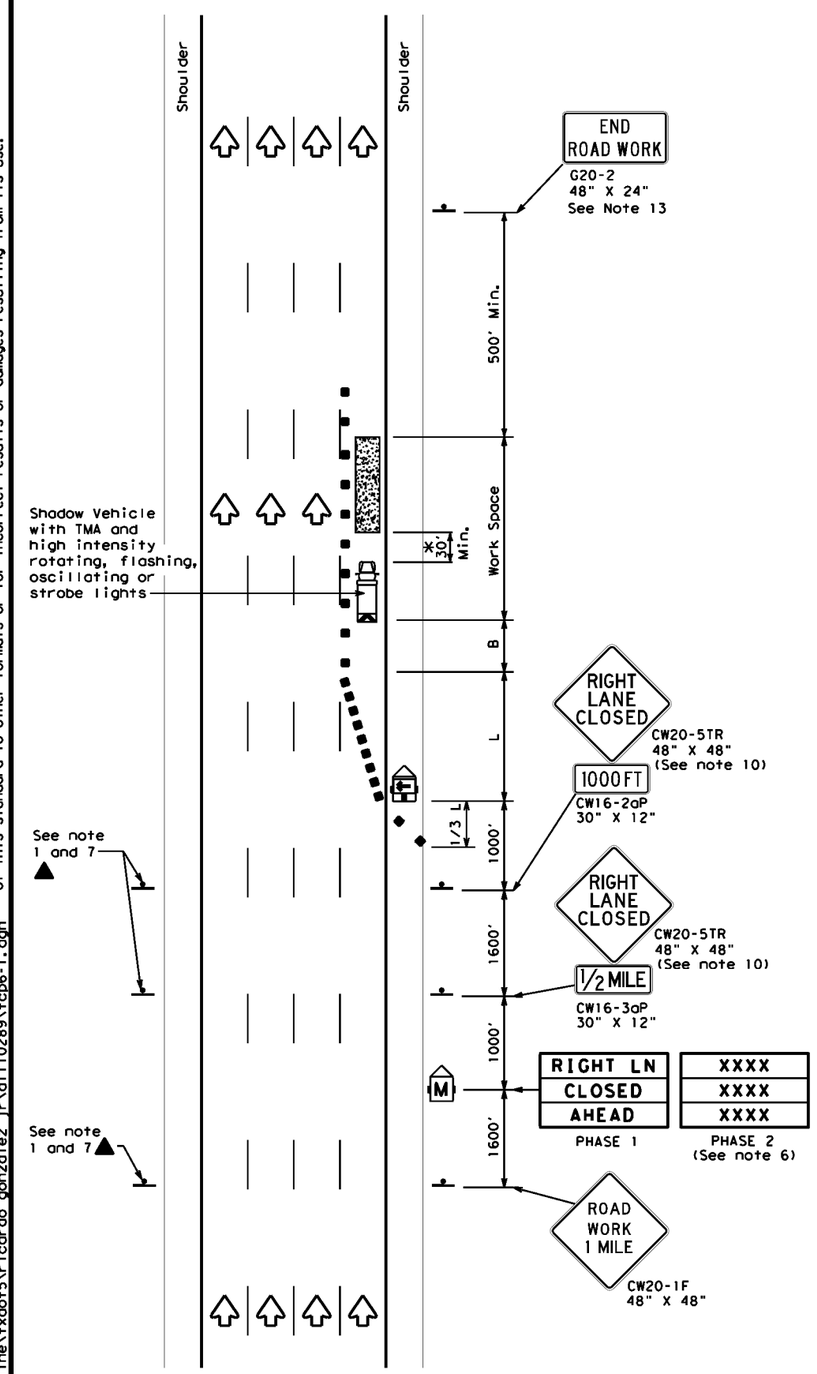
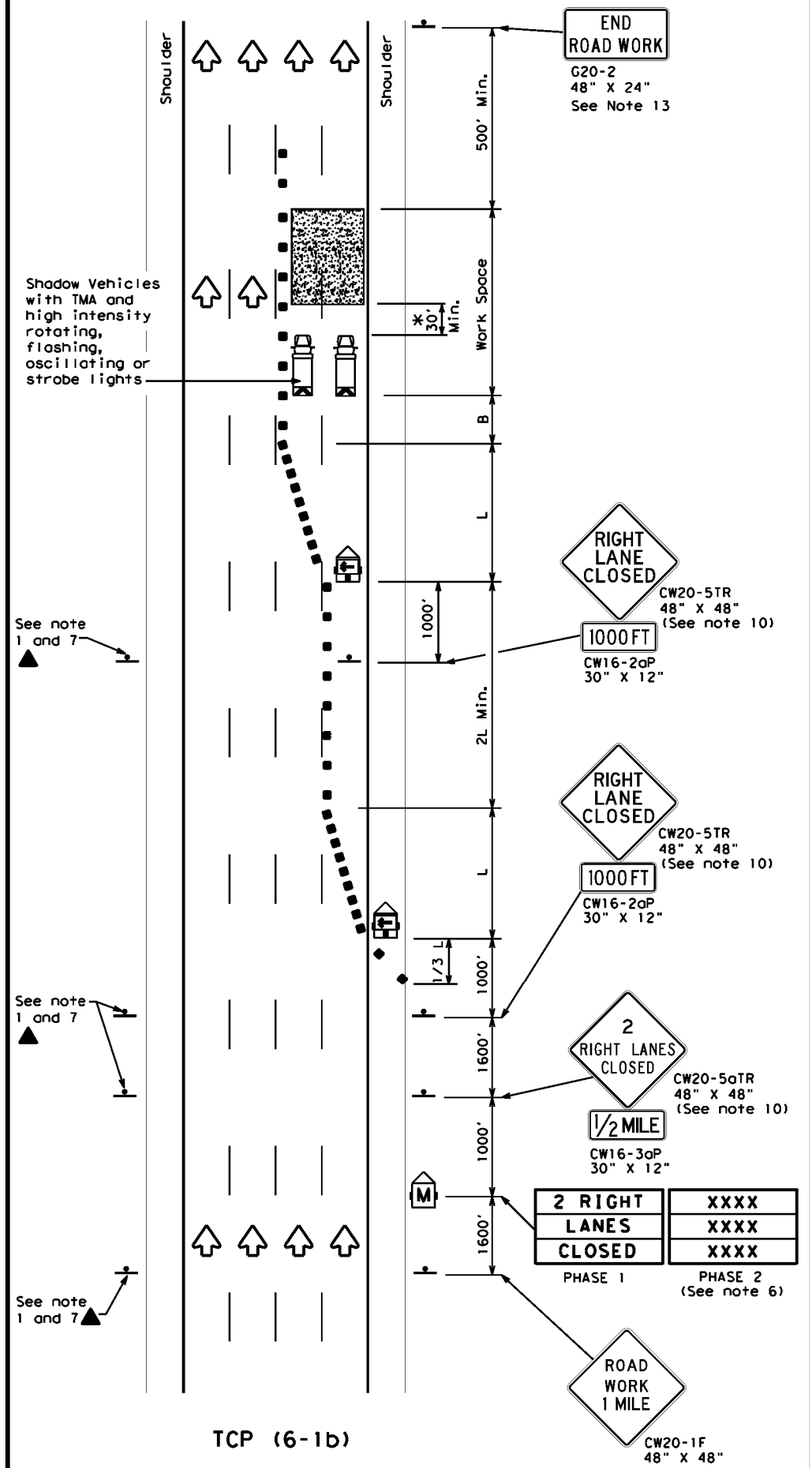


TCP (6-1a)

TYPICAL FREEWAY ONE LANE CLOSURE



TCP (6-1b)

TYPICAL FREEWAY TWO LANE CLOSURE

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

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

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

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

GENERAL NOTES

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

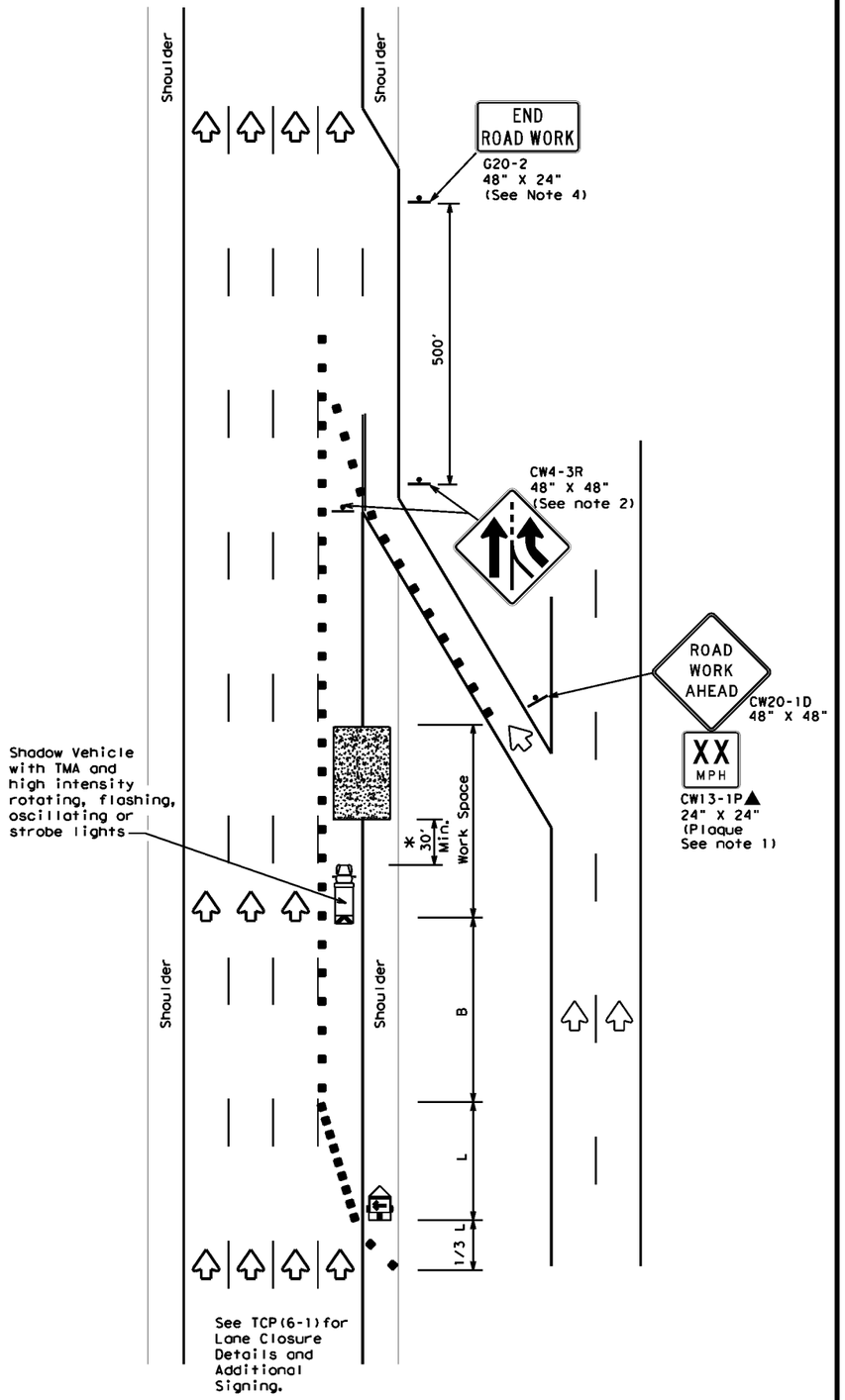
* A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN FREEWAY LANE CLOSURES

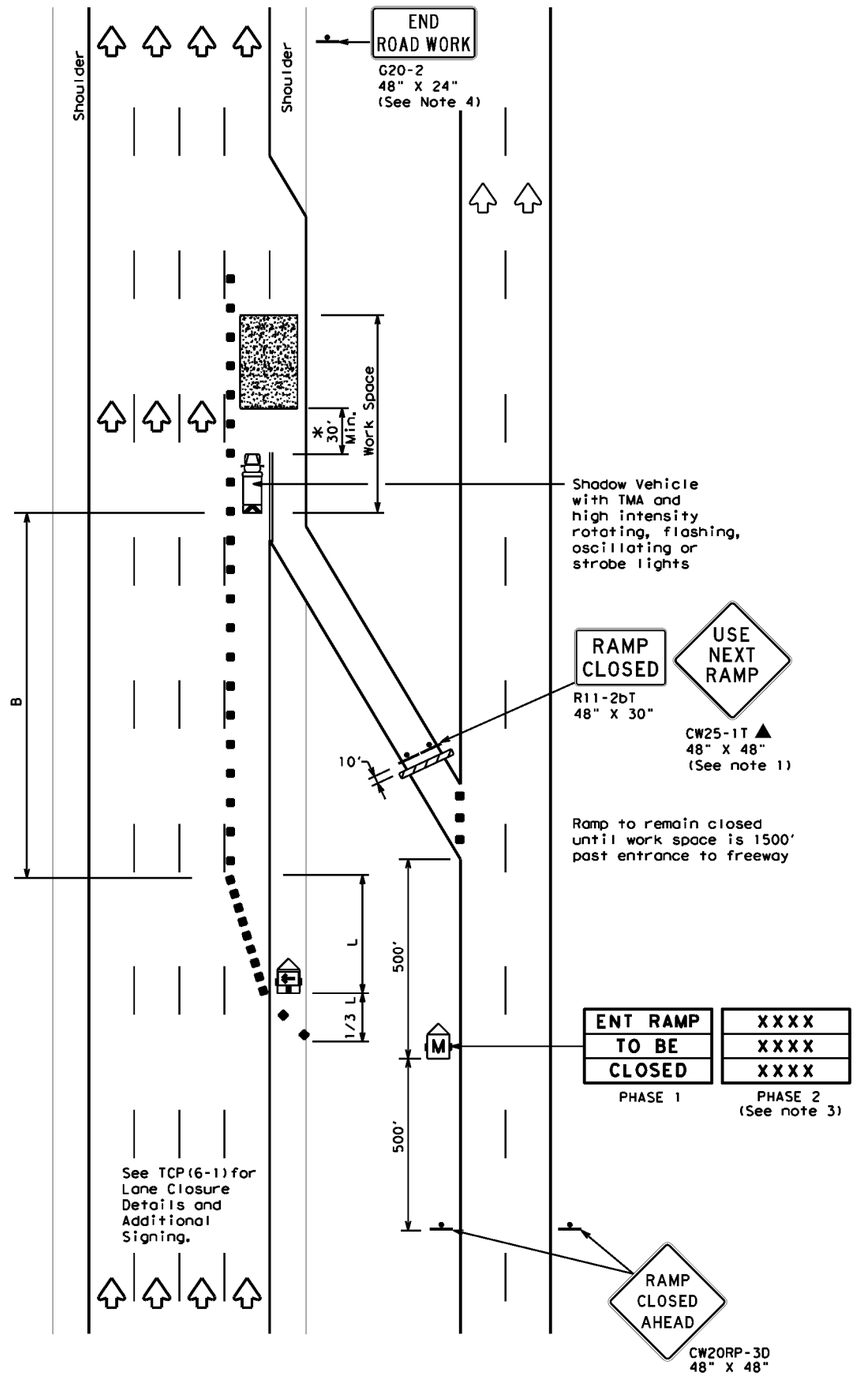
TCP(6-1)-12

FILE: tcp6-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-12	0922	00	075	VARIOUS
	DIST	COUNTY		SHEET NO.
	22	WEBB		38



TCP (6-2a)

ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)

ENTRANCE RAMP CLOSED

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

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

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

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

GENERAL NOTES

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

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

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP(6-2)-12

FILE: tcp6-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	22	WEBB		39

DATE: 1/30/2024 3:38:21 PM
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DATE: 1/30/2024 7:27:08 PM
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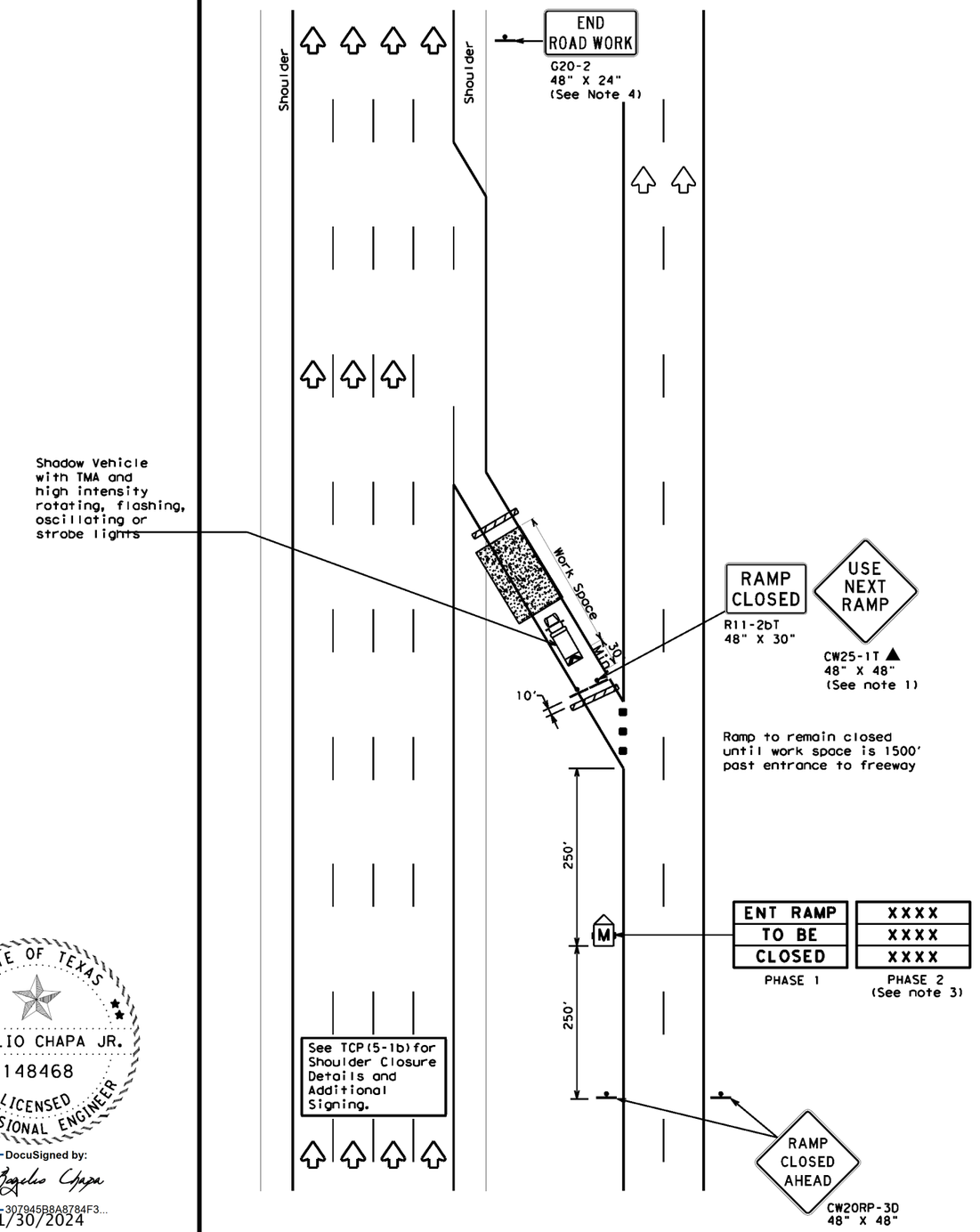


TCP (6-2b)

ENTRANCE RAMP CLOSED

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

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

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

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

GENERAL NOTES

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

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

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

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER
DocuSigned by:
307945B8A8784F3...
1/30/2024

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

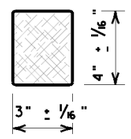
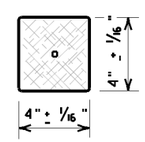
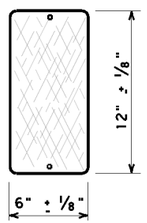
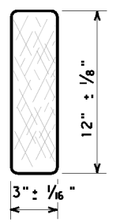
TCP(6-2)-12 (MOD)

FILE:	tcp6-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS		0922	00	075	VARIOUS
1-97 8-98		DIST	COUNTY		SHEET NO.
4-98 8-12		22	WEBB		40

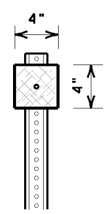
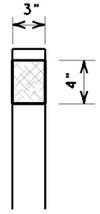
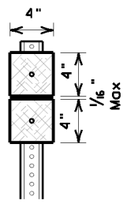
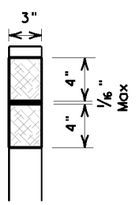
202

DATE: 1/30/2024 3:38:50 PM
FILE: c:\txdot\pw_online\txdot5\ricardo gonzalez jr\d1110289\dom1-20.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
S = Single
D = Double

COLOR OF REFLECTORS
W = White
Y = Yellow
R = Red

REFLECTOR UNIT SIZE
1 or 2

TYPE OF POST OR DELINEATOR
WC = Wing Channel Post
YFLX = Yellow Flexible Post
WFLX = White Flexible Post
BRF = Barrier Reflector

TYPE OF MOUNT
GND = Embedded (drivable or set in concrete)
CTB = Concrete Barrier Mount
GF1 or GF2 = Guard Fence Attachment
SRF = Surface Mount

DIRECTION
If Required
BI = Bi-Directional
BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
1, 2, 3, or 4

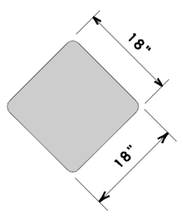
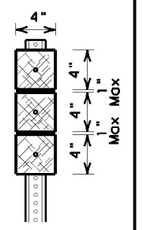
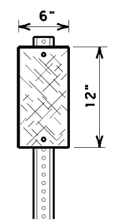
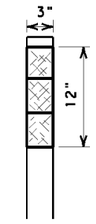
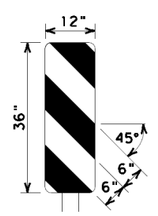
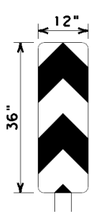
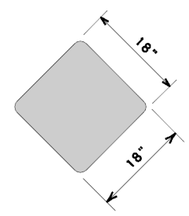
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

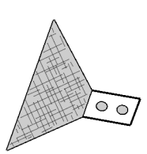
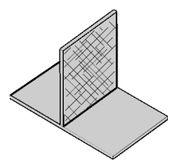
TYPE OF MOUNT
GND = Embedded (drivable)
SRF = Surface Mount
WAS = Wedge Anchor Steel
WAP = Wedge Anchor Plastic

DIRECTION
If Required
BI = Bi-Directional

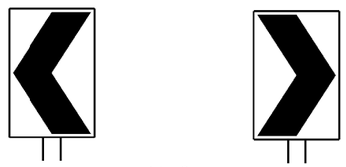
OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow-Type B_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			
	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.		
SHEETING	Yellow, White, Red		
NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.		

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	
NOTE	1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).			

ONE DIRECTION LARGE ARROW

DEVICE	 W1-6	
SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

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

DEPARTMENTAL MATERIAL SPECIFICATIONS

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

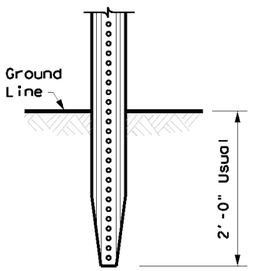
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	22	WEBB		41

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

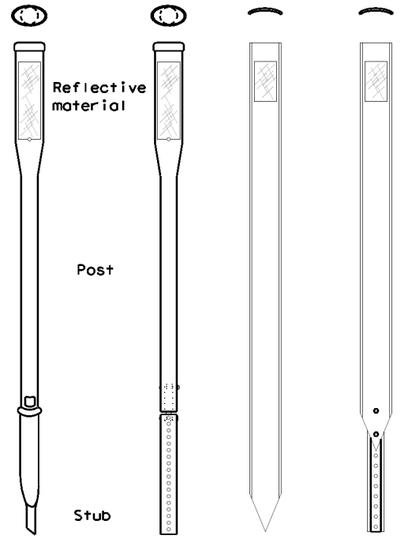


NOTES

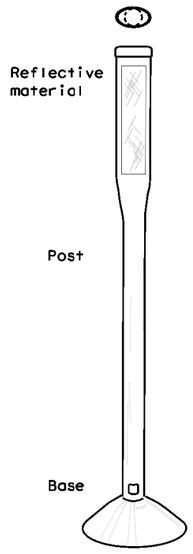
1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

FLEXIBLE POSTS (YFLX, WFLX)

GND



SRF



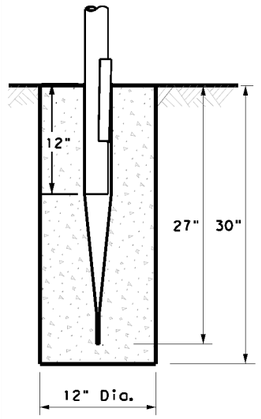
EMBEDDED | SURFACE MOUNT

NOTES

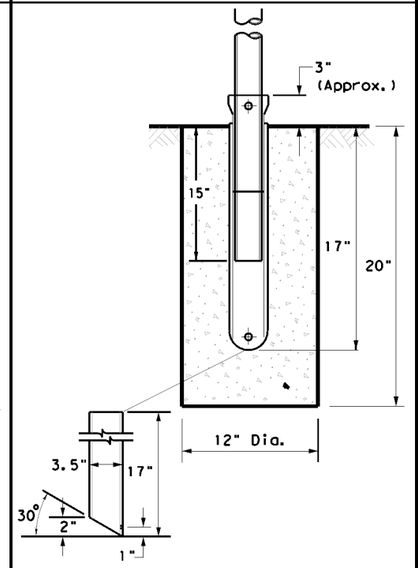
1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline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

WEDGE ANCHOR SYSTEMS

WAS



WAP



STEEL | PLASTIC

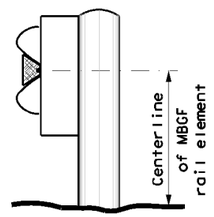
NOTE

1. Install per manufacturer's recommendations.

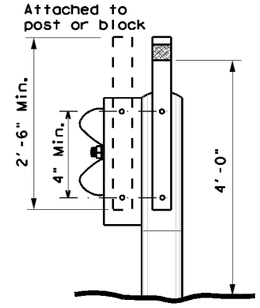
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

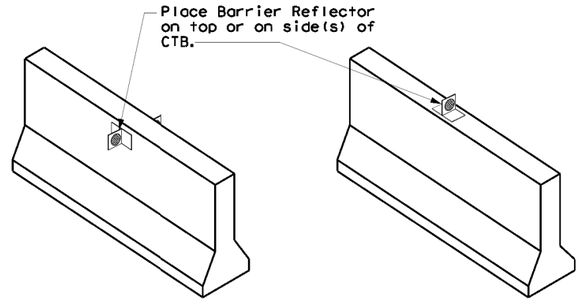
GF1



GF2



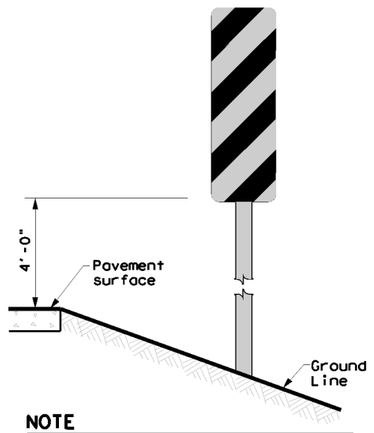
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

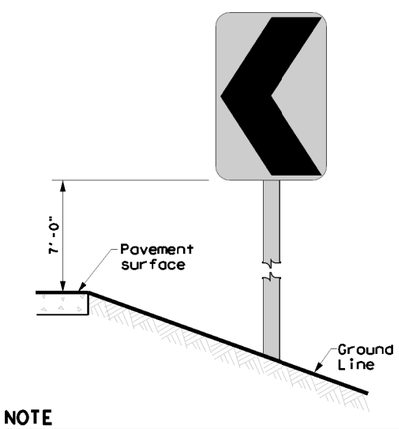
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

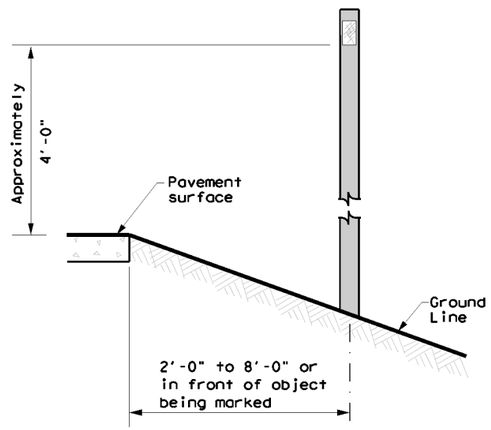
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation — Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	22	WEBB		42

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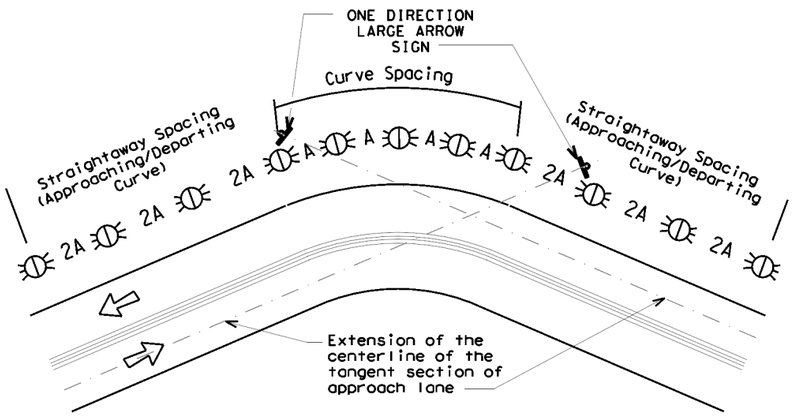
MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

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

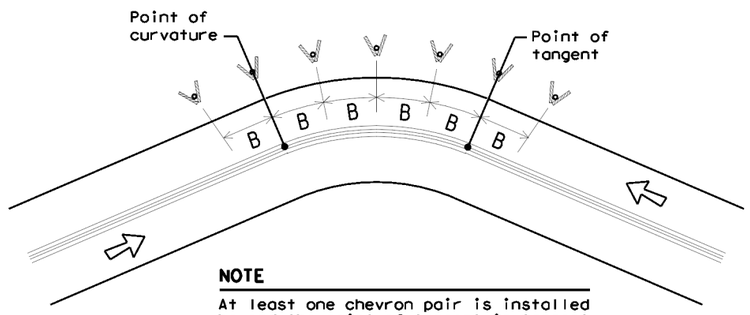
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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

Traffic Safety Division Standard

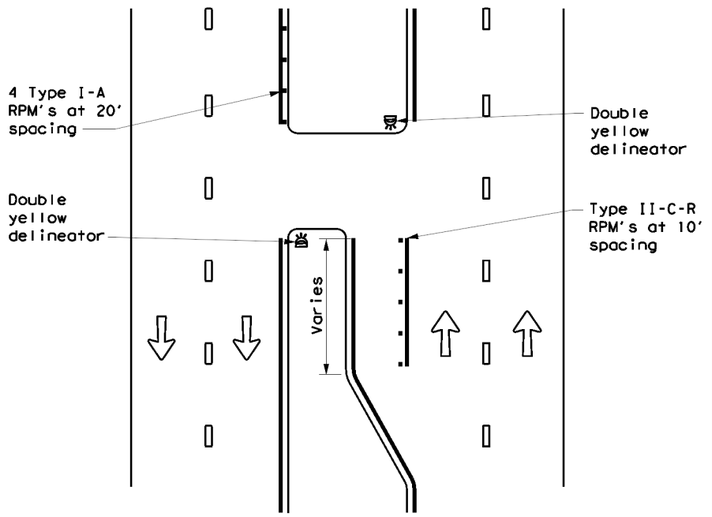
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	22	WEBB		43

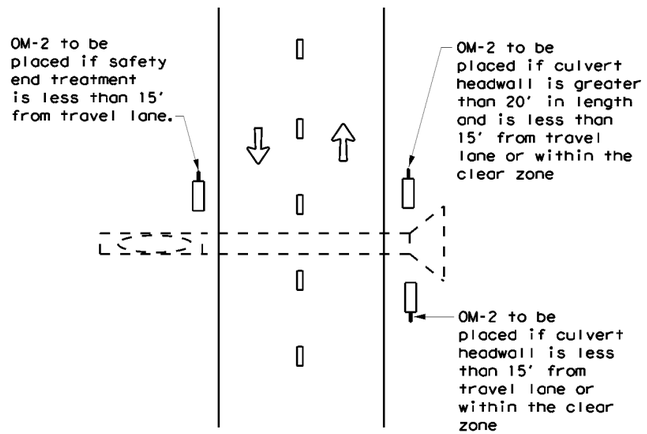
20C

CROSSOVERS



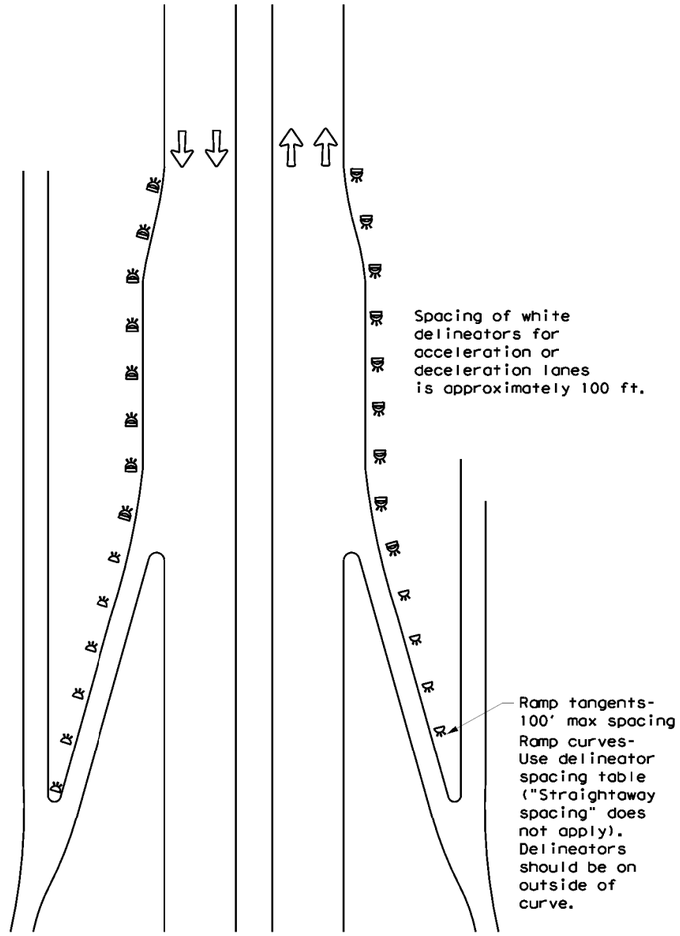
DETAIL 1

FOR CULVERTS WITHOUT MBGF



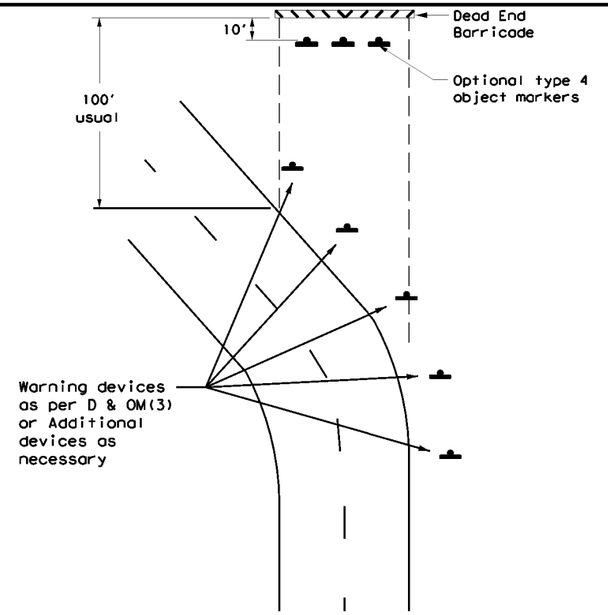
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



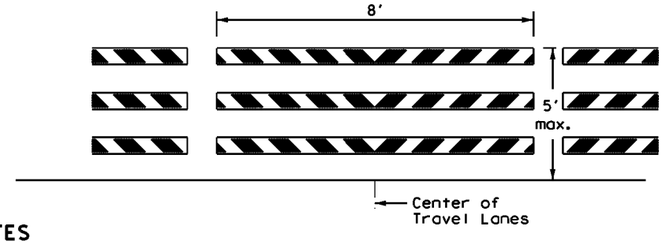
DETAIL 3

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
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3-15 7-20	DIST	COUNTY		SHEET NO.
	22	WEBB		44

200

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DATE: 1/30/2024 3:39:56 PM
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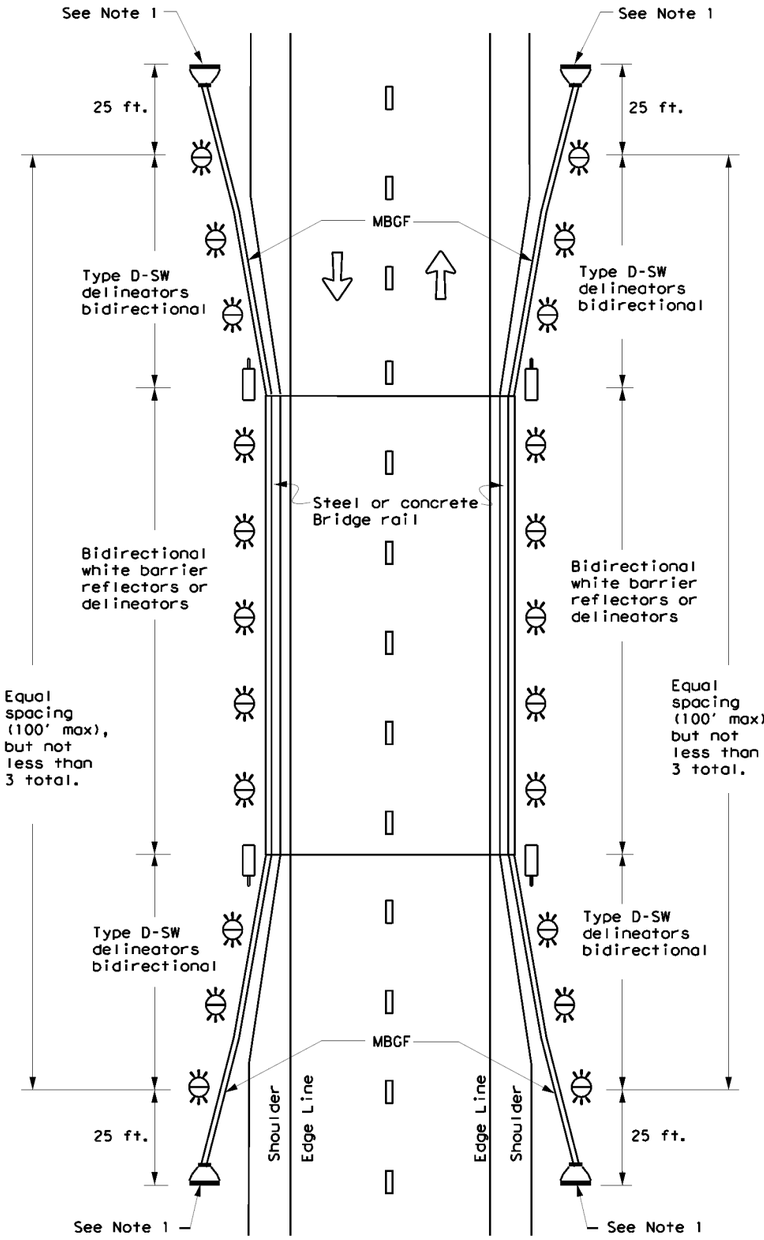
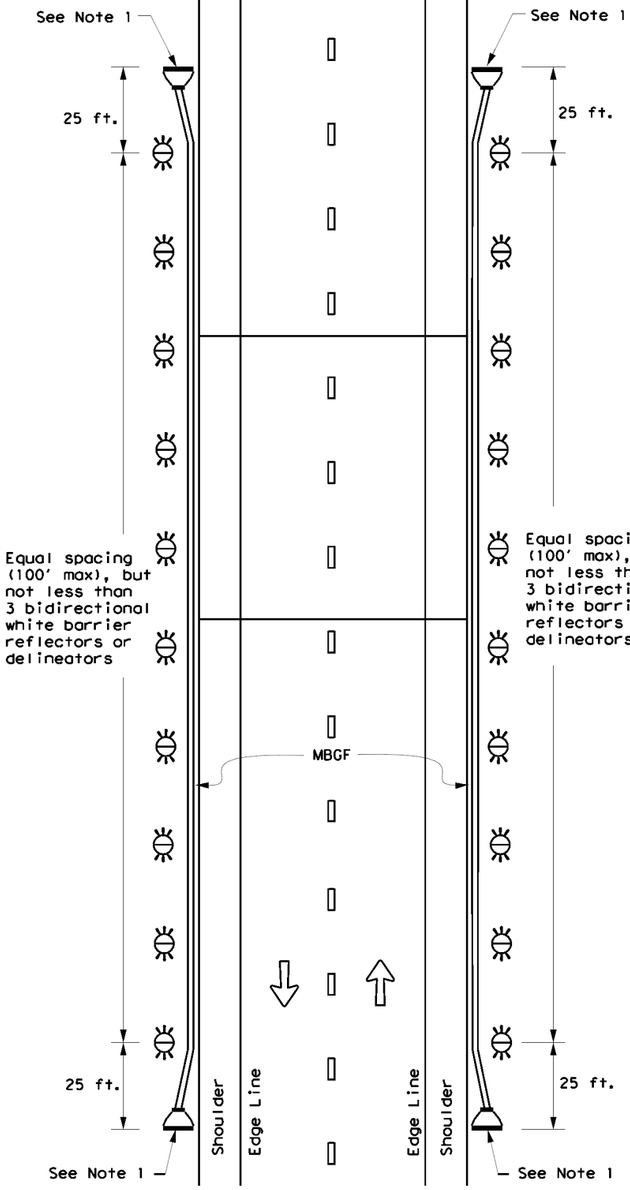
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. 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.

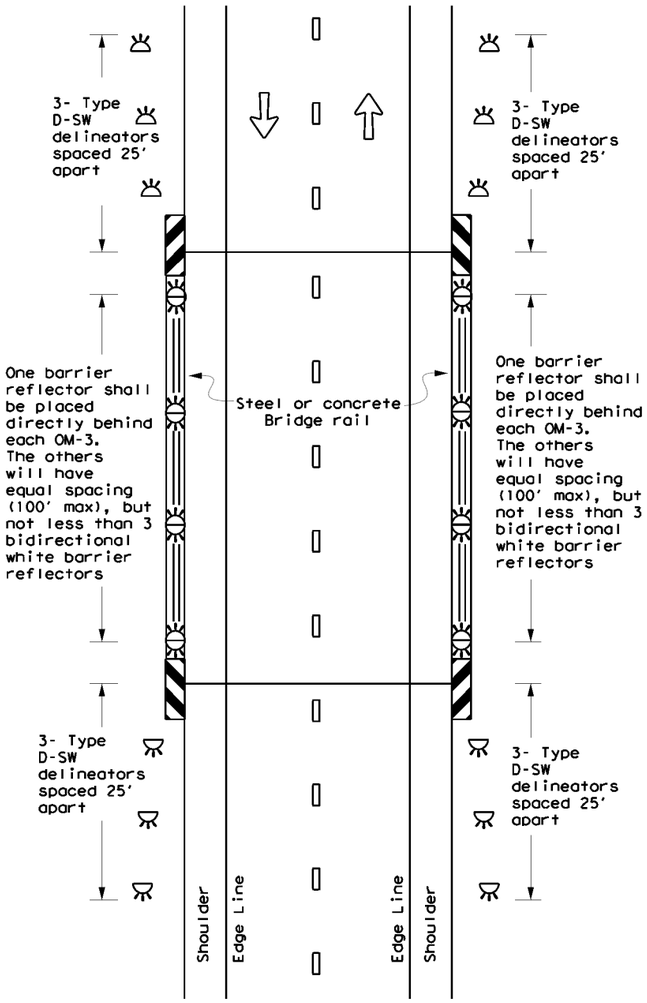
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. 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.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



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(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
7-20	DIST	COUNTY		SHEET NO.
	22	WEBB		45

20E

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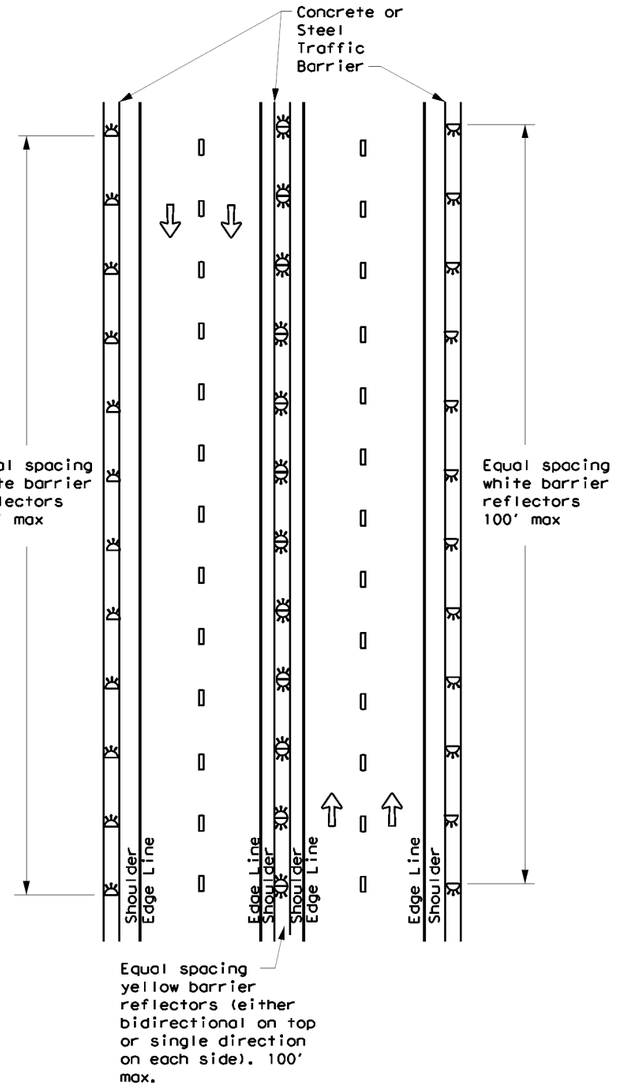
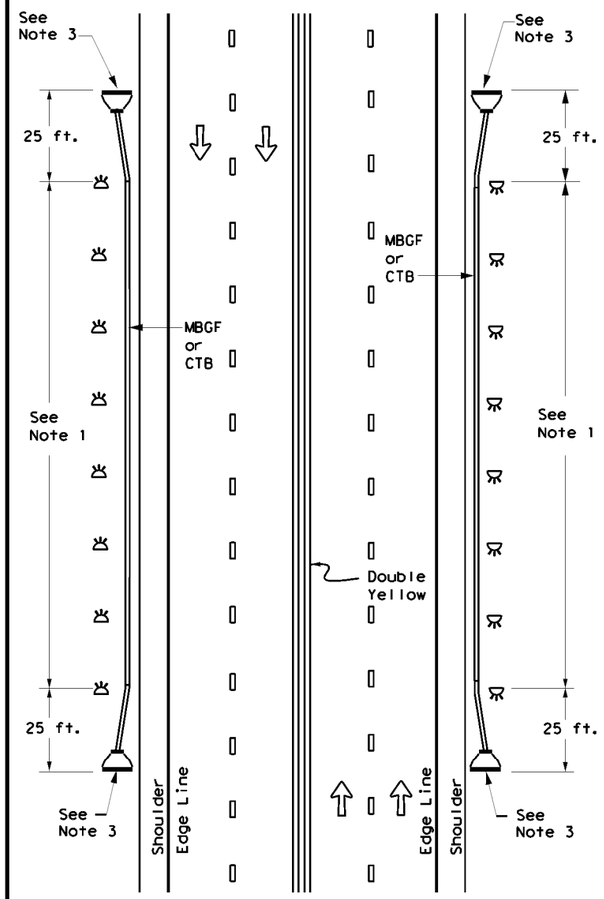
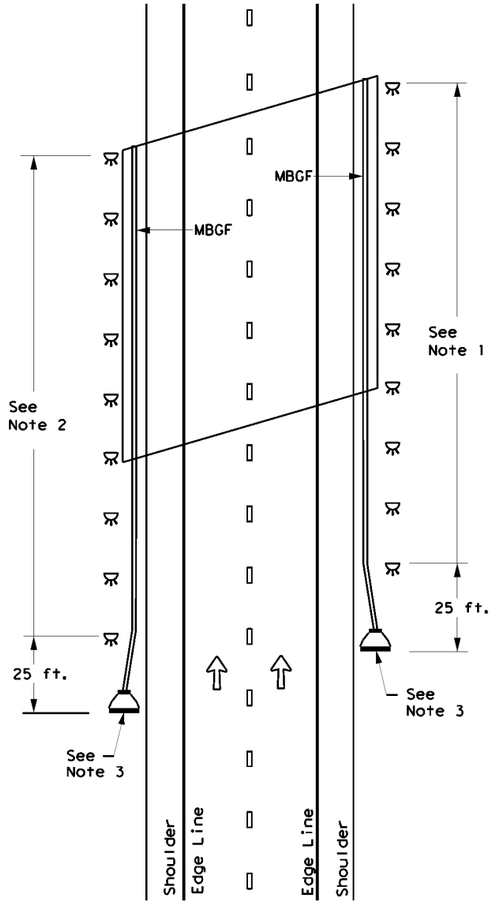
CONTINUOUS CONCRETE OR STEEL BARRIER



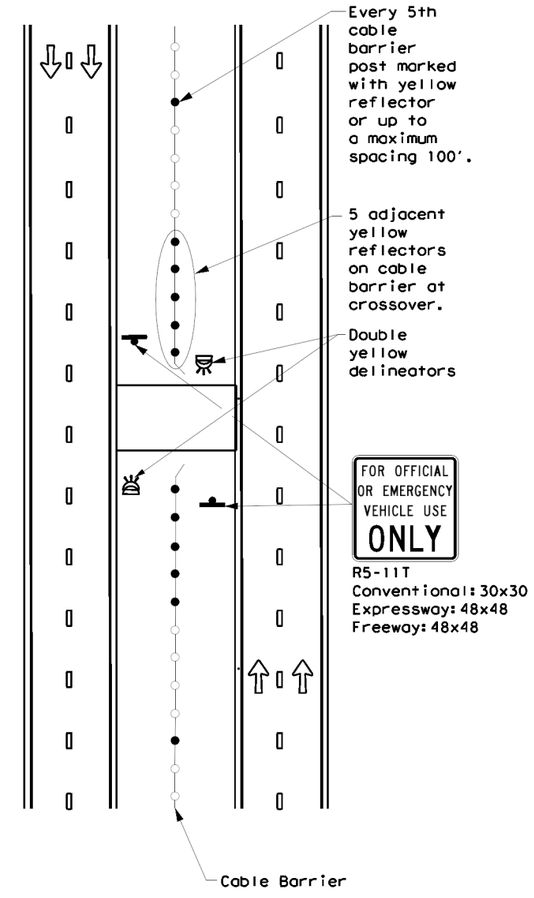
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

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

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
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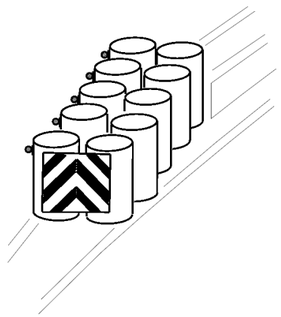
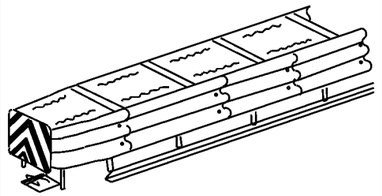
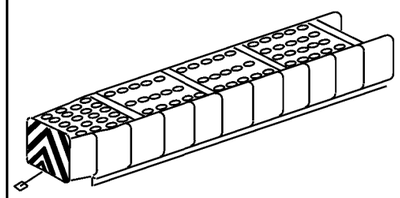
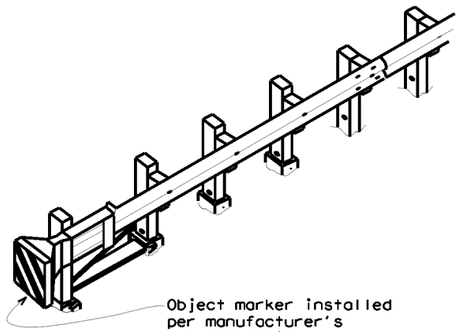
7-20	DIST	COUNTY		SHEET NO.
	22	WEBB		46

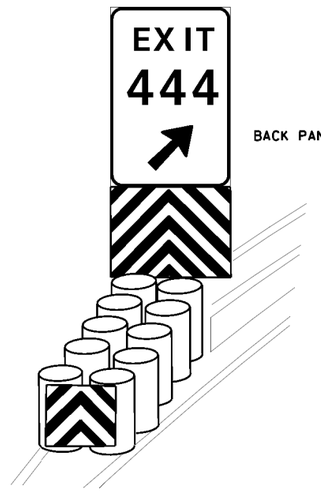




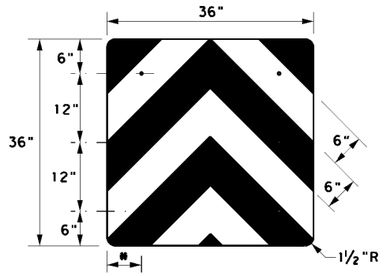


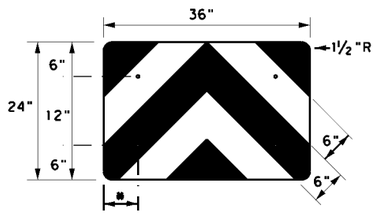


Object marker installed per manufacturer's recommendations.

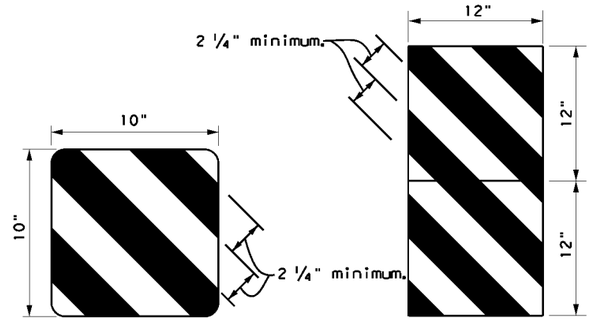


BACK PANEL (OPTIONAL)

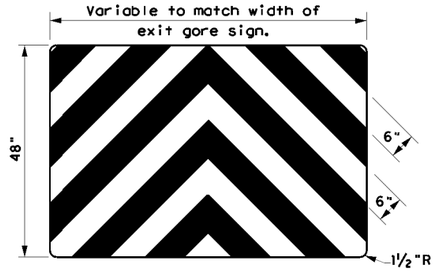


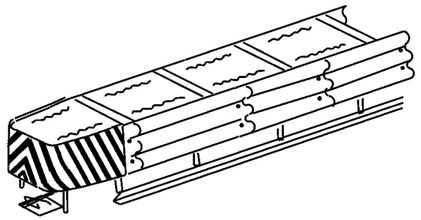


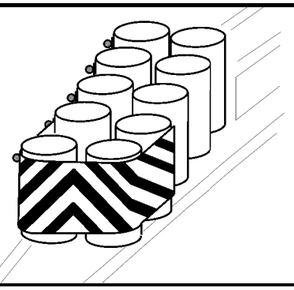
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

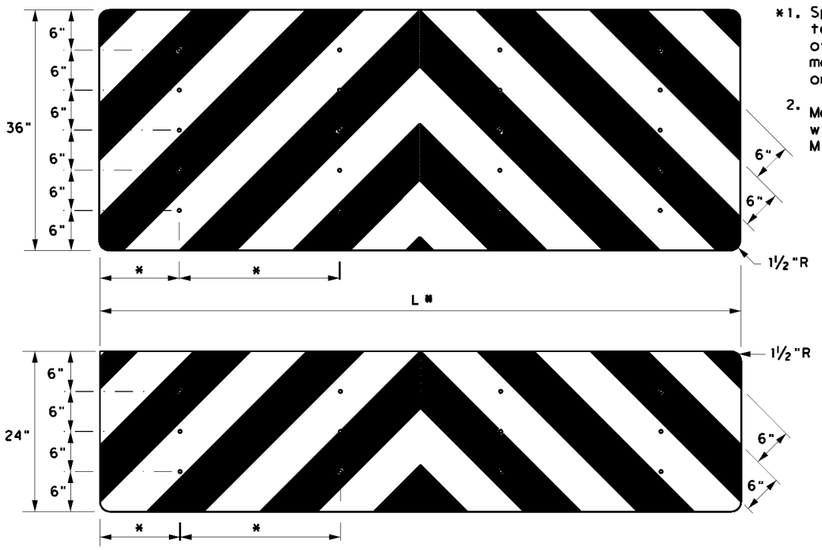


OBJECT MARKERS SMALLER THAN 3 FT^2









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: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	22	WEBB		47
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20G

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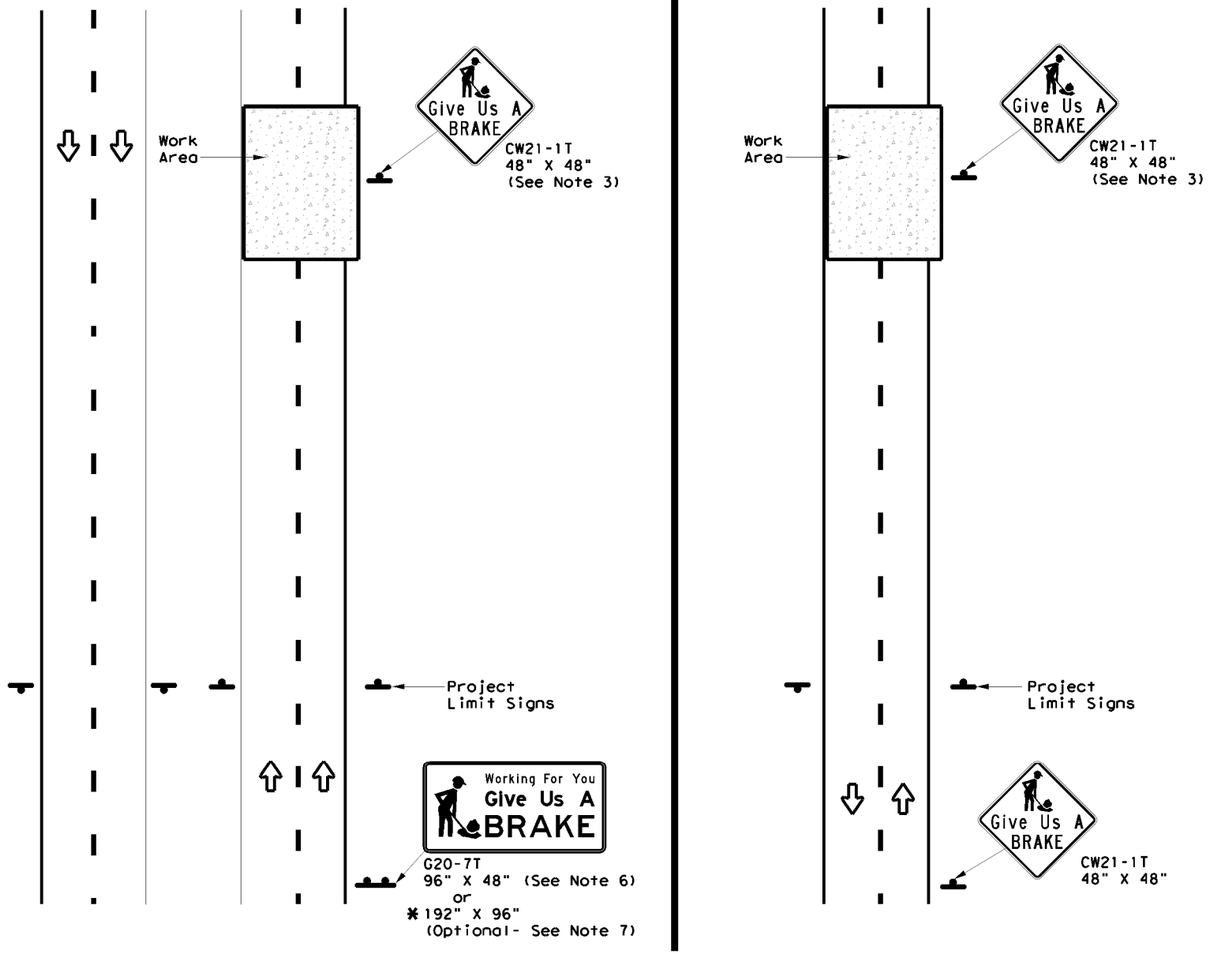

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

SUMMARY OF LARGE SIGNS

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL			DRILLED SHAFT 24" DIA. (LF)
						Size	(LF) ①	(LF) ②	
Orange	G20-7T	Working For You Give Us A BRAKE	96" X 48"	Type B_{FL} or C_{FL}	32	▲	▲	▲	▲
Orange	G20-7T	Working For You Give Us A BRAKE	192" X 96"	Type B_{FL} or C_{FL}	128	W8x18	16	17	12

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.
2. Sign locations shall be approved by the Engineer.
3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
   Item 636 - Aluminum Signs
   Item 647 - Large Roadside Sign Supports and Assemblies.
   Item 416 - Drilled Shaft Foundations
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.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
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6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	22	WEBB		48

116

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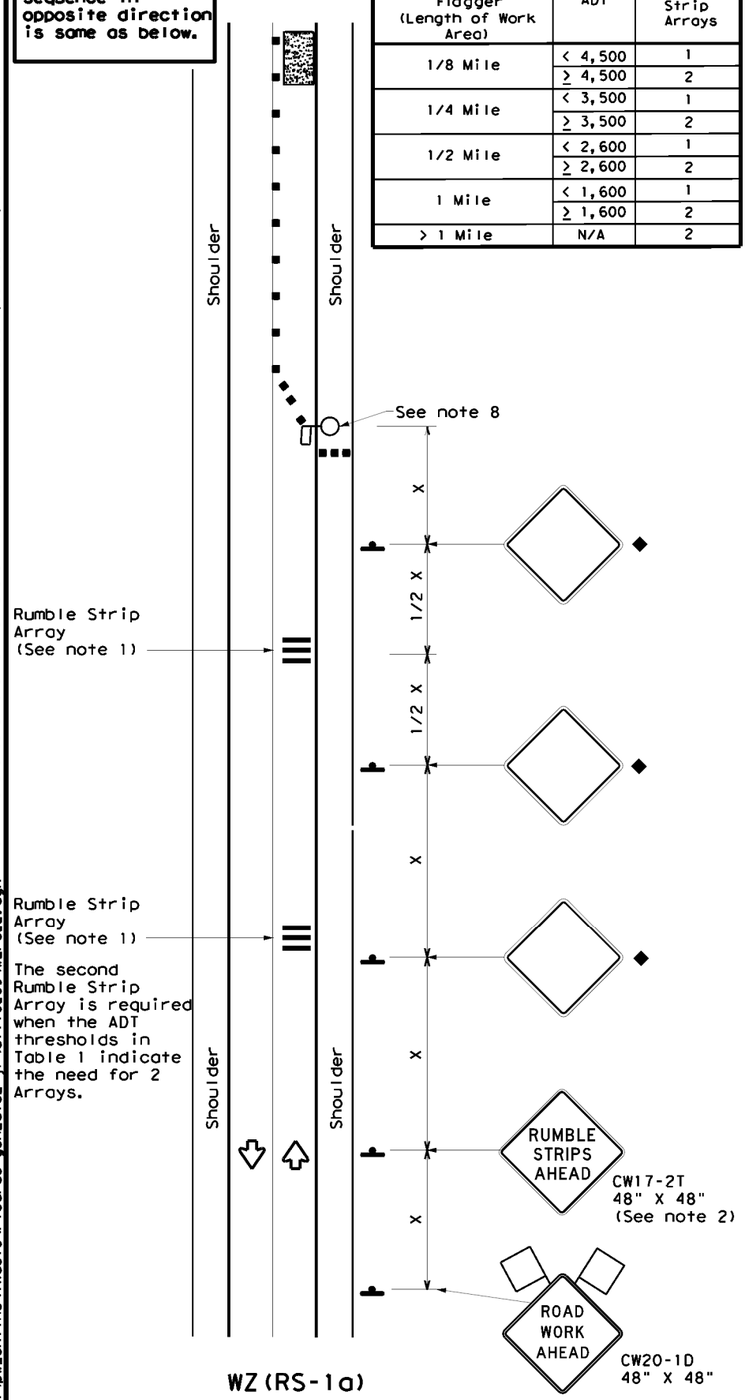
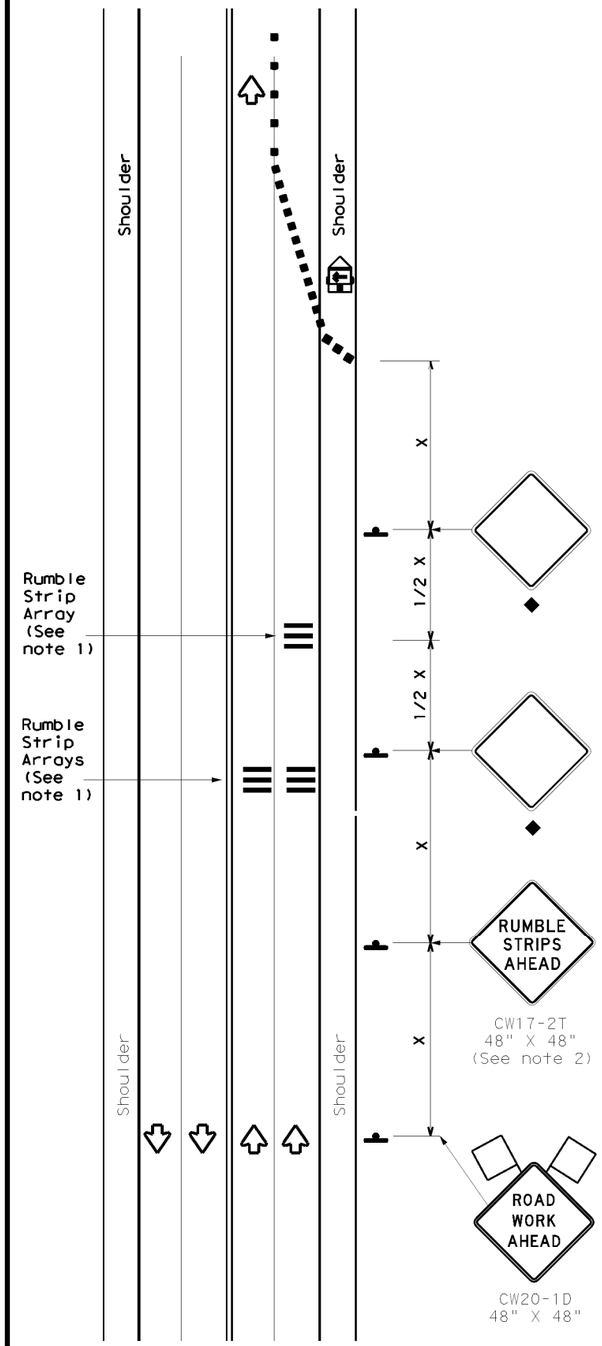
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

* For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

TABLE 2	
Speed	Approximate distance between strips in an array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
= 60 MPH	20'
≥ 65 MPH	* 35' +

Texas Department of Transportation — Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	0922	00	075	VARIOUS
	DIST	COUNTY		SHEET NO.
	22	WEBB		49

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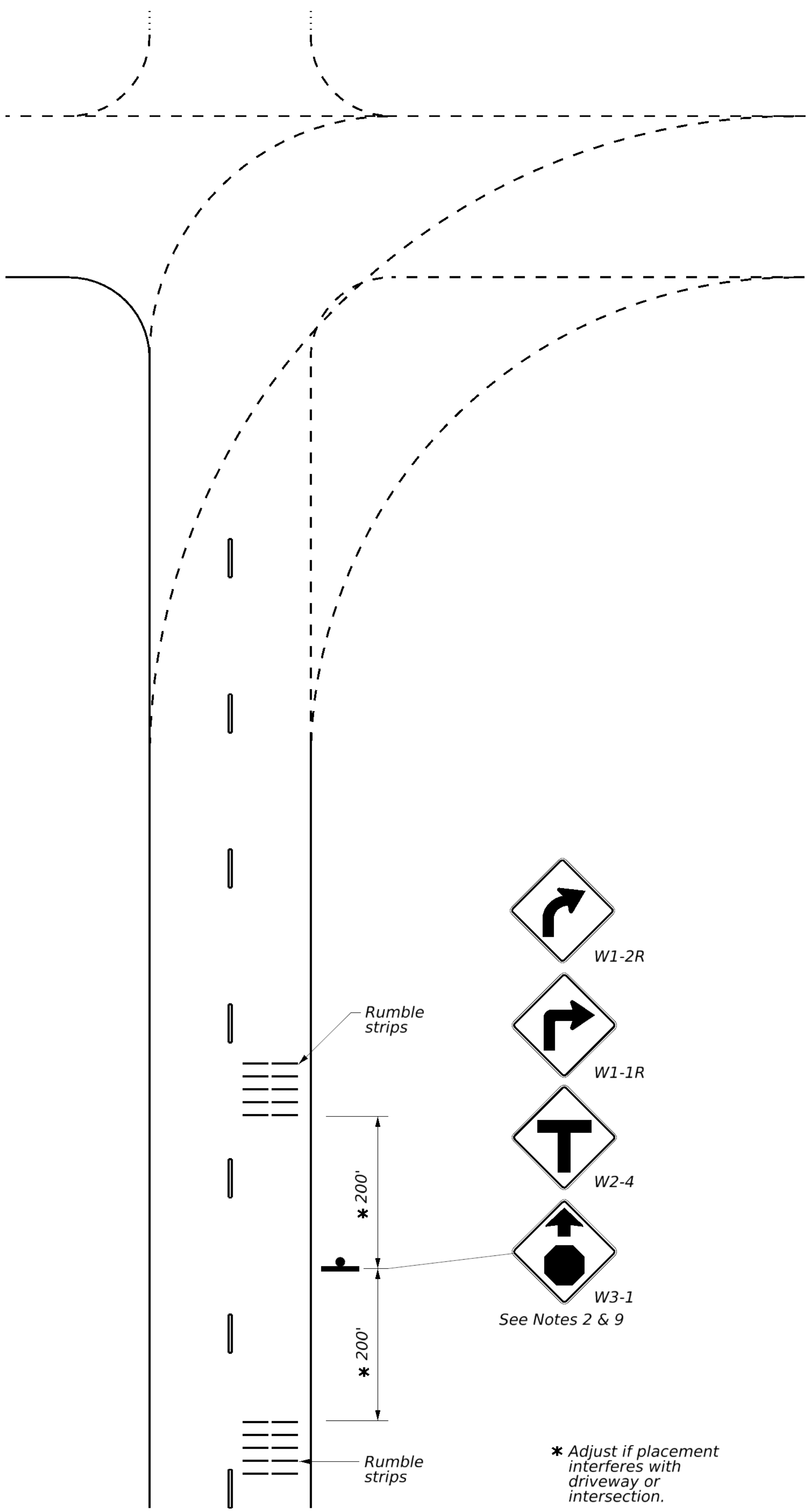
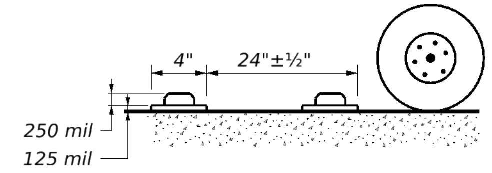
RUMBLE STRIP TYPICAL APPLICATION

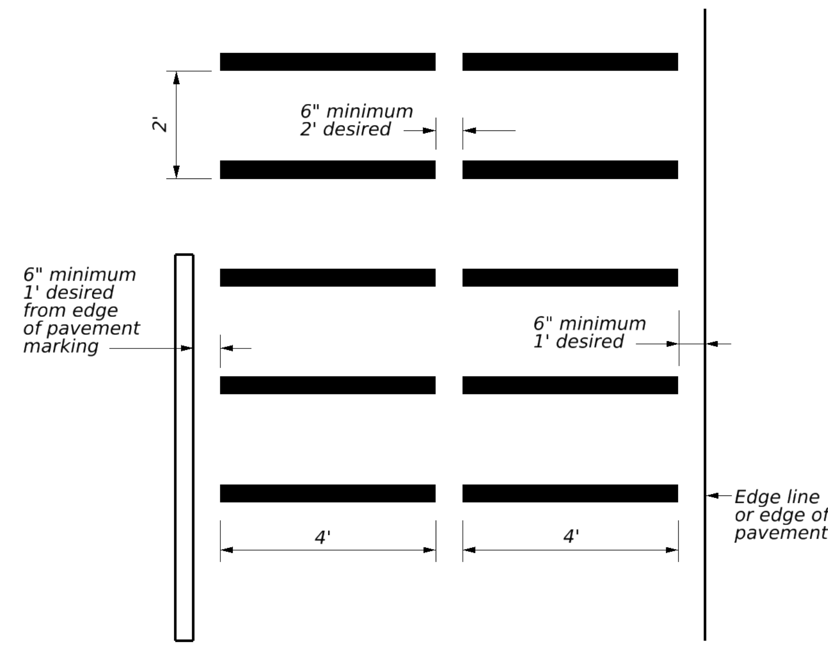
See Note 1





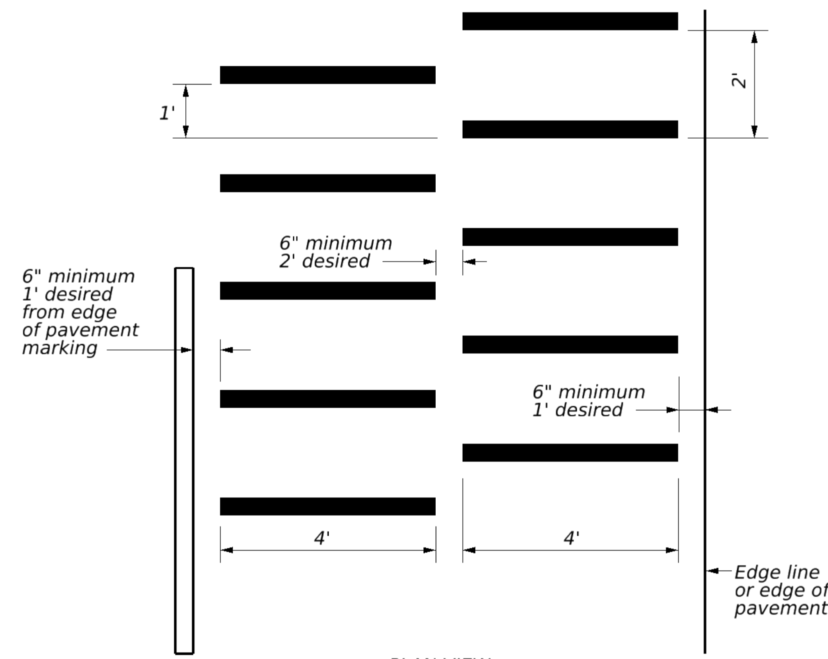
PROFILE VIEW

RUMBLE STRIP STANDARD PATTERN



PLAN VIEW

RUMBLE STRIP ALTERNATIVE PATTERN



PLAN VIEW

GENERAL NOTES

1. Transverse or in-lane rumble strips should only be used at high incident and special geometric locations. These special geometric locations may include: approaches to rural, high speed signalized or stop-controlled intersections with sight restrictions and/or high crash rates, approaches to unexpected urban intersections, approaches to newly installed stop or signalized controlled intersections, approaches to toll plazas, approaches to hazardous horizontal curves, and approaches to railroad grade crossings.
2. When used, the rumble strips shall be placed 200 feet upstream and downstream of the warning sign.
3. The use of rumble strips should not be widespread or indiscriminate.
4. Preformed black raised rumble strips should be used. They should be installed in accordance with the manufacturer's recommendations.
5. Please reference the TxDOT Material Producers List for approved rumble strips (transverse): http://www.txdot.gov/
6. Consideration should be given to noise levels when in-lane or transverse rumble strips are to be installed near residential areas, schools, churches, etc.
7. The RUMBLE STRIPS AHEAD (W17-2T) sign may be used in advance of in-lane or transverse rumble strips, based on engineering judgement. This sign is typically not necessary for rumble strip installations built to the guidelines on this standard sheet. When used, this sign should be spaced in advance of the rumble strips based on the Guidelines for Advance Placement of Warning Signs table of the Texas Manual on Uniform Traffic Control Devices.

W17-2T

8. Consideration shall be given to bicyclists. See RS(6).
9. Other signs can be used as conditions warrant.

Texas Department of Transportation

Traffic Safety Division Standard

TRANSVERSE OR IN-LANE RUMBLE STRIPS

RS(5)-23

FILE: rs(5)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
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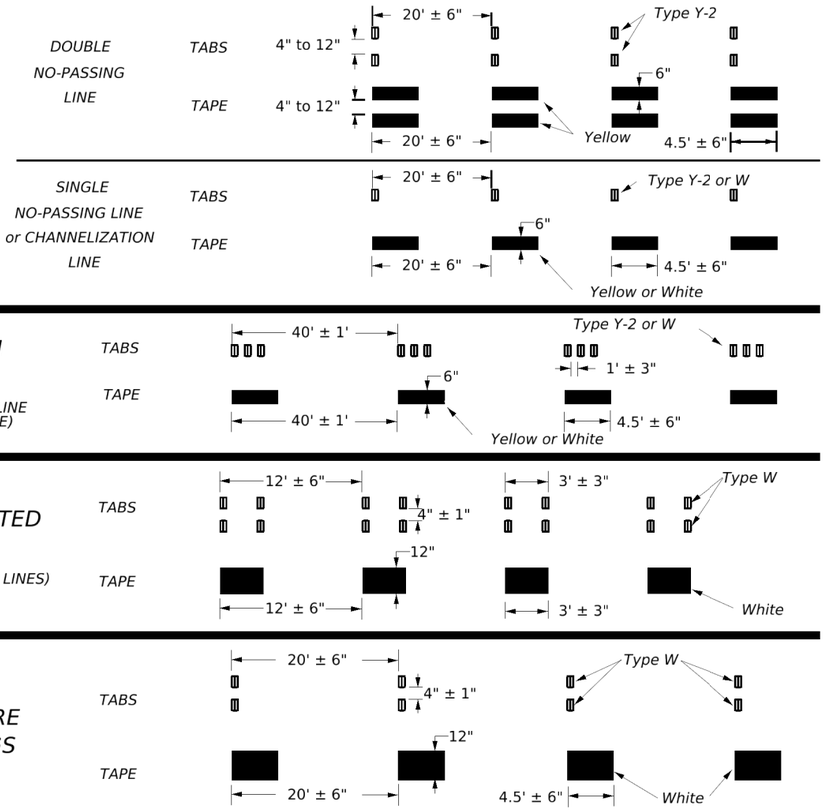
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



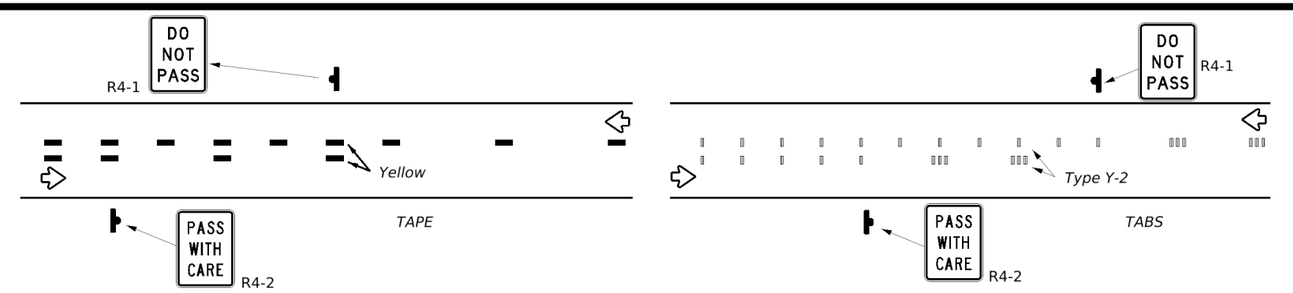
NOTES:

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

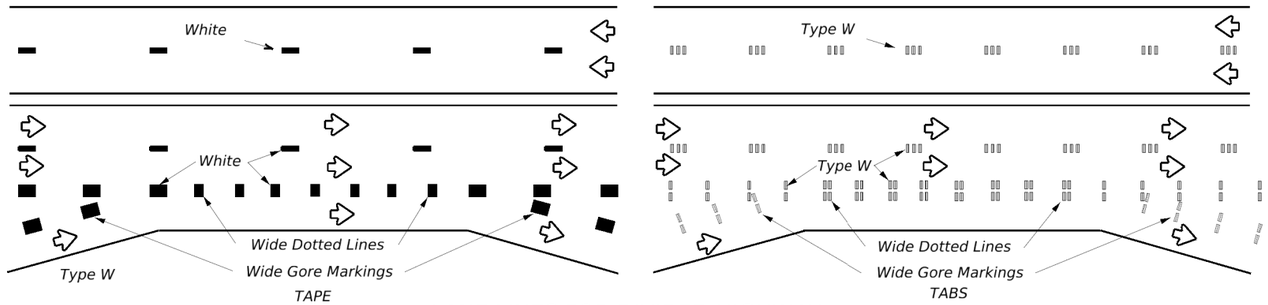
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

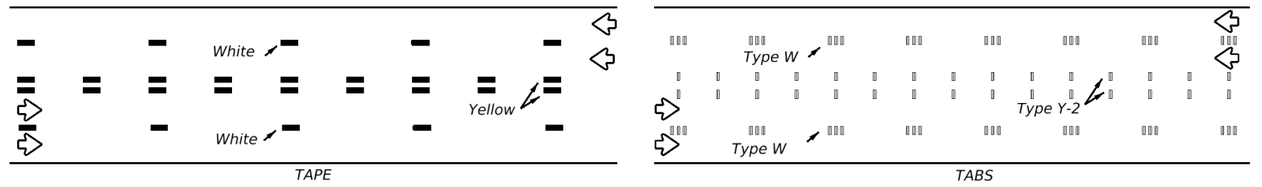
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



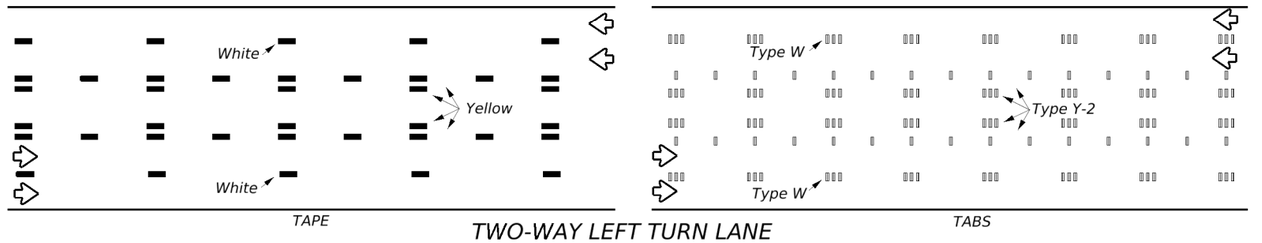
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



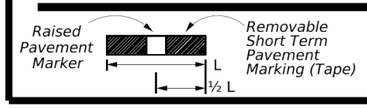
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

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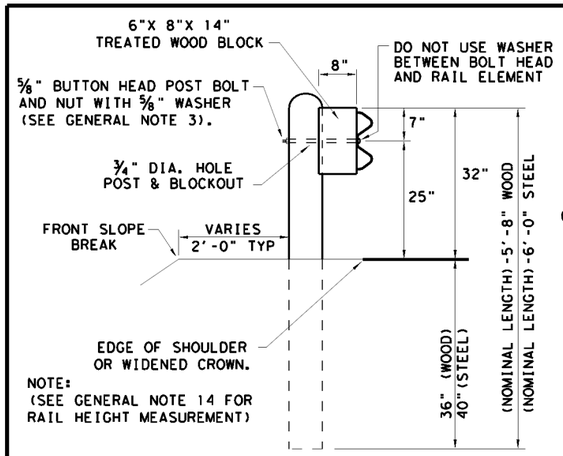
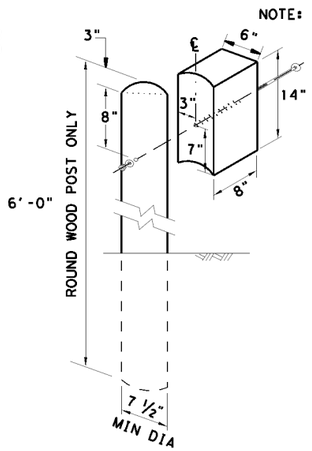
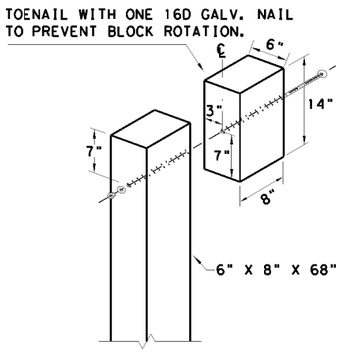


TYPICAL POST PLACEMENT

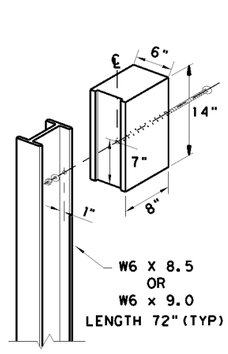


WOOD BLOCK TO ROUND WOOD POST

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

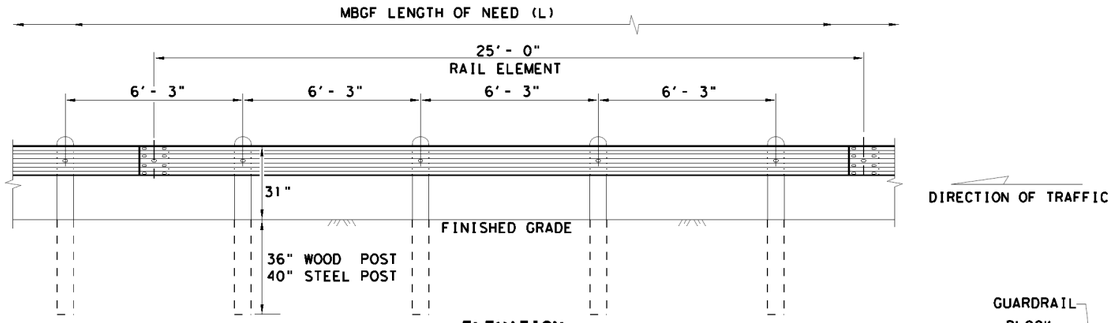


WOOD BLOCK TO RECTANGULAR WOOD POST



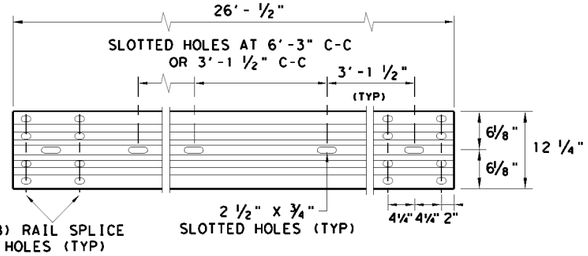
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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.

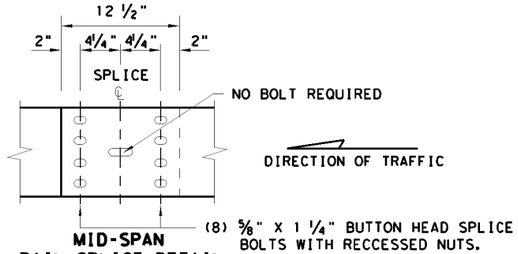
NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL BOLTS COME WITH A RECCESSED NUT.

SPLICE BOLT LENGTH — VARIES
FBB01 = 1 ¼"
FBB02 = 2"
⅝"

POST & BLOCK LENGTH
FBB03 = 10"
FBB04 = 18"

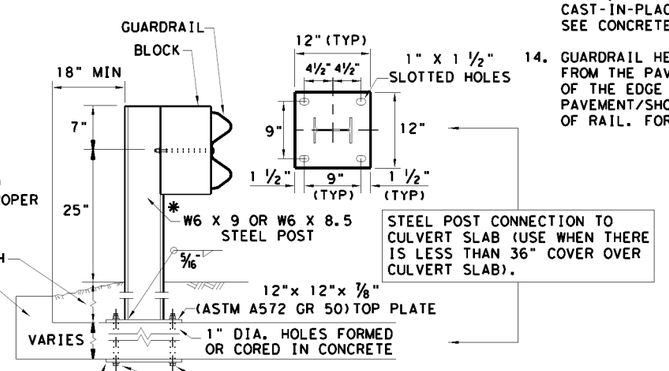
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation — Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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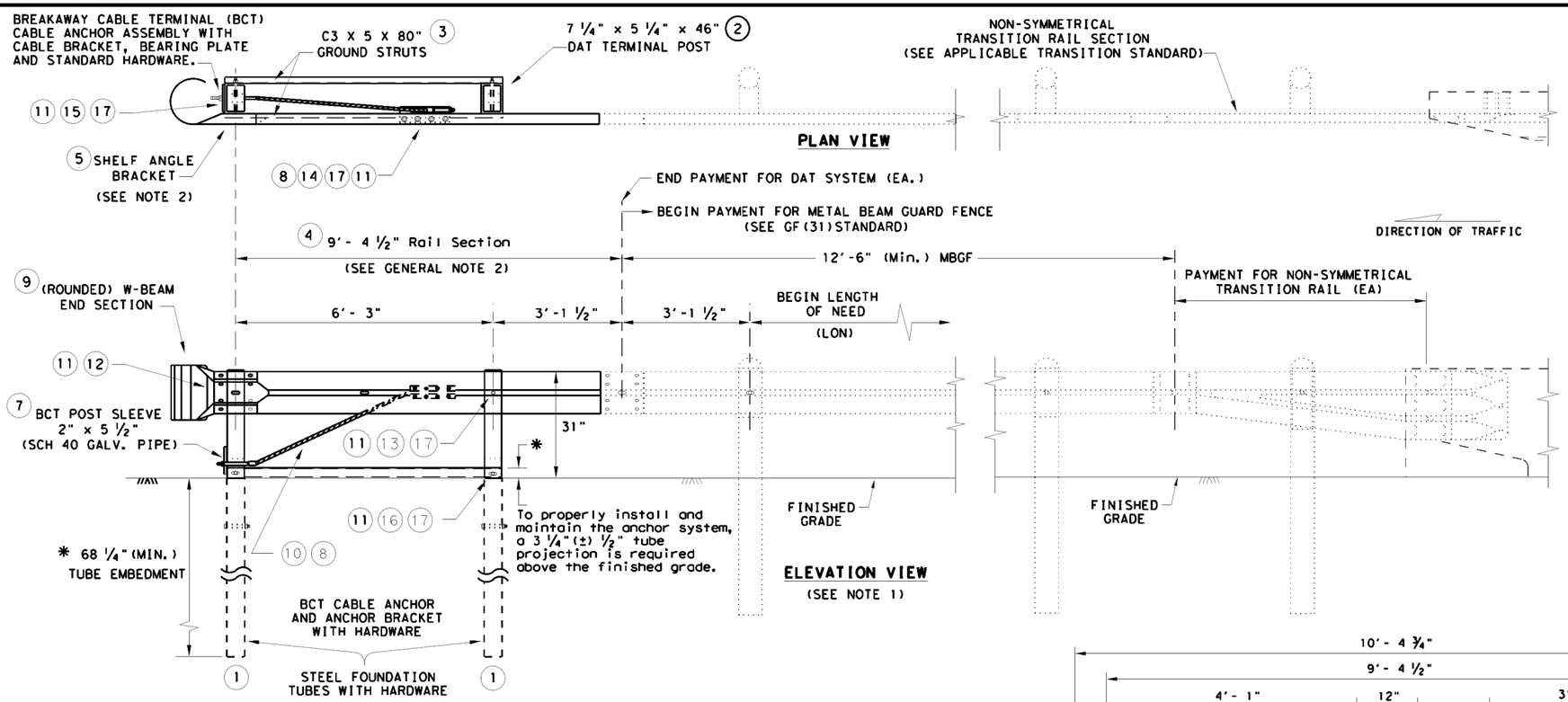


DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

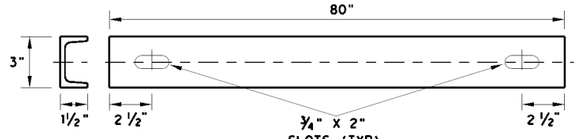
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

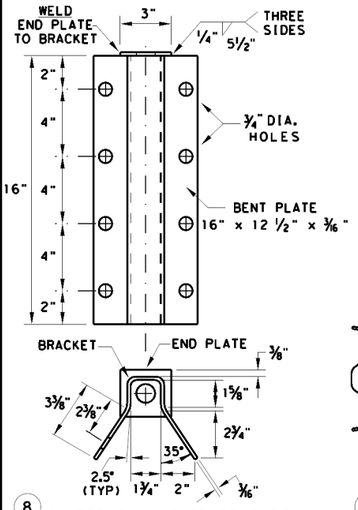
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(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

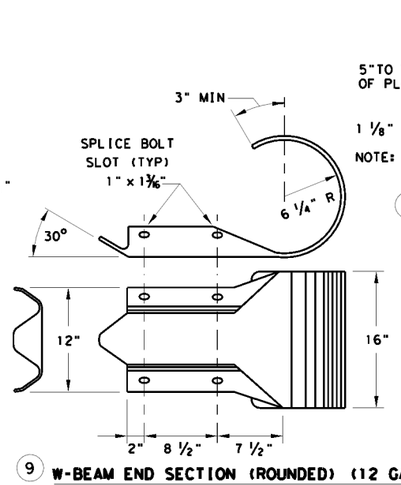
(4) TERMINAL RAIL ELEMENT FOR DAT



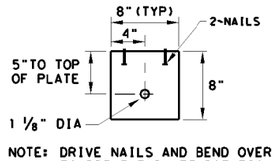
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

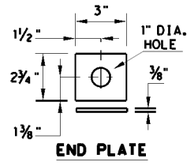


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

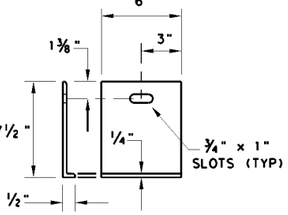


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

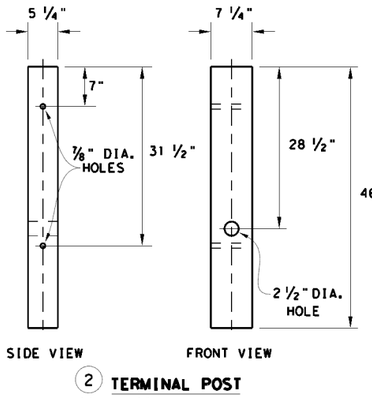
(6) BEARING PLATE
8"x 8"x 5/8" ℄



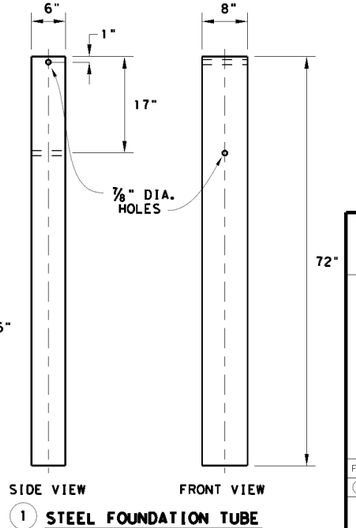
END PLATE



(5) SHELF ANGLE BRACKET



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



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

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT
GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG	
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY	
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DATE: 1/31/2024
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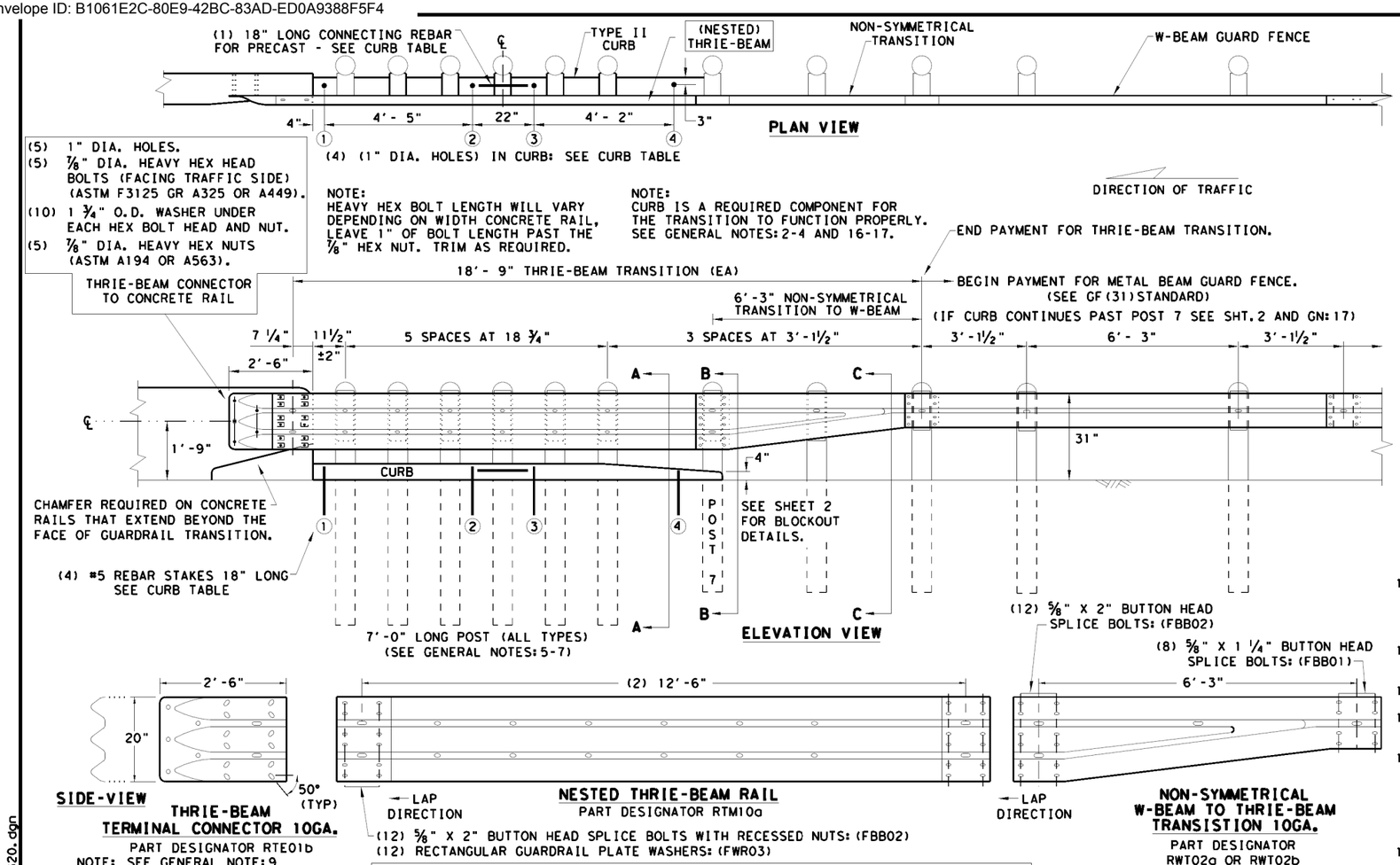


GENERAL NOTES

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

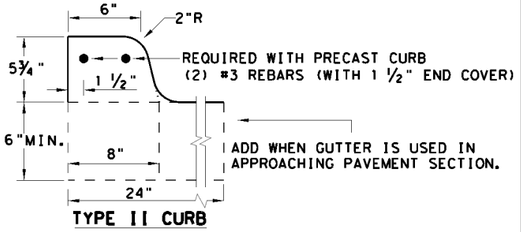
THRIE-BEAM TERMINAL - CURB TABLE

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

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

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

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



TYPE II CURB

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

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

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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	22	WEBB		54

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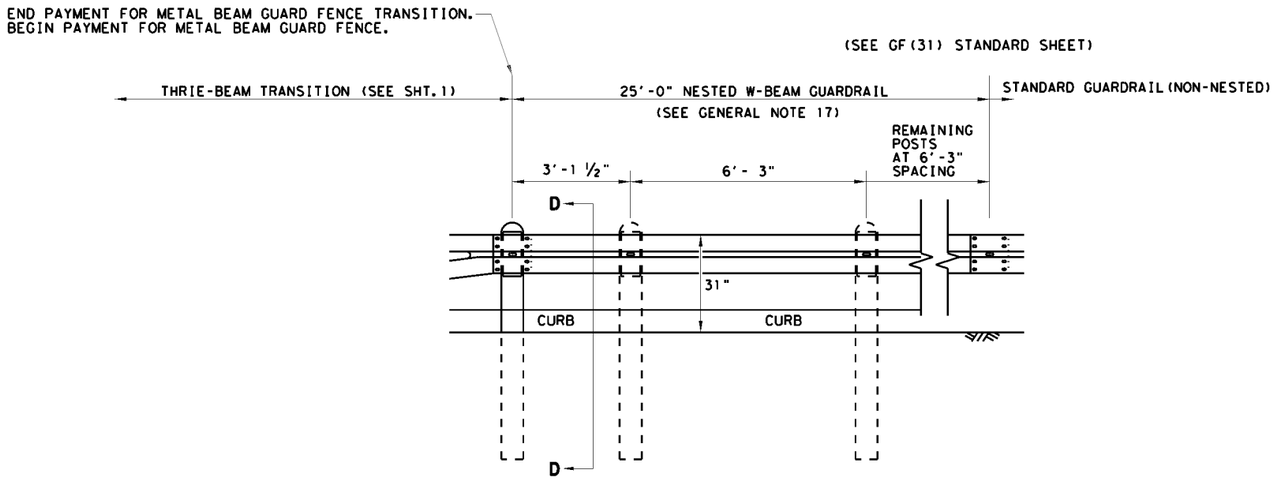
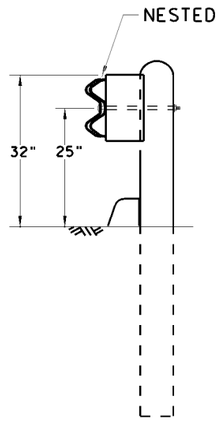
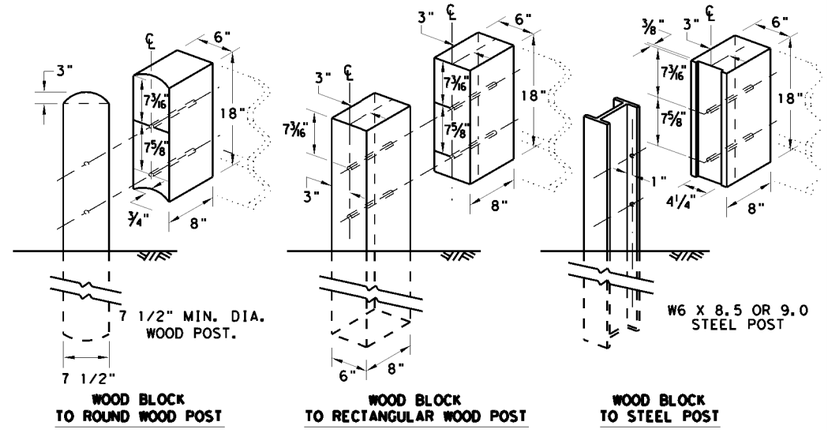
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



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

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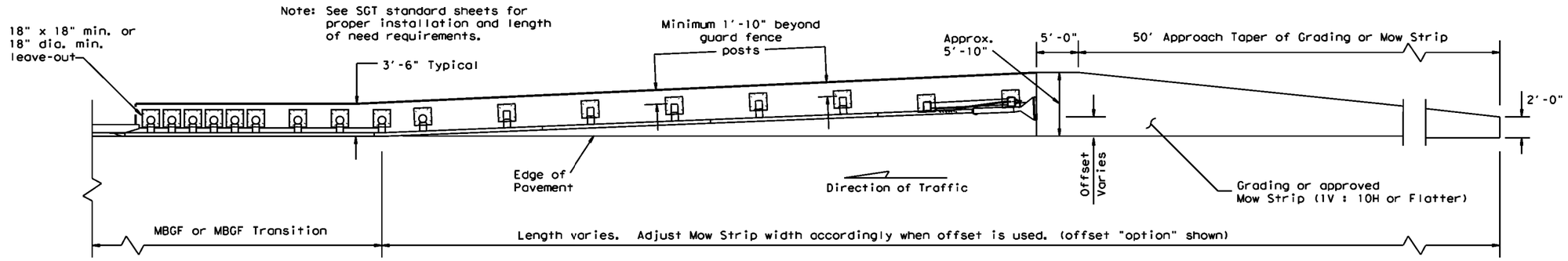
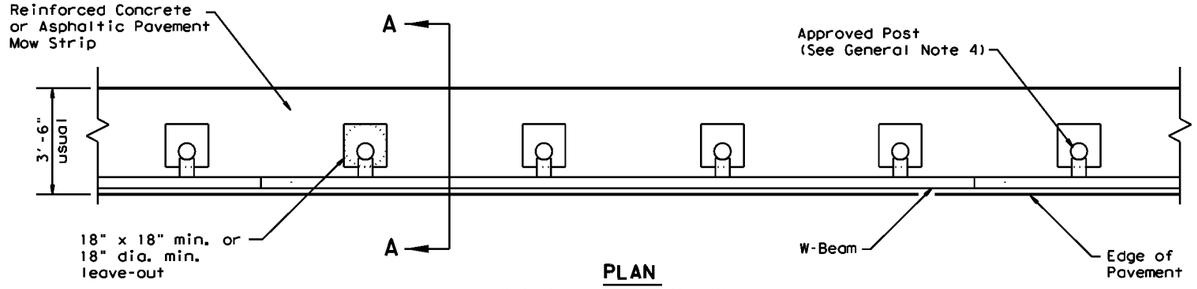
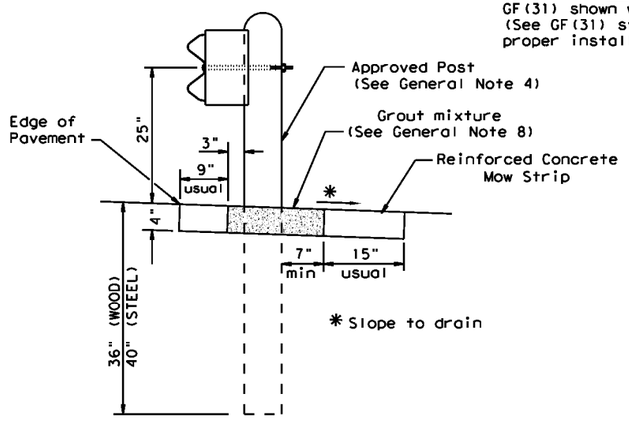


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



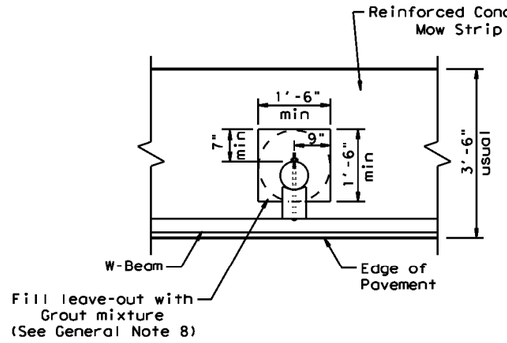
PLAN

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



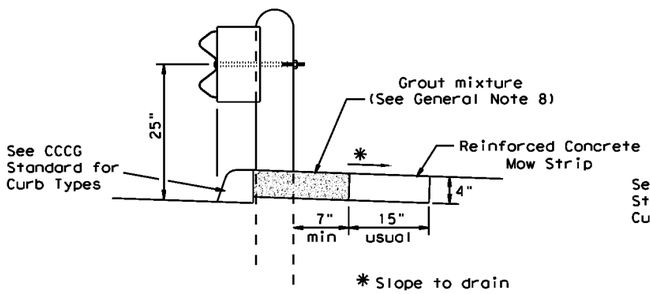
SECTION A-A

Typical



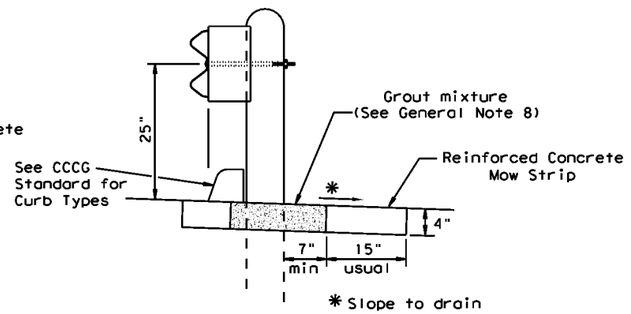
MOW STRIP DETAIL

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



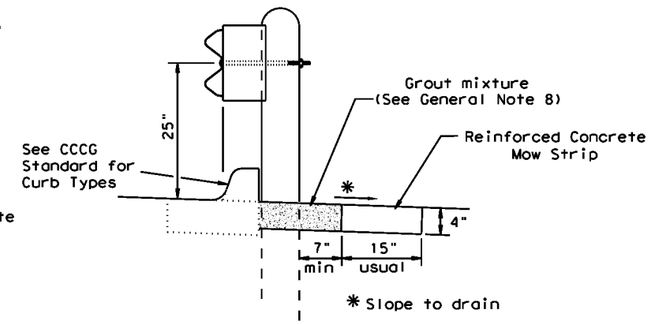
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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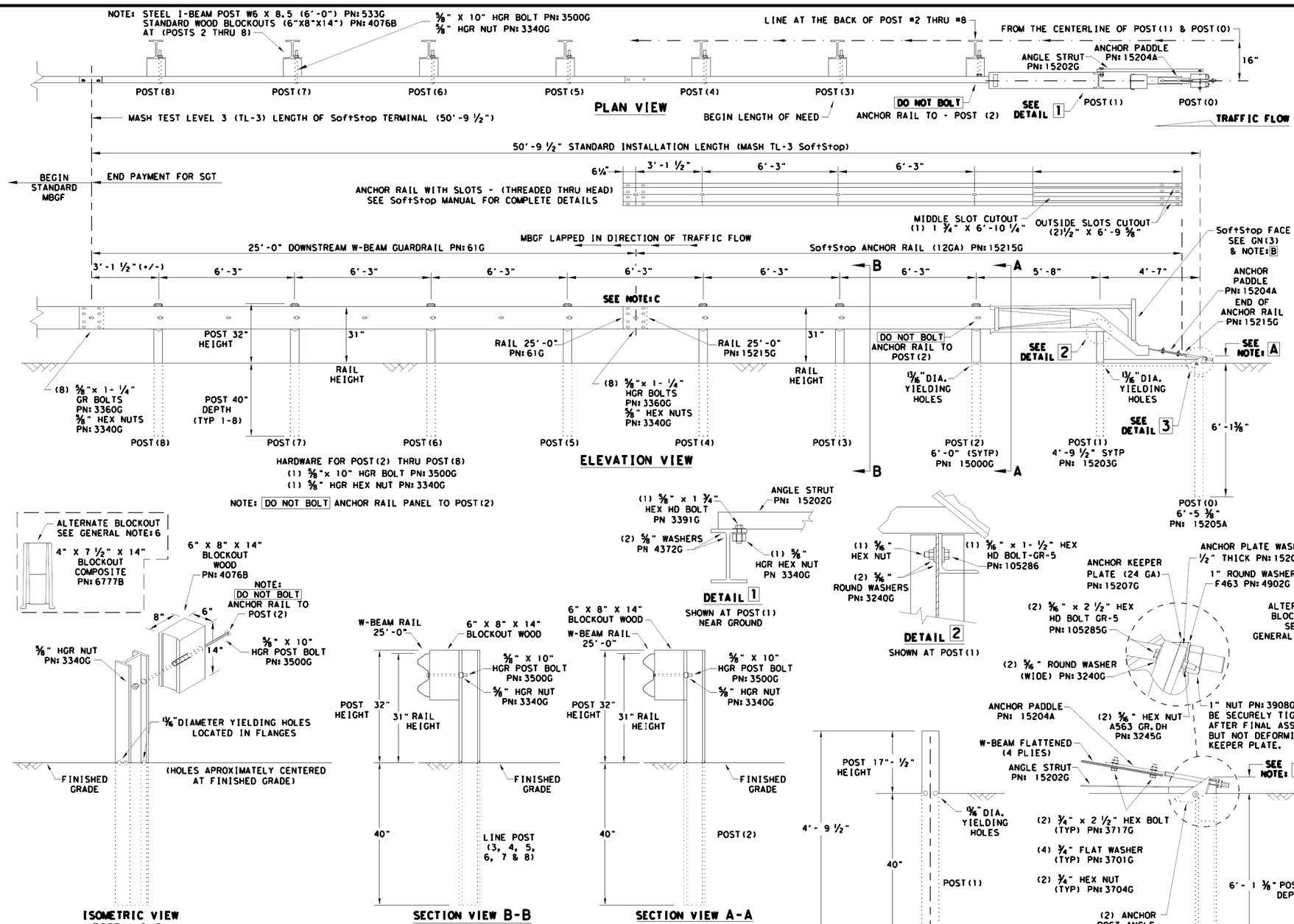

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
	DIST	COUNTY		SHEET NO.
	22	WEBB		57

DATE: 1/30/2024
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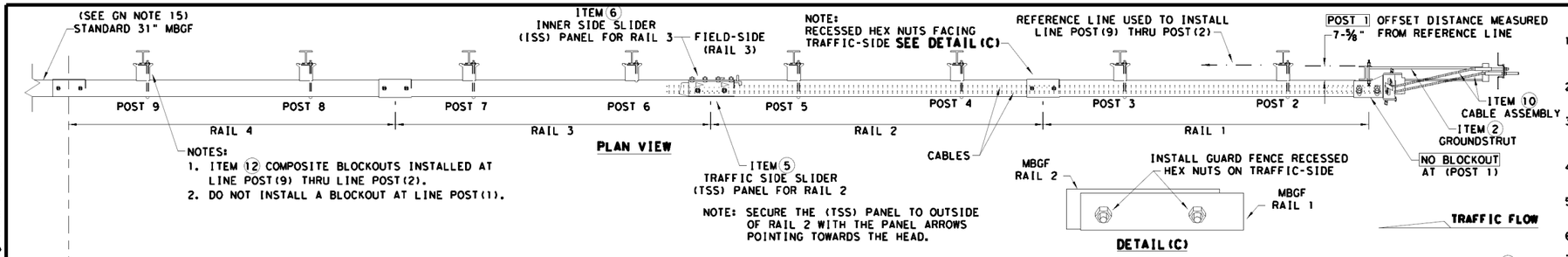

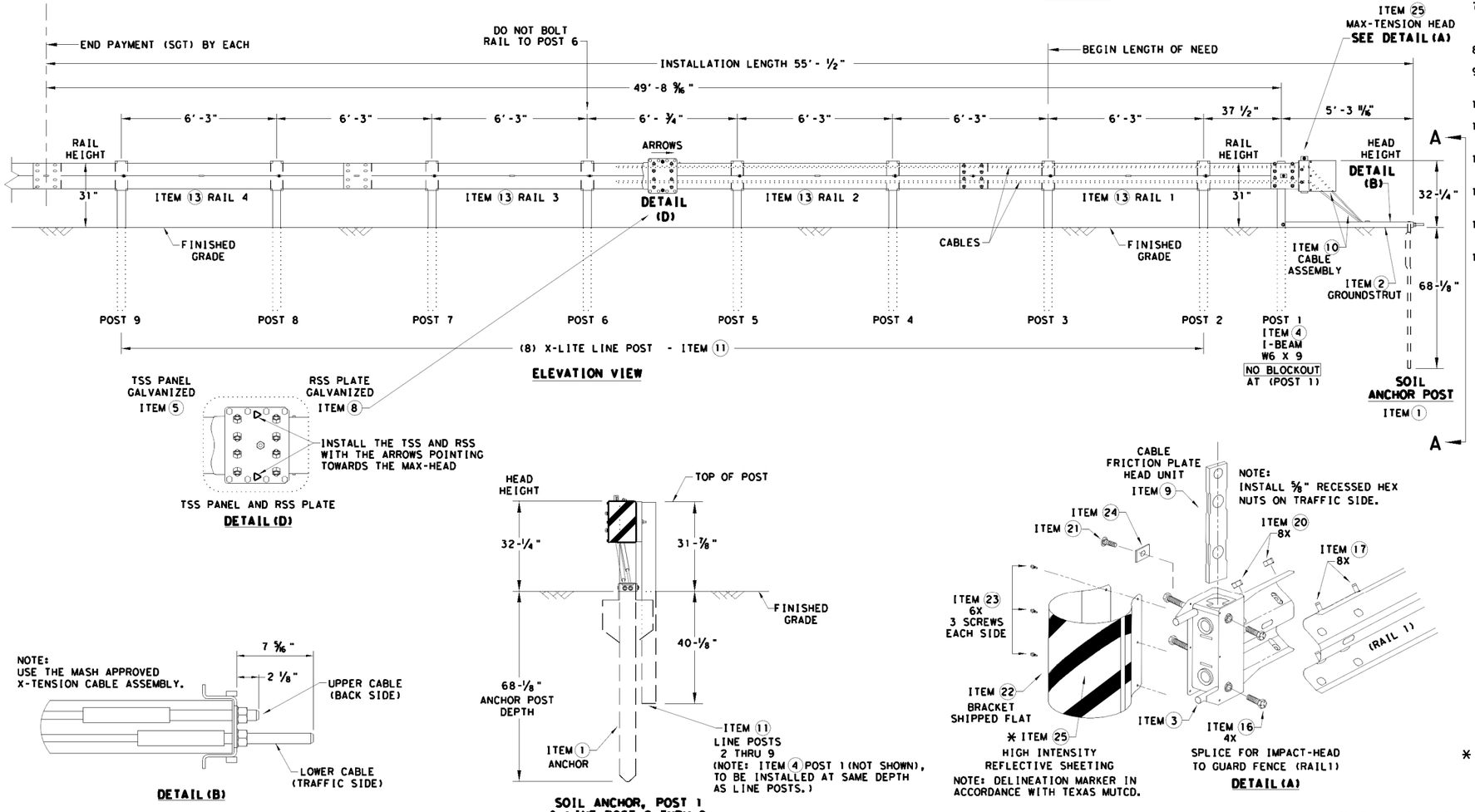

GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
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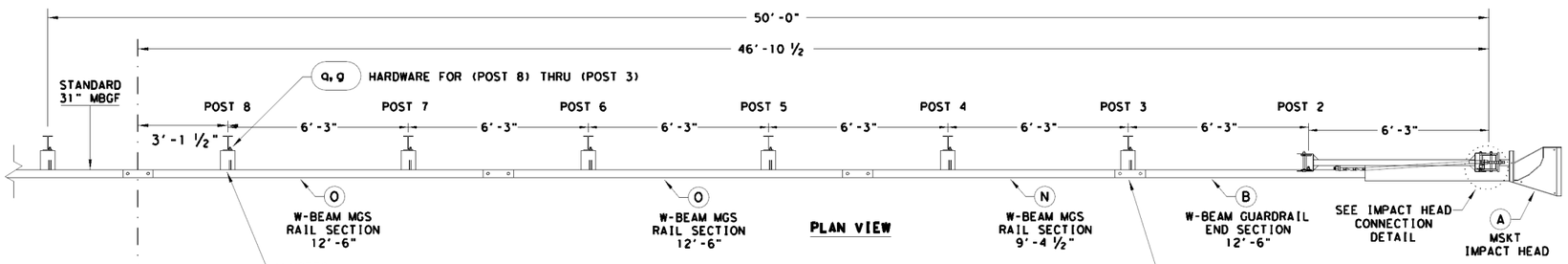
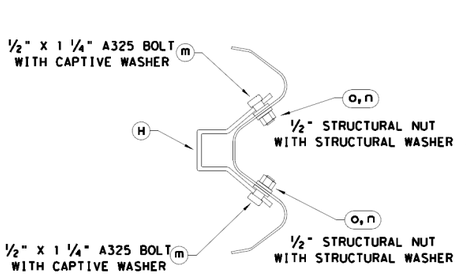
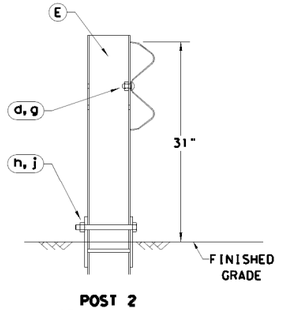


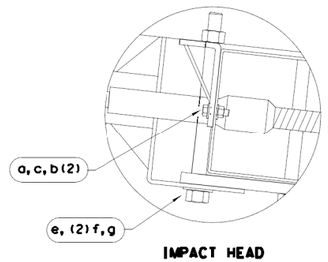
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



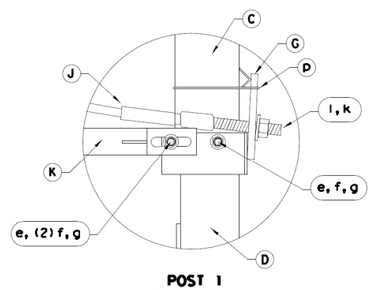
SECTION B-B
ANCHOR BRACKET



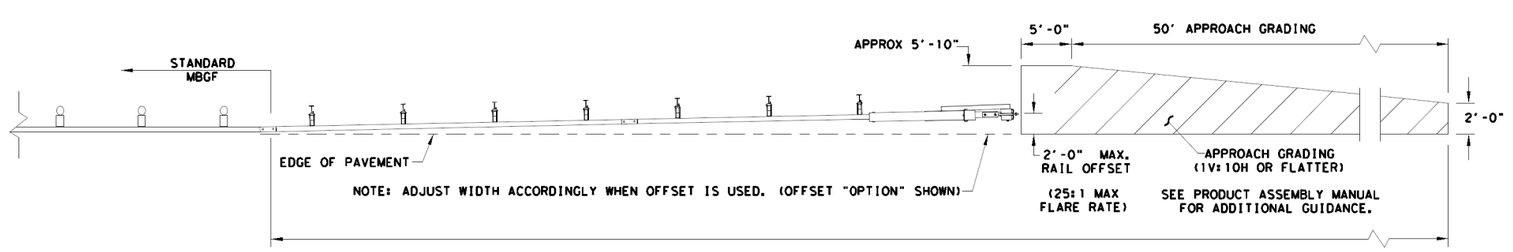
POST 2
SECTION A-A



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.

GENERAL NOTES

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

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

SEE NOTES: *

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

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
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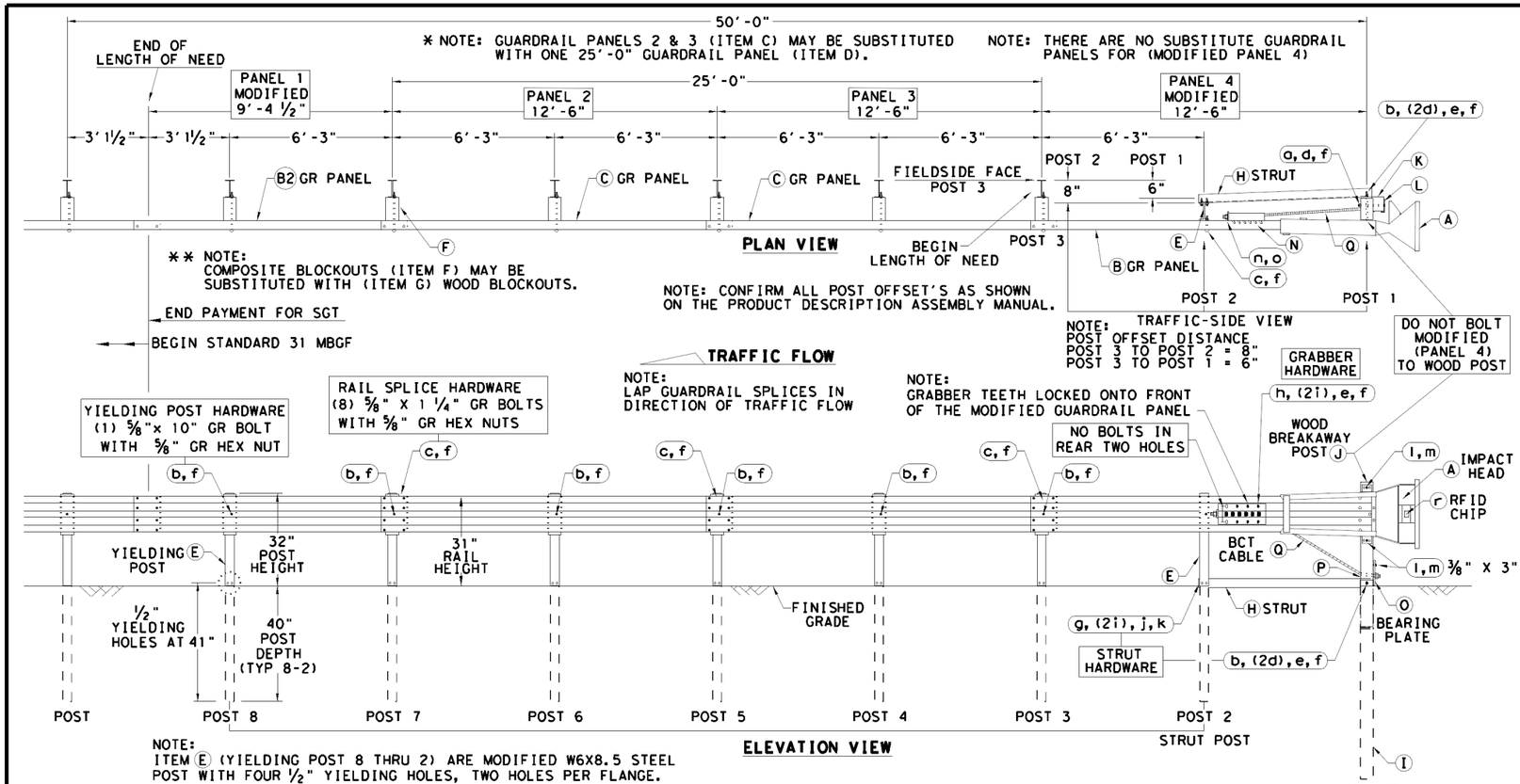
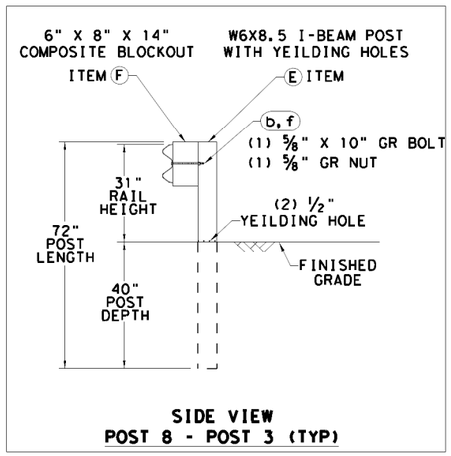


GENERAL NOTES

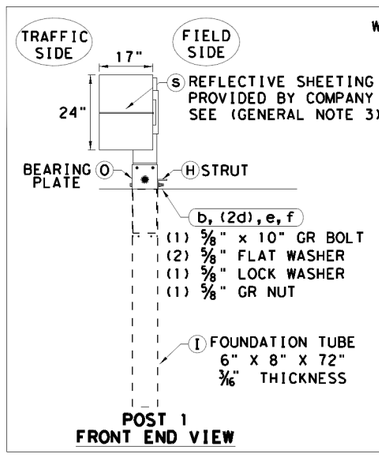
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

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

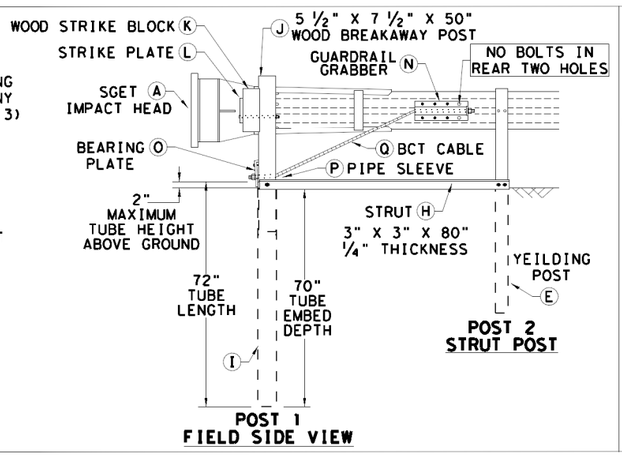
* ALTERNATIVE ITEMS
** NOTE: SEE PLAN VIEW



SIDE VIEW
POST 8 - POST 3 (TYP)

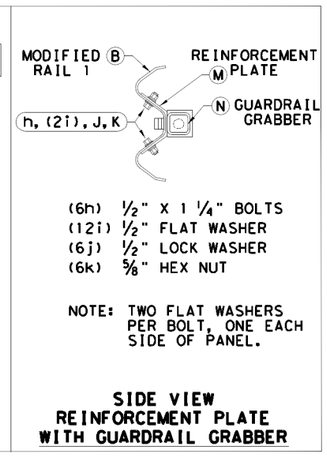


POST 1
FRONT END VIEW

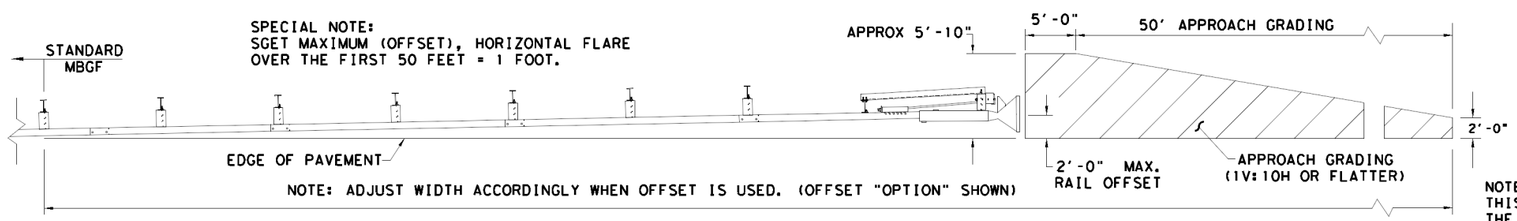


POST 1
FIELD SIDE VIEW

POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

Texas Department of Transportation
Design Division Standard

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

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
©TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
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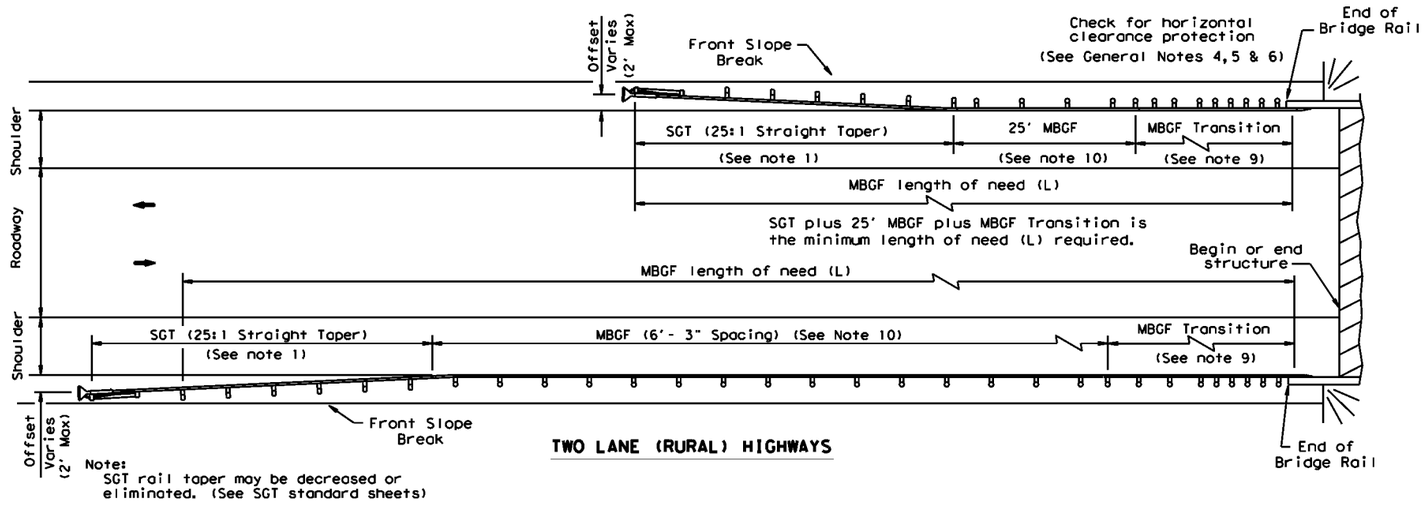
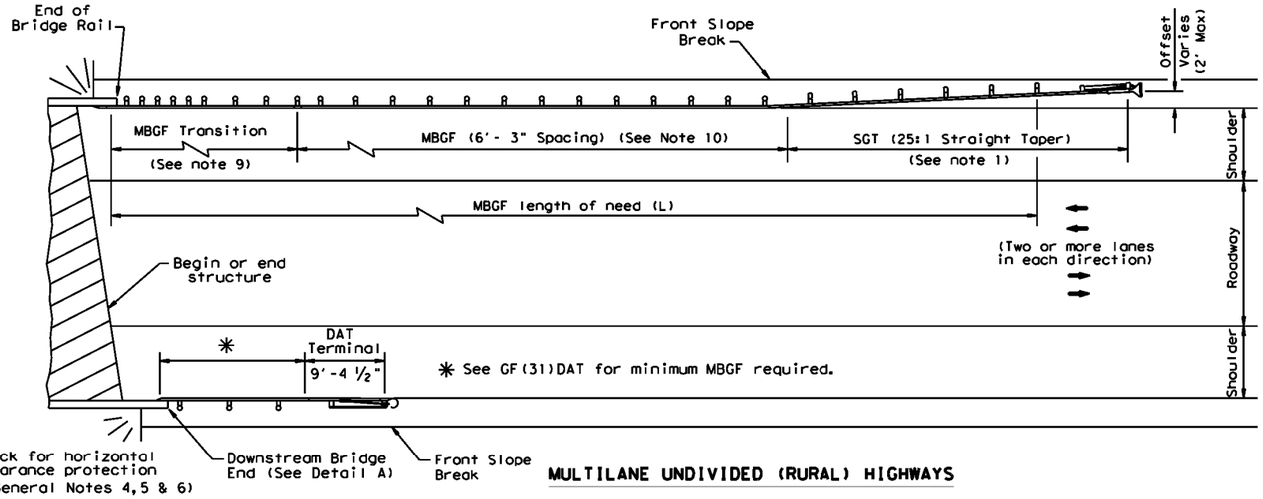
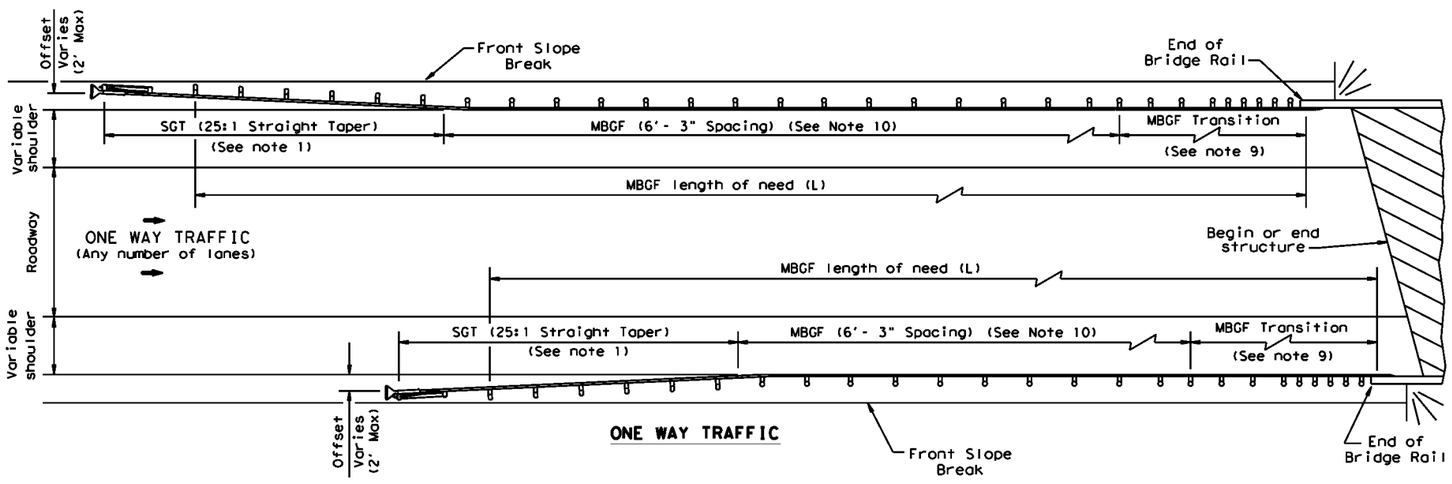


TWO LANE (RURAL) HIGHWAYS

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



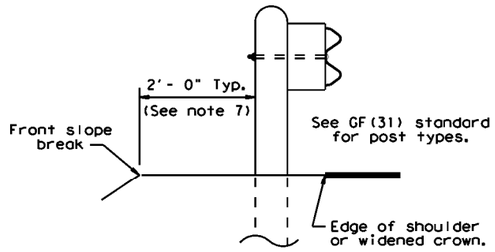
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



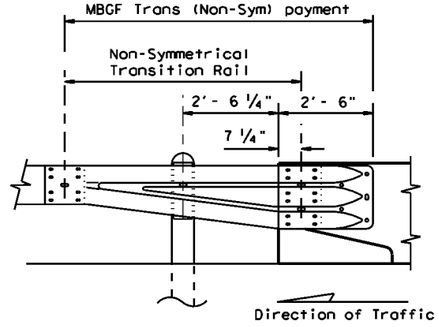
ONE WAY TRAFFIC

GENERAL NOTES

1. For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
2. Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
3. Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
4. MBGF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBGF consideration.
5. Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
6. Direct connection of MBGF to concrete rails are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (This requires a minimum of three standard line posts plus the DAT terminal, See Detail A)
7. The crown shall be widened to accommodate MBGF. Typically the "front slope" break should be 2'- 0" from the back of the MBGF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBGF).
8. 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
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REVISIONS	0922	00	075	VARIOUS
REVISED APRIL 2014 SEE MEMO 04(4)	DIST	COUNTY		SHEET NO.
	22	WEBB		61

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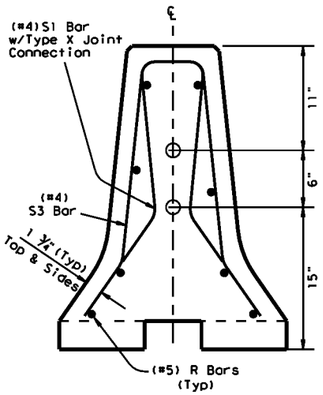
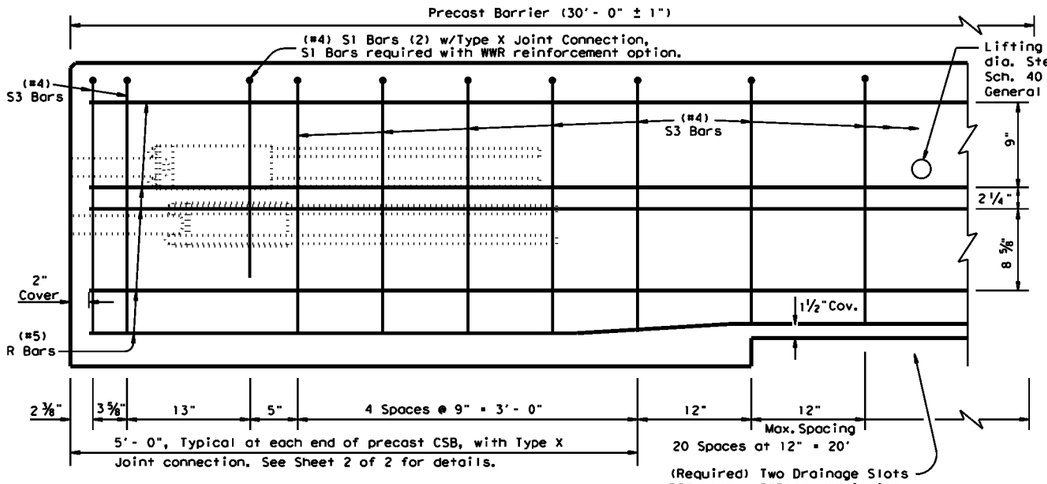


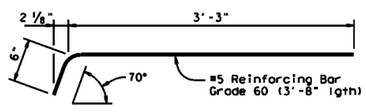
End View Precast Barrier

See sheet 2 of 3 for Joint connection Type X



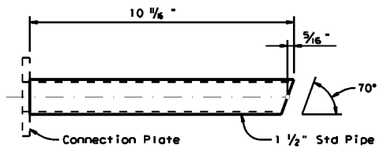
Reinforcement for Precast (CSB) Concrete Safety Barrier (Type 1)

Showing reinforcement for Joint Type X



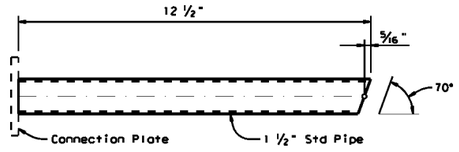
DEFORMED BAR ANCHOR DETAILS

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



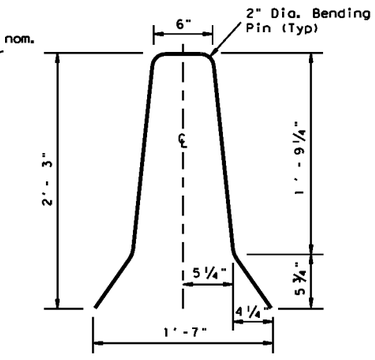
UPPER CONNECTION PIPE DETAILS

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



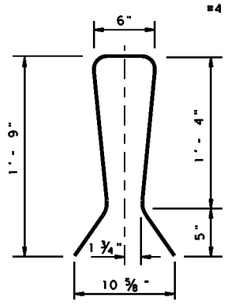
LOWER CONNECTION PIPE DETAILS

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



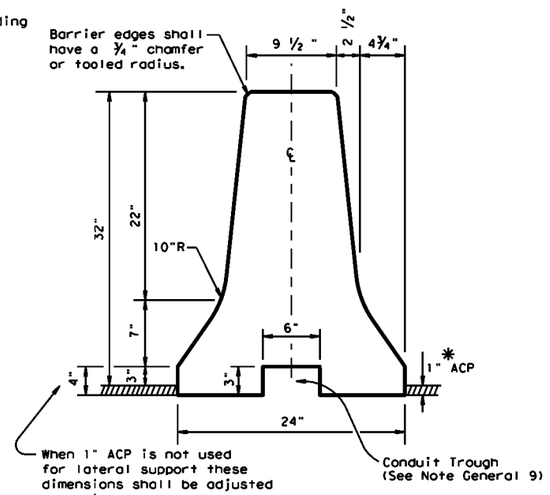
S3 Bar

#4 Bar



S1 Bar

#4 Bar (2)
(Joint Type X)

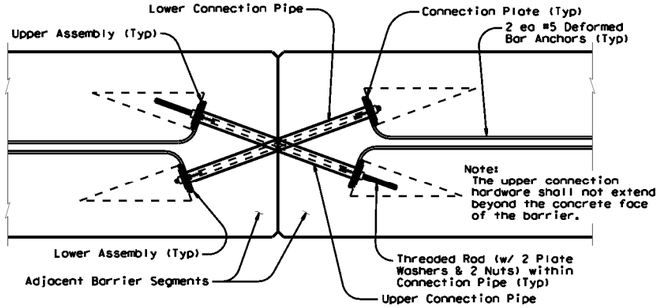


Concrete Safety Barrier

✱ 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.



TYPE X JOINT INSTALLATION DETAIL

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

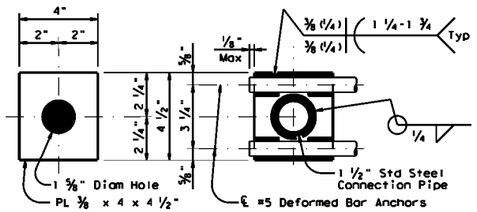
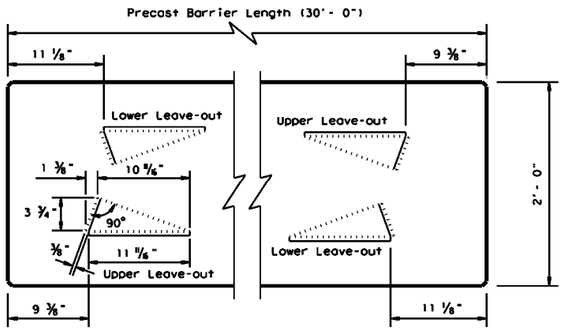


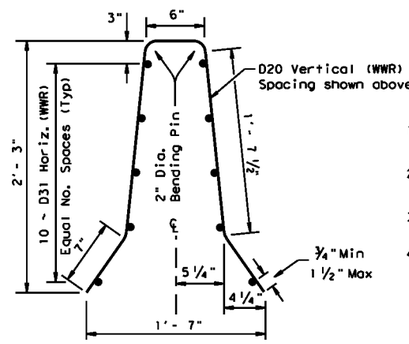
PLATE DIMENSIONS WELDING DETAILS

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.



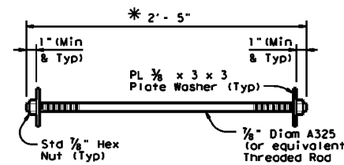
BARRIER PLAN AT END JOINTS



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

(WWR) General Notes

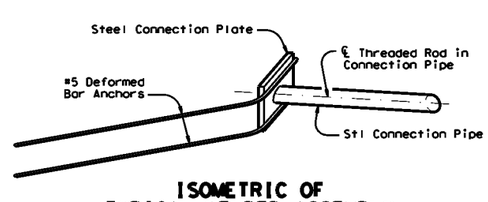
1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing 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

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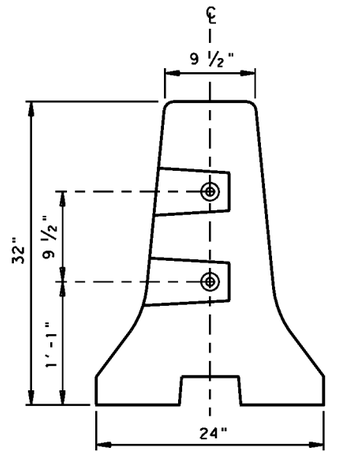
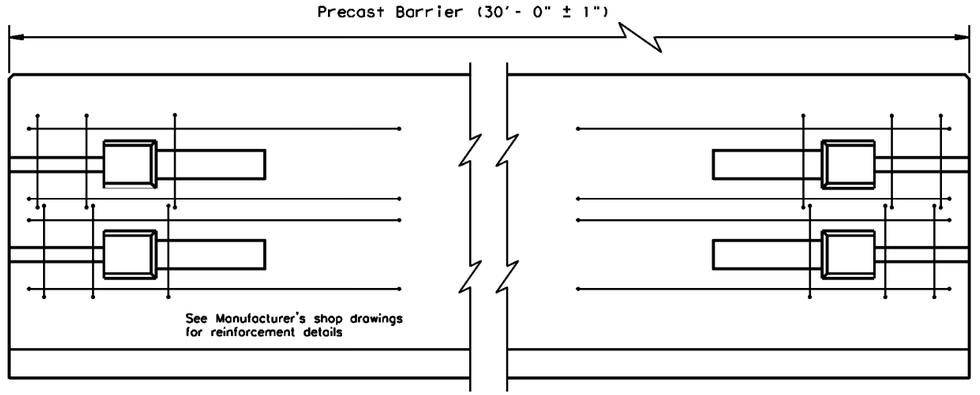
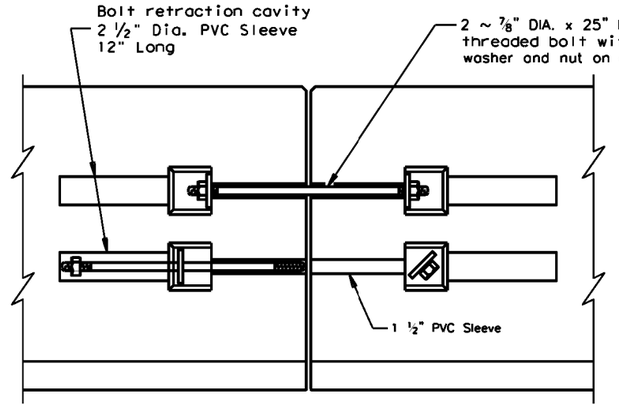


END VIEW (CSB) QUICK-BOLT
QUICK-BOLT POCKET LOCATIONS

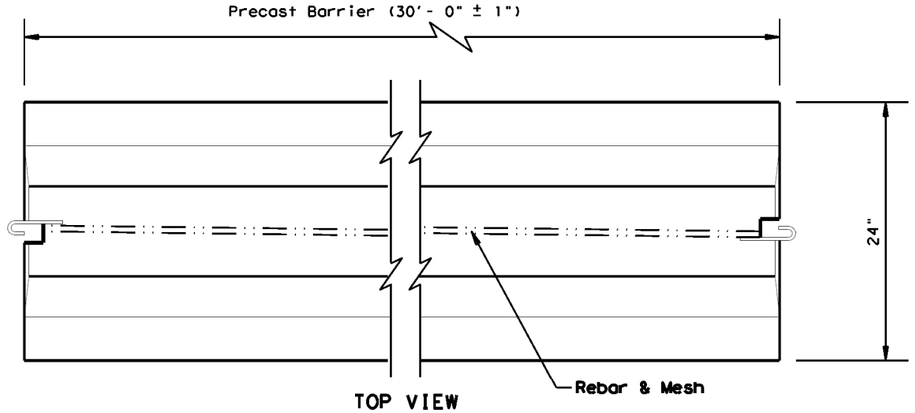


ELEVATION (CSB) QUICK-BOLT
See Manufacturer's shop drawing for additional details

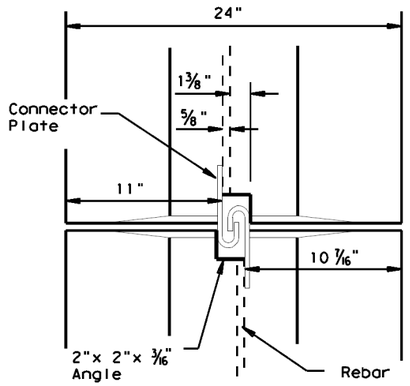


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

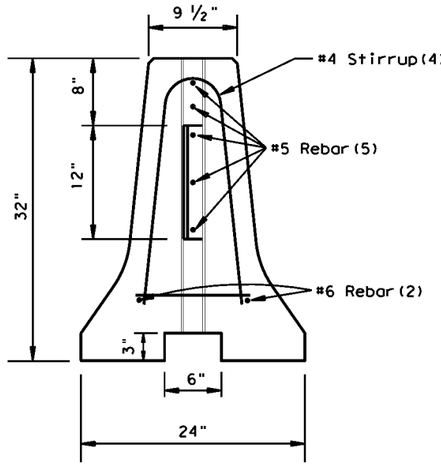
Joint Connection (Type Q)



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.

SHEET 2 OF 2

Texas Department of Transportation
Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER
(TYPE 1)

CSB(1)-10

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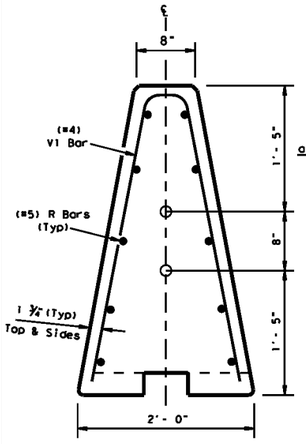
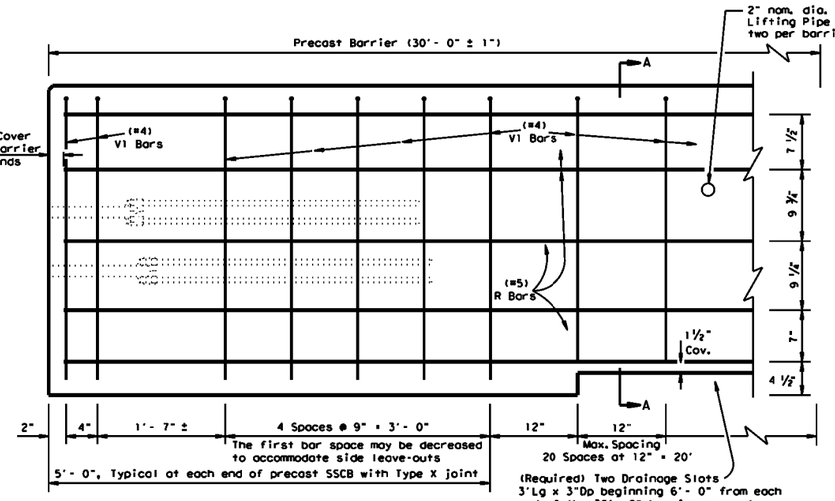


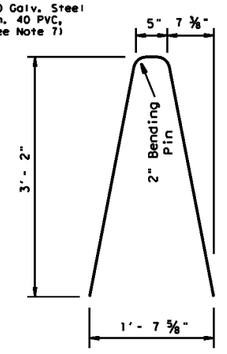
End View
Precast Barrier

Pipe locations for Joint Type X connection



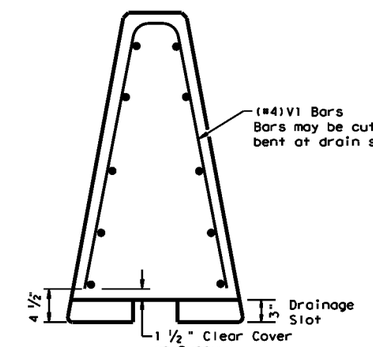
Reinforcement for Precast (SSCB)
Single Slope Concrete Barrier (Type 1)

Showing reinforcement for Joint Connection (Type X)

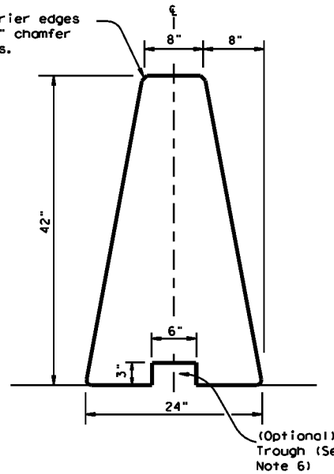


V1 Bar
#4 Rebar

Note:
V1 Bars above the drainage slots may bent to accomodate 1 ½" clear cover as directed by the Engineer.

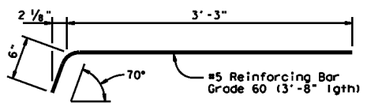


Section A-A
Steel Placement at (Required) Drainage Slots



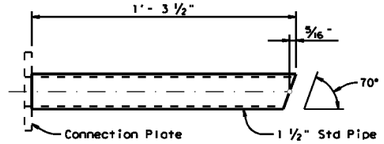
Single Slope Concrete Traffic Barrier

Precast SSCB barrier may be connected to cast-in-place SSBC. The joint connection "Types" may be used in the cast-in-place barrier, to match the precast barrier connection.



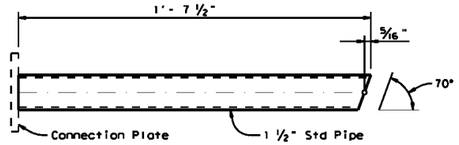
DEFORMED BAR ANCHOR DETAILS

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



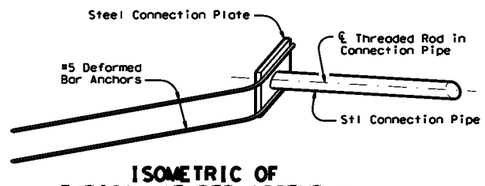
UPPER CONNECTION PIPE DETAILS

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.

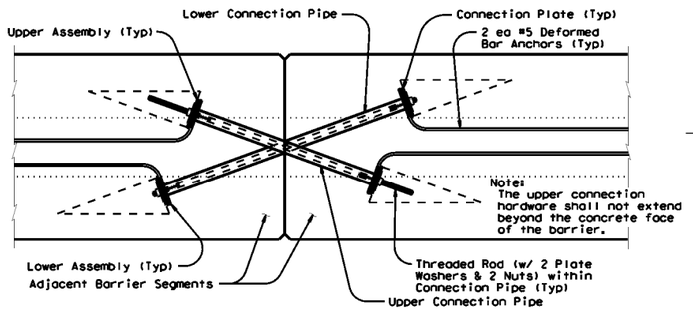


ISOMETRIC OF TYPICAL WELDED ASSEMBLY

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

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 a tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.
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.
9. All steel assemblies shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."



TYPE X JOINT INSTALLATION DETAIL

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

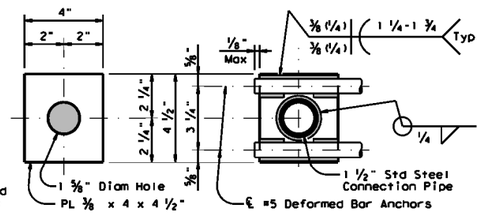
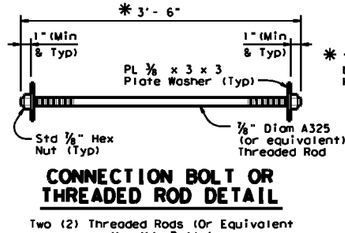


PLATE DIMENSIONS **WELDING DETAILS**

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.

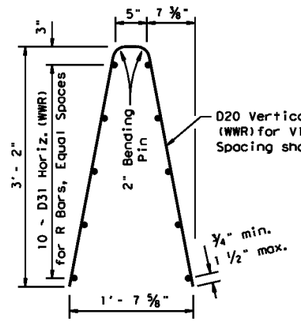


* The connection hardware shall not extend beyond the concrete face of the barrier. Hex head bolts may be provided. The proper length of all hardware should be verified.

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.

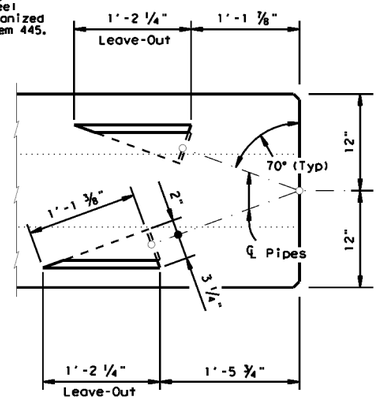
Weight of one precast 30 ft. (SSCB) segment = Approx. 10.5 Tons or 717 lbs per ft.



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

(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".



BARRIER PLAN AT JOINT

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1)

SSCB(2)-10

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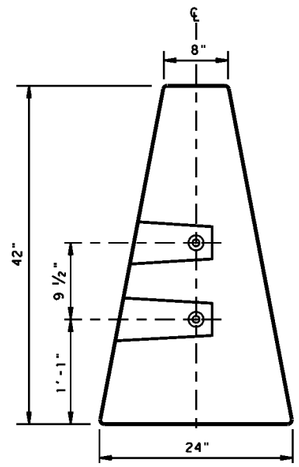
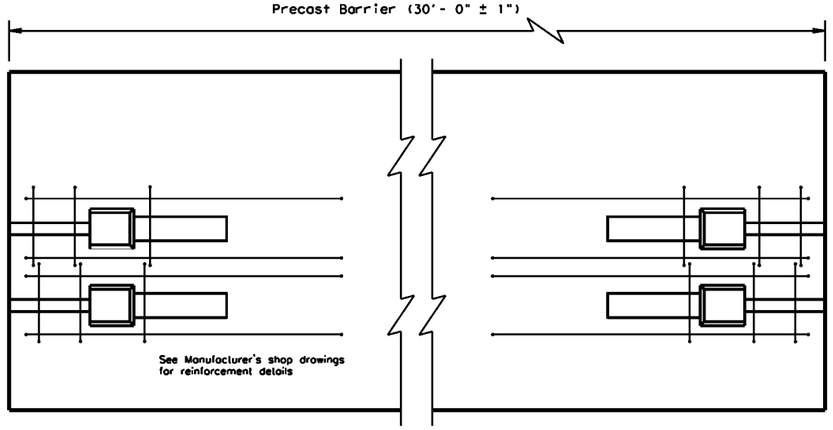
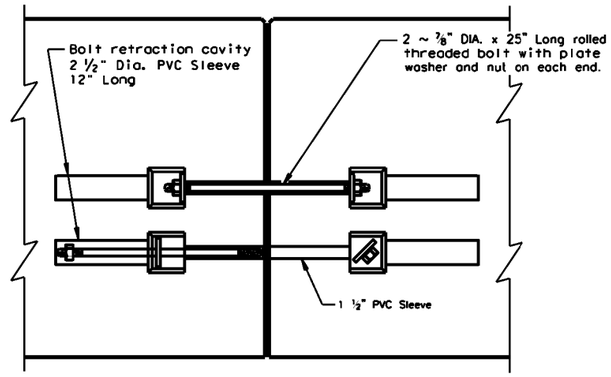


END VIEW
"QUICK-BOLT" POCKET LOCATIONS

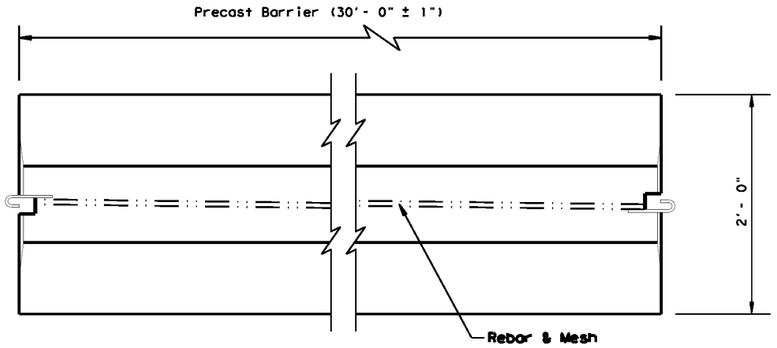


ELEVATION VIEW
"QUICK-BOLT" (SSCB)
See Manufacturer's shop drawing for additional details

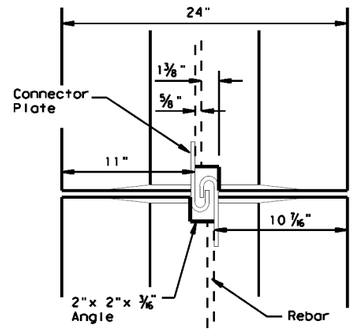


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

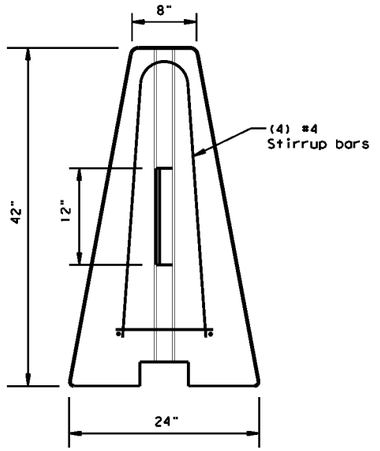
Joint Connection (Type Q)



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



VIEW FROM ABOVE
J-J HOOK CONNECTION



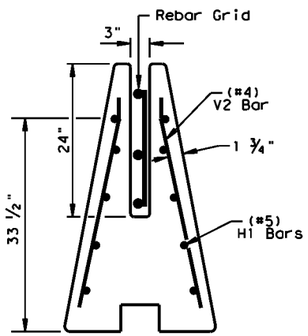
END VIEW

Proprietary Joint Connections (SSCB)

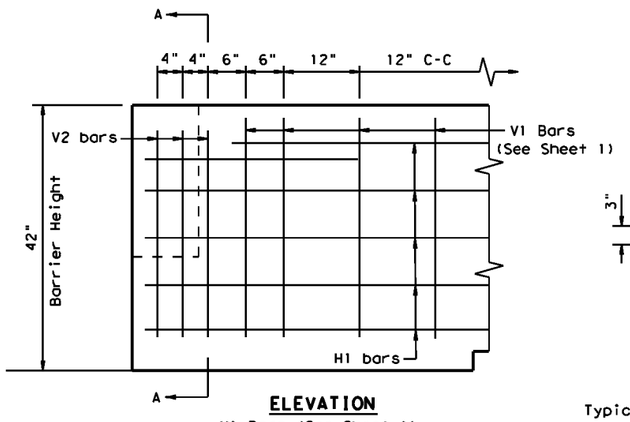
Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

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

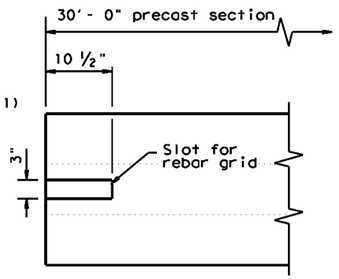
If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.



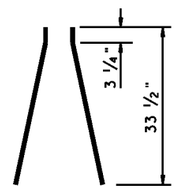
SECTION A-A
Showing (Type R) Rebar Grid



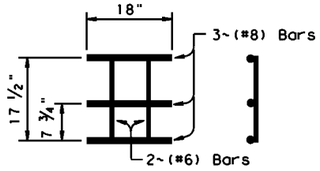
ELEVATION
V1 Bars (See Sheet 1)



TOP VIEW
JOINT CONNECTION
Typical at both ends of barrier segment



(#4) V2 BARS
6 ~ two piece bars per barrier segment



WELDED REBAR GRID

Joint Connection (Type R)

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
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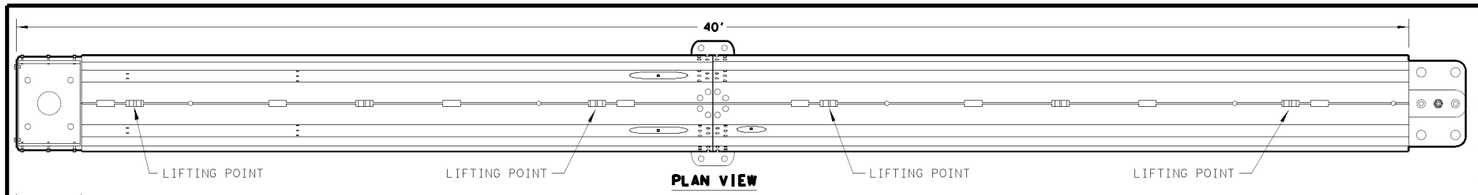
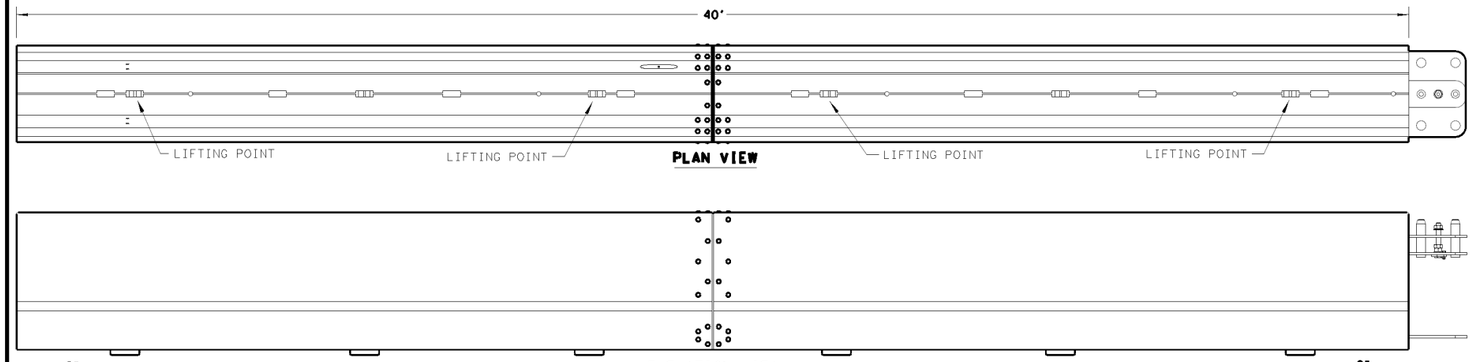


PLAN VIEW

ELEVATION VIEW

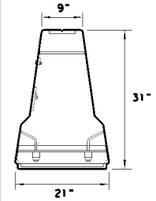
BARRIERGUARD END SECTION - 40 FT. MALE OR FEMALE END SECTION



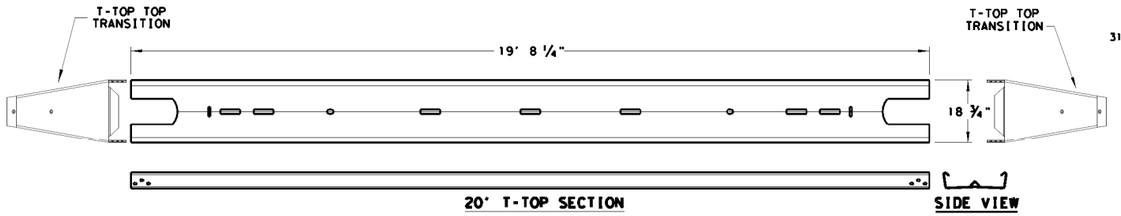
PLAN VIEW

ELEVATION VIEW

BARRIERGUARD STANDARD SECTION - 40 FT.

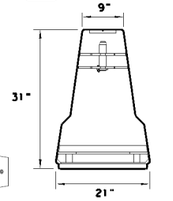


FEMALE END CROSS SECTION

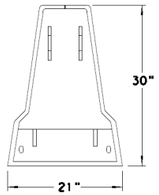


20' T-TOP SECTION

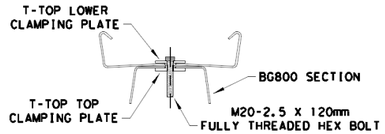
SIDE VIEW



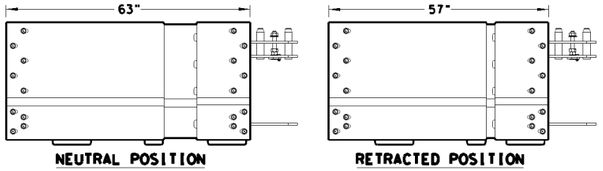
MALE END CROSS SECTION



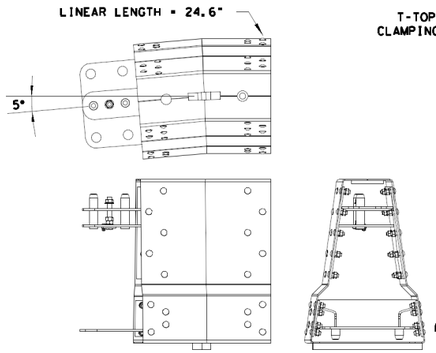
FULL HEIGHT TERMINAL COVER



T-TOP MOUNTING DETAIL



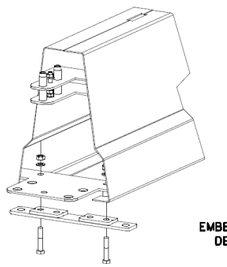
VARIABLE LENGTH BARRIER



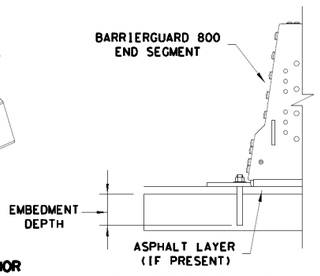
5° (LH) LEFT HAND ANGLE SECTION

NOTE: ADDITIONAL ANGLE SECTION AVAILABLE

5° (RH) RIGHT HAND ANGLE SECTION
10° (LH) LEFT HAND ANGLE SECTION
10° (RH) RIGHT HAND ANGLE SECTION



INTERMEDIATE ANCHOR AT QUICKLINK



SEE ANCHORING TABLE

GENERAL NOTES

1. THE SYSTEM SHOWN ON THIS DRAWING IS A PROPRIETARY BARRIER TRADED AS BARRIERGUARD 800 AND BARRIERGUARD 800 MDS AND HAS BEEN DESIGNED AND MANUFACTURED BY LAURA METAAL ROAD SAFETY INC. FOR TECHNICAL ASSISTANCE AND APPLICATION SUPPORT CONTACT LEE STUART AT LAURA METAAL ROAD SAFETY INC. AT (702) 664-2009 OR lstuart.laurametaal@outlook.com
2. THE BARRIERGUARD 800 SYSTEM HAS BEEN CRASH TESTED TO MASH AND HAS FHWA APPROVAL AS A TL-3 BARRIER. THE DEFLECTION TABLE OUTLINES BASIC SYSTEM PERFORMANCE AND COMPONENT ANCHORING REQUIREMENTS.
3. THIS DRAWING PACKAGE PROVIDES THE RELEVANT INFORMATION AND GENERAL GRAPHICS REQUIRED TO IDENTIFY THE COMPONENT PARTS OF BARRIERGUARD 800 AND THEIR INCORPORATION AS A WHOLE SYSTEM FOR DEPARTMENTAL STANDARD APPLICATIONS.
4. BARRIERGUARD 800 REQUIRES ANCHORING (PINNING) AT EACH END OF THE INSTALLED LENGTH. (INTERMEDIATE ANCHORS CAN BE USED TO REDUCE DEFLECTION).
5. INSTALLATION OF BARRIERGUARD 800 OR BARRIERGUARD 800 MDS, NORMALLY STARTS WITH A MALE TERMINAL SECTION AND IS FINISHED WITH A FEMALE TERMINAL SECTION. STANDARD SECTIONS ARE USED BETWEEN THE TERMINAL SECTIONS TO OBTAIN THE REQUIRED LENGTH OF POSITIVE BARRIER PROTECTION.
6. THE FULL HEIGHT TERMINAL (FHT) SECTIONS MAY BE CAPPED WITH A FHT COVER, HOWEVER IF EXPOSED TO ON-COMING TRAFFIC THE END SHOULD BE PROTECTED WITH A SUITABLE CRASH CUSHION. THE BARRIERGUARD 800 RANGE IS COMPATIBLE WITH MOST COMMONLY USED CRASH CUSHION END TREATMENTS. FOR DETAILS OF BARRIERGUARD 800 CRASH CUSHION CONNECTIONS THAT ARE NOT DETAILED WITHIN THESE DRAWINGS, PLEASE CONTACT LAURA METAAL ROAD SAFETY INC. FOR MORE DETAILS. THE FULL HEIGHT TERMINAL COVER IS SUITABLE FOR THE "DOWN STREAM" END OF A SYSTEM THAT DOES NOT HAVE EXPOSURE TO ON-COMING TRAFFIC.
7. WHEN INSTALLING THE MINIMUM DEFLECTION SYSTEM (MDS), THE SYSTEM CAN BE INSTALLED WITH ADDITIONAL INTERMEDIATE ANCHORS ALONG THE LENGTH OF THE BARRIER RUN AT INTERVALS SHOWN IN THE DEFLECTION TABLE. EACH BARRIER RUN CAN BE MADE UP OF ANY MIXTURE OF THE SYSTEMS BY THE INTRODUCTION OF INTERMEDIATE ANCHORS AND/OR T-TOP AS REQUIRED.
8. THERE ARE SEVERAL METHODS OF ACHIEVING RADIUS IN A LENGTH OF BARRIERGUARD 800. RADIUS CAN BE ACHIEVED USING VARIOUS METHODS AND THUS ALLOWING THE BARRIERGUARD TO FOLLOW THE DESIRED CURVATURE IN THE INSTALLATION, THESE METHODS ARE, THE MOVEMENT IN THE QUICKLINK, ADJUSTABLE 20FT. SECTIONS OR SHORT ANGLED SECTIONS WHICH ALLOW A RADIUS AS LOW AS 12FT. FOR FURTHER INFORMATION AND ADVICE CONTACT LAURA METAAL ROAD SAFETY INC.
9. A BARRIERGUARD 800 VARIABLE LENGTH BARRIER (VLB) SECTION SHOULD BE USED WHEN BARRIERGUARD 800 OR BARRIERGUARD 800 MDS IS ANCHORED ACROSS A BRIDGE EXPANSION JOINT. IF T-TOP IS TO BE USED IN CONJUNCTION WITH THE VLB, THE T-TOP SHOULD BE USED FOR MINIMUM 40FT ON EITHER SIDE OF THE VLB AND TERMINATED WITH TRANSITIONS. THE VLB SECTION PROVIDES APPROXIMATELY 7in OF EXTENSION AND 7in OF CONTRACTION. MULTIPLE VLB'S CAN BE LINKED TOGETHER TO PROVIDE MORE EXPANSION OR CONTRACTION. THE VLB'S SHOULD BE PLACED IN THE VICINITY OF THE EXPANSION JOINT. THE VLB DOES NOT NEED TO BE PLACED DIRECTLY OVER THE EXPANSION JOINT BUT MUST BE BETWEEN THE NEAREST ANCHORS ON EACH SIDE OF THE JOINT. IT IS RECOMMENDED THAT THE VLB IS PLACED WITHIN 40FT OF THE JOINT.
10. THE T-TOP CAN BE INSTALLED EITHER BEFORE OR AFTER THE BARRIERGUARD 800 HAS BEEN FULLY ASSEMBLED AND ANCHORED IN PLACE. T-TOP IS REQUIRED WHEN THE BARRIERGUARD 800 IS USED AS A MDS, ANCHORED EVERY 20FT. GATE SECTIONS AND VARIABLE LENGTH BARRIERS. THE T-TOP SHOULD EXTEND 40FT ON EITHER SIDE OF THESE CONDITIONS AND BE TERMINATED WITH TRANSITIONS.
11. THE BARRIERGUARD 800 RANGE HAS BEEN DESIGNED TO BE USED ON AND HAS BEEN TESTED ANCHORED ON ASPHALT, CONCRETE AND COMPACTED SUBBASE. CONTACT LAURA METAAL ROAD SAFETY INC. FOR FURTHER INFORMATION.
12. BARRIERGUARD 800 COMPONENTS ARE MANUFACTURED IN SI (METRIC) UNITS. ENGLISH UNITS SHOWN ARE APPROXIMATE. ALL COMPONENTS ARE FULLY GALVANIZED.
13. BARRIERGUARD 800 SYSTEMS SHALL BE ASSEMBLED AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS DETAILED DRAWINGS, PROCEDURES AND SPECIFICATIONS. FOR ANY INSTALATIONS OUTSIDE OF THE SCOPE OF THESE DRAWINGS PLEASE CONTACT LAURA METAAL ROAD SAFETY INC. FOR DETAILS.

BARRIERGUARD 800 DEFLECTION TABLE

	STANDARD SYSTEM	MINIMUM DEFLECTION SYSTEMS (MDS)
DESCRIPTION	ONLY ANCHORED AT THE EXTREME ENDS OF THE BARRIER LENGTH	ANCHORED EVERY 20 FT.
DEFLECTION AT MASH TL-3	5'-6"	18 ½"
T-TOP REQUIREMENTS	NONE REQUIRED	REQUIRED FOR MDS SECTIONS

STANDARD ANCHORING REQUIREMENTS (TABLE)

	RESIN STUD ANCHORS			DRIVEN ANCHORS		Hilti HSL-3 SHALLOW MECHANICAL
	CONCRETE *	UNREINFORCED CONCRETE *	ASPHALT	ASPHALT	SUBBASE/SOIL	CONCRETE
ANCHOR DIAMETER	1 in.	1 in.	1 in.	1-3/16 in.	5-1/2 in.	**
EMBEDMENT DEPTH	6 in.	8 in.	16 in.	16 in.	32 in.	**
DRILL DIAMETER	1-1/8 in.	1-1/8 in.	1-1/8 in.	1-3/16 in.	DRIVEN	**
PULL OUT CAPACITY (MIN)	17500 lb	17500 lb	N/A	N/A	N/A	**
SHEAR CAPACITY (MIN)	25000 lb	25000 lb	N/A	N/A	N/A	**

* ALTERNATIVE ANCHORS INCLUDING MECHANICAL ANCHORS FOR CONCRETE MAYBE USED IF THEY MEET THE STRENGTH REQUIREMENTS LISTED, DETAILS WILL BE MANUFACTURER SPECIFIC.
** CONTACT: LAURA METAAL ROAD SAFETY INC. FOR SPECIFIC APPLICATION.

Texas Department of Transportation

Design Division Standard

BARRIERGUARD 800 SYSTEM
STEEL BARRIER
MASH TL-3
BARRIERGUARD-19

FILE: barrierguard19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
© TxDOT: JULY 2019	CONT	SECT	JOB	HIGHWAY
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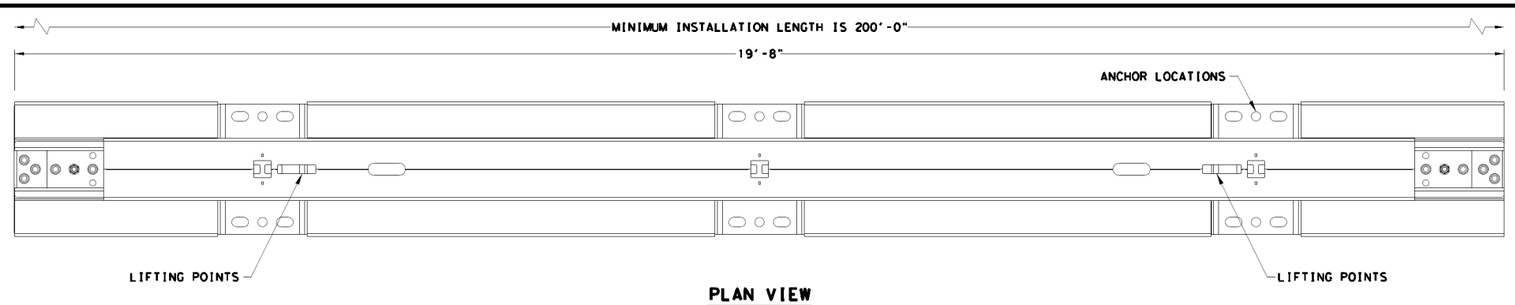
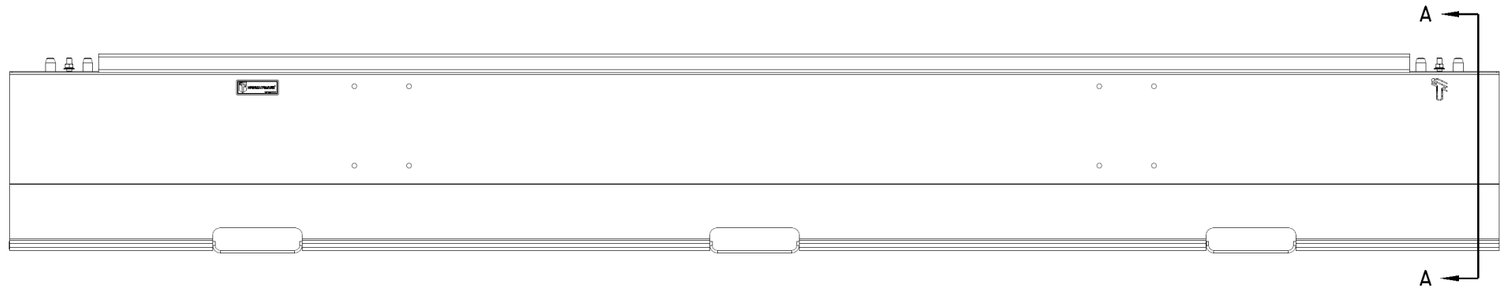
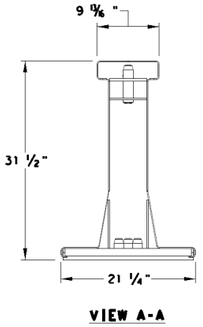


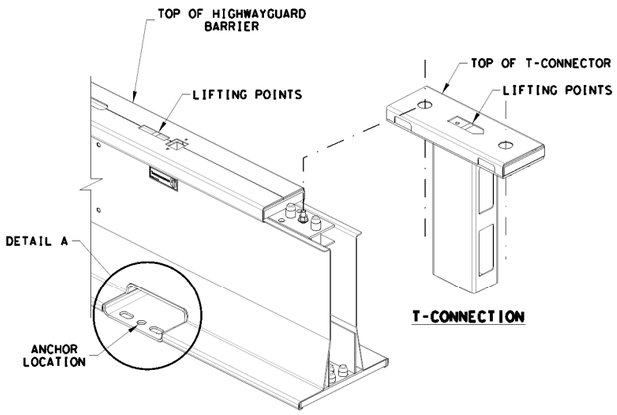
PLAN VIEW



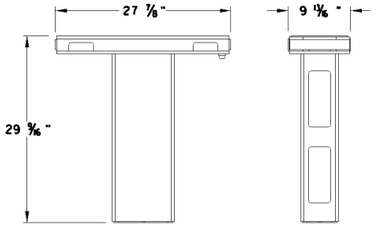
ELEVATION VIEW
LEFT SIDE



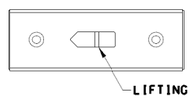
VIEW A-A



ISOMETRIC VIEW



ELEVATION VIEW SIDE VIEW

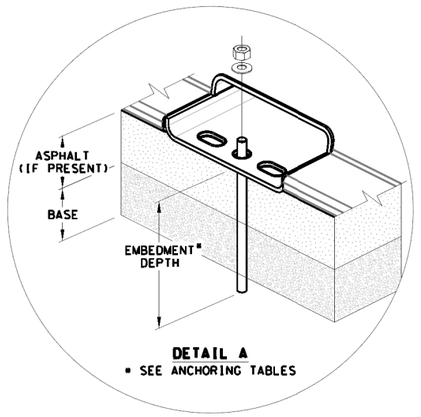


PLAN VIEW

T-CONNECTOR DETAILS

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

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



DETAIL A
• SEE ANCHORING TABLES

STANDARD ANCHORING REQUIREMENTS (ASPHALT)**				
	ANCHOR OPTIONS	ANCHOR LENGTH	EMBEDMENT DEPTH (MIN.)	DRILL DIAMETER
1	1" GALV. RESIN THREADED ANCHOR (WITH 1" GALV. WASHER & NUT)	1'-1"	11 ¾"	1 ⅛"
2	1 ⅜" GALV. DROP IN PIN (NOT DRIVEN PIN)	1'-2 ⅜"	1'-1 ¾"	1 ¼"
3	1" GALV. RESIN THREADED ANCHOR (WITH 1" GALV. WASHER & NUT)	1'-6"	1'-4 ½"	1 ¼"
4	1" GALV. CHEMICAL THREADED "LEFTY" KELKEN REMOVABLE ANCHOR (WITH 1" GALV. WASHER & NUT)	NA	1'-0"	1 ¼"

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

NOTE:
ANCHORS ARE TO BE POSITIONED A MINIMUM OF 5 ¾" AWAY FROM THE EDGE OF AN EXCAVATION FOR RESIN ANCHORS OR 7 ¾" FOR DROP IN PINS.

STANDARD ANCHORING REQUIREMENTS (CONCRETE)***				
	ANCHOR OPTIONS	ANCHOR LENGTH	EMBEDMENT DEPTH (MIN.)	DRILL DIAMETER
1	1" GALV. RESIN THREADED ANCHOR (WITH 1" GALV. WASHER & NUT)	9"	6"	1 ⅛"
2	1" HILTI HSL-3 MECHANICAL ANCHOR	9 ¼"	****	****
3	1" GALV. CHEMICAL THREADED "LEFTY" KELKEN REMOVABLE ANCHOR (WITH 1" GALV. WASHER & NUT)	NA	6"	1 ¼"
4	1 ⅜" GALV. DROP IN PIN (NOT DRIVEN PIN)	1'-2 ⅜"	1'-1 ¾"	1 ¼"

*** 7 ⅞" MINIMUM REINFORCED CONCRETE DEPTH.
10" MINIMUM UNREINFORCED CONCRETE DEPTH.
**** CONTACT: HIGHWAY CARE LTD. FOR SPECIFIC APPLICATION.

NOTE:
ANCHORS ARE TO BE POSITIONED A MINIMUM OF 11 ⅞" FROM THE EDGE OF THE CONCRETE PAD.

GENERAL NOTES

1. THE SYSTEM SHOWN ON THIS DRAWING IS A PROPRIETARY BARRIER TRADED AS HIGHWAYGUARD AND HIGHWAYGUARD LDS AND HAS BEEN DESIGNED AND MANUFACTURED BY HIGHWAY CARE LTD. FOR TECHNICAL ASSISTANCE AND APPLICATION SUPPORT CONTACT AT (888) 323-6374 OR engineering@highwaycare.com
2. THE HIGHWAYGUARD HAS BEEN CRASH TESTED TO MASH AND HAS FHWA APPROVAL AS A TL-3 & TL-4 BARRIER. THE DEFLECTION TABLE OUTLINES BASIC SYSTEM PERFORMANCE AND COMPONENT ANCHORING REQUIREMENTS.
3. THIS DRAWING PACKAGE PROVIDES THE RELEVANT INFORMATION AND GENERAL GRAPHICS REQUIRED TO IDENTIFY THE COMPONENT PARTS OF HIGHWAYGUARD AND THEIR INCORPORATION AS A WHOLE SYSTEM FOR DEPARTMENTAL STANDARD APPLICATIONS.
4. INSTALLATION OF HIGHWAYGUARD BARRIER OR HIGHWAYGUARD LDS BARRIER, NORMALLY STARTS WITH AN END CAP THAT MUST BE PROTECTED WITH A SUITABLE CRASH CUSHION END TREATMENT IF EXPOSED TO ONCOMING TRAFFIC. THE CRASH CUSHION CONNECTIONS ARE NOT DETAILED WITHIN THESE DRAWINGS, PLEASE CONTACT HIGHWAY CARE LTD. FOR MORE DETAILS.
5. THE FULL HEIGHT OF HIGHWAYGUARD BARRIER 20FT SEGMENT IS 31.5". EACH SEGMENT IS LOWERED INTO POSITION WITH THE T-CONNECTION ALREADY ATTACHED TO THE END OF THE BARRIER THAT IS BEING JOINED TO THE RUN OF BARRIER. ENSURE ORIENTATION OF T-CONNECTOR ALLOWS ALIGNMENT PINS TO BE LOWERED ONTO NEXT SECTION. THE T-CONNECTOR ALLOWS THE BARRIER FOR ADJUSTMENTS, QUICK INSTALLATION, QUICK REMOVAL AND REPLACEMENT OF DAMAGED BARRIERS. MINIMUM INSTALLATION LENGTH OF HIGHWAYGUARD BARRIER IS 200'-0".
6. THERE ARE SEVERAL METHODS OF ACHIEVING RADIUS IN A LENGTH OF HIGHWAYGUARD BARRIER. RADIUS CAN BE ACHIEVED USING VARIOUS T-CONNECTORS AND THUS ALLOWING THE HIGHWAYGUARD BARRIER TO FOLLOW THE DESIRED CURVATURE IN THE INSTALLATION, THESE TYPE OF T-CONNECTORS ARE, 2.5°, 5° AND 10° ANGLES. FOR FURTHER INFORMATION AND ADVICE CONTACT HIGHWAY CARE LTD.
7. USING HIGHWAYGUARD BARRIER OR HIGHWAYGUARD BARRIER LDS ON BRIDGE STRUCTURES, POSSIBLE ANCHORING SHOULD TAKE PLACE OFF BRIDGE DECKS. ANY ANCHORING ON BRIDGE DECKS NEEDS TO BE AGREED IN ADVANCE WITH THE TECHNICAL EXPERT RESPONSIBLE FOR THE BRIDGE TO ENSURE IT IS NOT DAMAGED. IF ANCHORING EITHER SIDE OF A BRIDGE DECK EXPANSION JOINT, THEN THIS MOVEMENT MUST BE MIRRORED IN THE BARRIER. FOR FURTHER INFORMATION AND ADVICE CONTACT HIGHWAY CARE LTD.
8. THE HIGHWAYGUARD BARRIER SECTIONS CAN BE EQUIPPED WITH OPTIONAL WHEELSETS THAT ALLOW THE BARRIERS TO BE MANEUVERED WITHOUT LIFTING THE MACHINERY/ EQUIPMENT SUCH AS INSTALLING IN TUNNELS OR AREAS WITH OVERHEAD RESTRICTIONS. THE WHEELSETS CAN BE RAISED AND LOWERED FROM THE TOP OF THE BARRIER USING A MANUAL WRENCH AND 1" SOCKET.
9. THE HIGHWAYGUARD BARRIER HAS BEEN MASH TESTED, USING 1 ⅜" DIA. DROP IN PIN ANCHORS AND EMBEDDED 1'-6" INTO ASPHALT. ALTERNATIVE GROUND EMBEDMENT CONDITIONS MAY BE ACCEPTABLE BUT MIGHT REQUIRE DIFFERENT ANCHOR SOLUTIONS, PLEASE CONTACT HIGHWAY CARE LTD. FOR FURTHER INFORMATION.
10. ALL COMPONENTS ARE FULLY GALVANIZED.
11. HIGHWAYGUARD BARRIER SYSTEMS SHALL BE ASSEMBLED AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS DETAILED DRAWINGS, PROCEDURES AND SPECIFICATIONS. FOR ANY INSTALLATIONS OUTSIDE OF THE SCOPE OF THESE DRAWINGS, PLEASE CONTACT HIGHWAY CARE LTD. FOR DETAILS.
12. FOR ANCHORING LAYOUTS FOR HIGHWAYGUARD AND HIGHWAYGUARD LDS, PLEASE SEE MANUFACTURER'S PRODUCT MANUAL OR CONTACT HIGHWAY CAR LTD. FOR INFORMATION.

HIGHWAYGUARD DEFLECTION TABLE		
	STANDARD SYSTEM	MINIMUM DEFLECTION SYSTEMS (LDS)
DESCRIPTION	ONLY ANCHORED AT THE FIRST AND ENDS OF THE BARRIER LENGTH	ANCHORS ARE STAGGERED EVERY 39'-4 ½"
DEFLECTION AT MASH TL-3	64"	2'-3"
DEFLECTION AT MASH TL-4	71"	2'-7"

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

Texas Department of Transportation

Design Division Standard

HIGHWAYGUARD SYSTEM STEEL BARRIER

MASH TL-3 & TL-4

HIGHWAYGUARD-21

FILE: highwayguard21.dgn	DN: TXDOT	CK: KM	DW: SS	CK: XX
©TxDOT: JULY 2021	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
	DIST	COUNTY		SHEET NO.
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DATE: 1/30/2024
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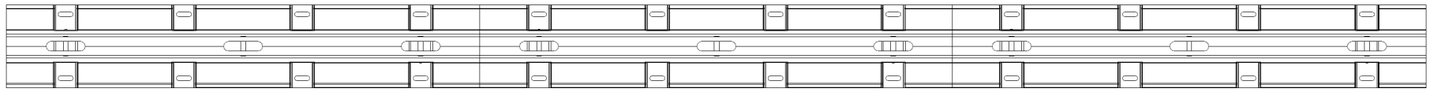
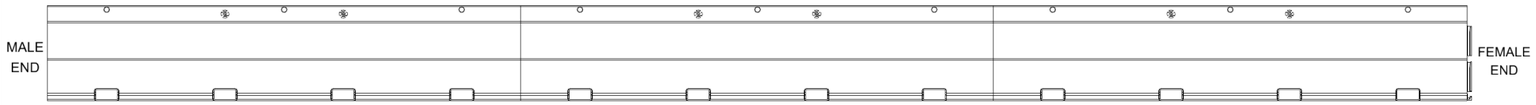
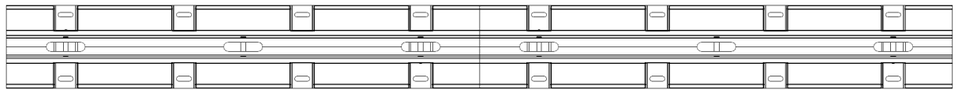


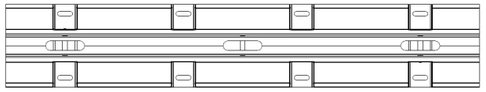
PLAN VIEW



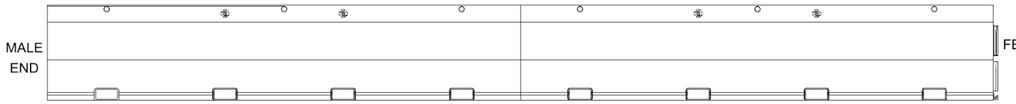
ELEVATION VIEW
ZONEGUARD STANDARD UNIT x 50'-0"



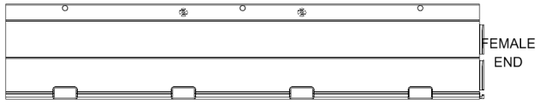
PLAN VIEW



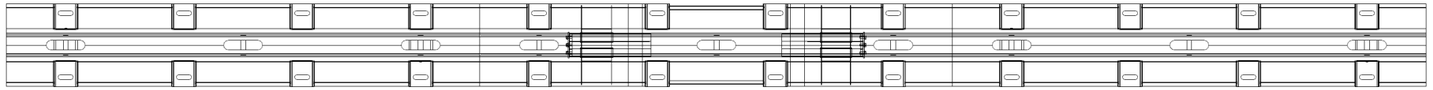
PLAN VIEW



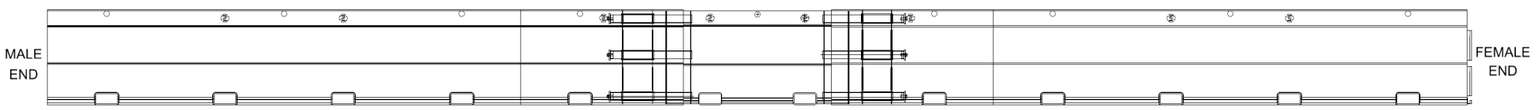
ELEVATION VIEW
ZONEGUARD STANDARD UNIT x 33'-4"



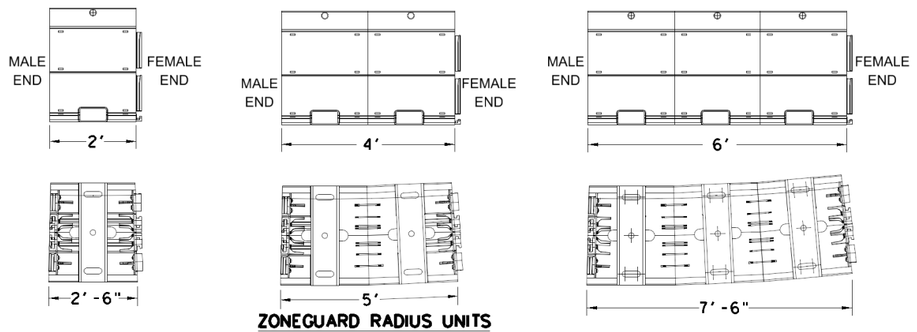
ELEVATION VIEW
ZONEGUARD STANDARD UNIT x 16'-8"



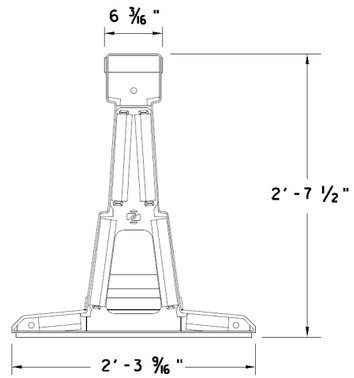
PLAN VIEW



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



ZONEGUARD RADIUS UNITS



ZONEGUARD TYPICAL SECTION

GENERAL NOTES

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

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

EXPECTED DEFLECTION TABLE

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

ANCHORING TABLE

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

Texas Department of Transportation

Design Division Standard

ZONEGUARD SYSTEM
STEEL BARRIER
MASH TL-3
ZONEGUARD-19

FILE: zoneguard19	DN: TxDOT	CK: KM	DW: VP	CK: CGL
© TxDOT: JULY 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
	DIST	COUNTY		SHEET NO.
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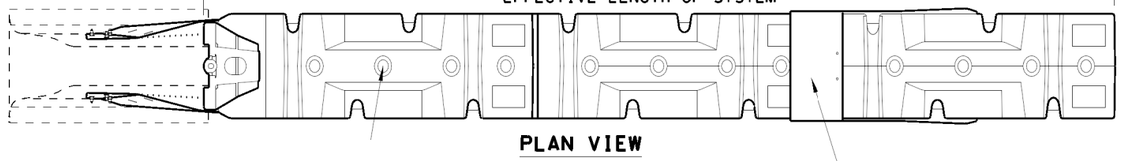
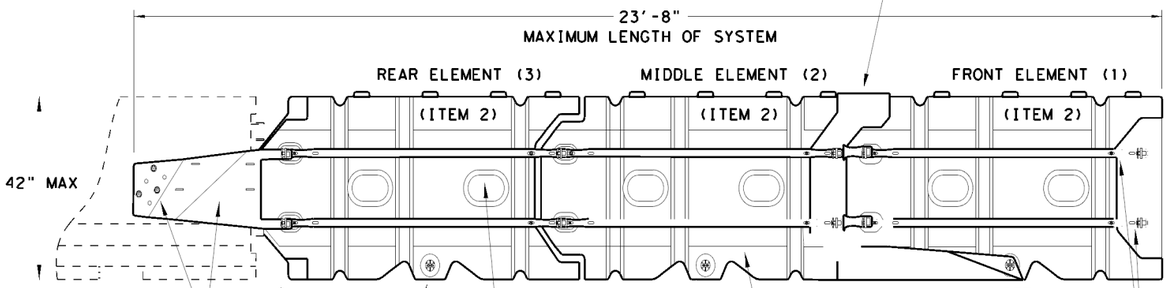
SYSTEM SHOWN - ABSORB-M TL-3



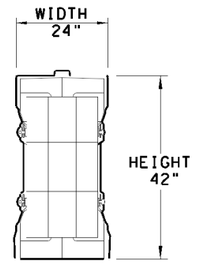
PLAN VIEW

TRAFFIC FLOW

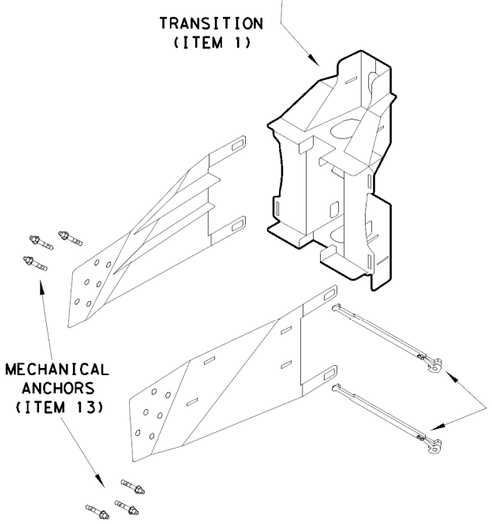


ELEVATION VIEW

TRAFFIC FLOW



SECTION A-A



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"

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).

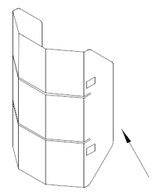
BILL OF MATERIALS (BOM) ABSORB-M TL-3 & TL-2 SYSTEMS			QTY	QTY
ITEM #	PART NUMBER	PART DESCRIPTION	TL-2 SYSTEM	TL-3 SYSTEM
1	BSI-1809036-00	TRANSITION-(GALV)	1	1
2	BSI-1808002-00	PRE-ASSEMBLED ABSORBING (ELEMENTS)	2	3
3	BSI-4004598	FILL CAPS	8	12
4	BSI-4004599	DRAIN PLUGS	2	3
5	BSI-1809053-00	TENSION 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

**APPLY DECAL



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:
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	DIST	COUNTY		SHEET NO.
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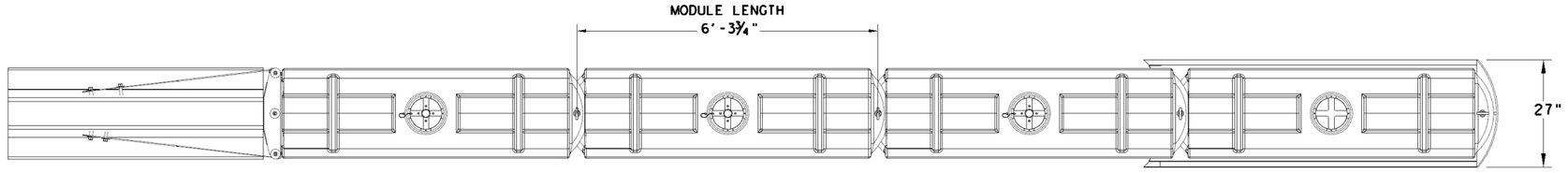
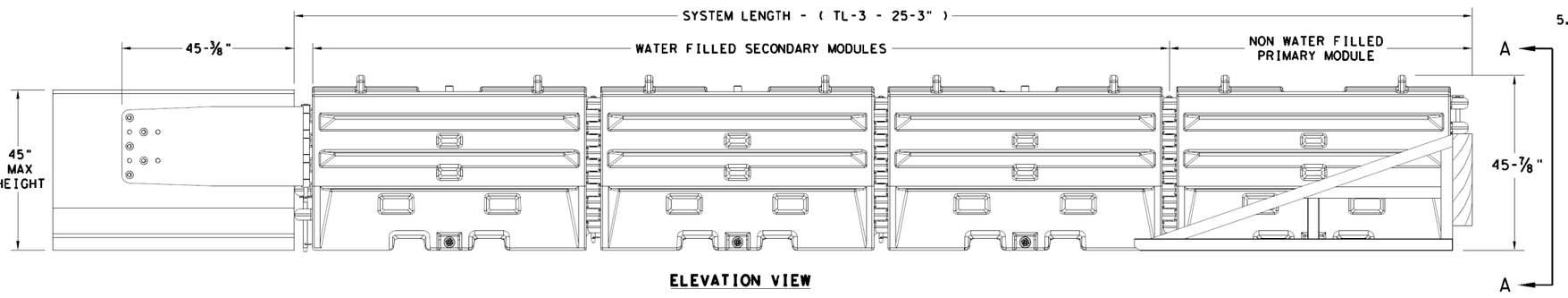


PLAN VIEW



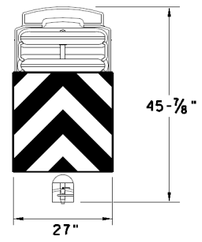
ELEVATION VIEW

GENERAL NOTES

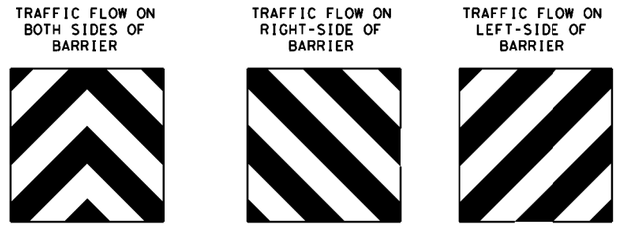
1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE, 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

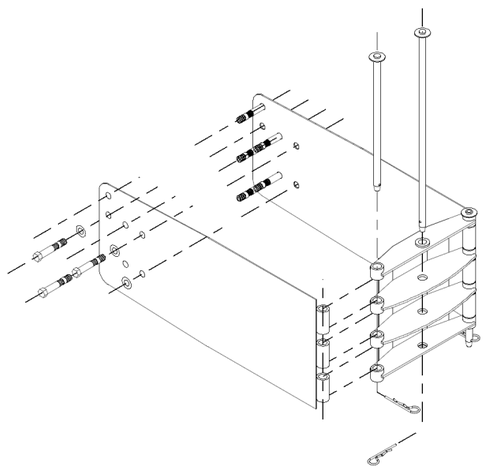


NOSE SHEETING PANEL DELINEATION

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:
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LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA (PSN:)	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
2	LT/RT	98	0.85 MI N OF FM1472	222400001806076	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'	2		2						X	
3	LT/RT	99	3.40 MI N OF SL20	222400001806034	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			4	2					X	
4	RT	100	7.95 MI N OF SL20	222400001805068	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			2	3					X	
5	RT	101	1.65 MI S OF US83	222400001805067	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			2	4					X	
8	LT/RT	104	26.35 MI NW OF IH 35	222400215003015	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			4	5					X	
9	LT/RT	105	25.90 MI NW OF IH 35	222400215003014	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			4	8					X	
10	LT/RT	106	22.90 MI NW OF IH 35	222400215003009	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			4	9					X	
11	LT/RT	107	21.15 MI NW OF IH 35	222400215003010	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			4	10					X	
12	LT/RT	108	20.00 MI NW OF IH 35	222400215003011	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			4	11					X	
14	LT/RT	110	0.85 MI S OF US 59	222400298802003	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			4	12					X	
15	LT/RT	111	0.95 MI S OF US 59	222400298802004	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			4	14					X	
16	LT/RT	112	12.50 MI S OF US 59	222400298802002	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			4	15					X	
17	LT/RT	113	7.50 MI S OF US 59	222400298802005	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			4	16					X	
18	LT/RT	114	9.20 MI S OF US 59	222400298802006	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			4	17					X	
19	LT/RT	115	14.05 MI S OF US 59	222400298802001	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			4	18					X	
22	LT	118	3.35 MI N OF US 83	222400001804065	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			2	19					X	
23	LT	119	3.80 MI N OF US 83	222400001804064	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			2	22					X	
24	LT	120	6.40 MI N OF US 83	222400001804062	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			2	23					X	
25	LT	121	6.60 MI N OF US 83	222400001804061	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			2	24					X	
26	LT	122	7.15 MI N OF US 83	222400001804060	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			2	25					X	
27	LT	123	7.85 MI N OF US 83	222400001804059	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			2	26					X	
28	LT	124	8.85 MI S OF LASALLE C/L	222400001803056	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			2	27					X	
29	LT	125	8.55 MI S OF LASALLE C/L	222400001803055	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			2	28					X	
30	LT	126	7.90 MI S OF LASALLE C/L	222400001803054	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			2	29					X	
31	LT	127	6.95 MI S OF LASALLE C/L	222400001803053	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			2	30					X	
32	LT	128	6.75 MI S OF LASALLE C/L	222400001803052	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			2	31					X	
33	LT	129	6.55 MI S OF LASALLE C/L	222400001803051	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			2	32					X	
34	LT	130	4.85 MI S OF LASALLE C/L	222400001803050	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			2	33					X	
35	LT	131	4.55 MI S OF LASALLE C/L	222400001803049	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'			2	34					X	
36	LT	132	2.15 MI S OF LASALLE C/L	222400001803047	TL-3	BI	N/A	N/A	PTB	24"	32"	APPROX. 35'		2	2	35					X	
												TOTALS	2	2	84							

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

CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:		CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
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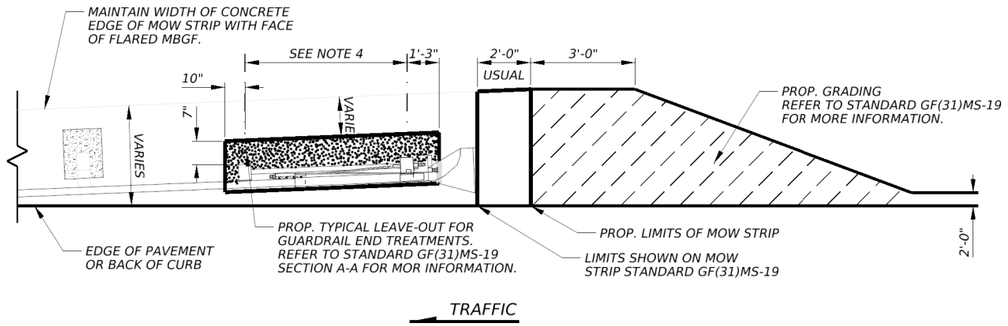
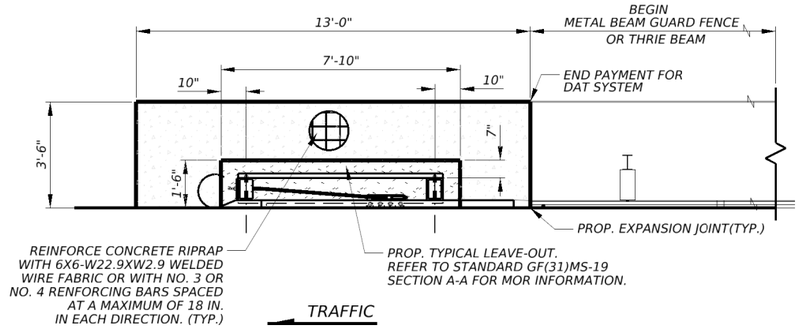
	DIST	COUNTY		
	22	WEBB		
	STATE AID PROJECT			SHEET NO.
	C 922-00-75			71



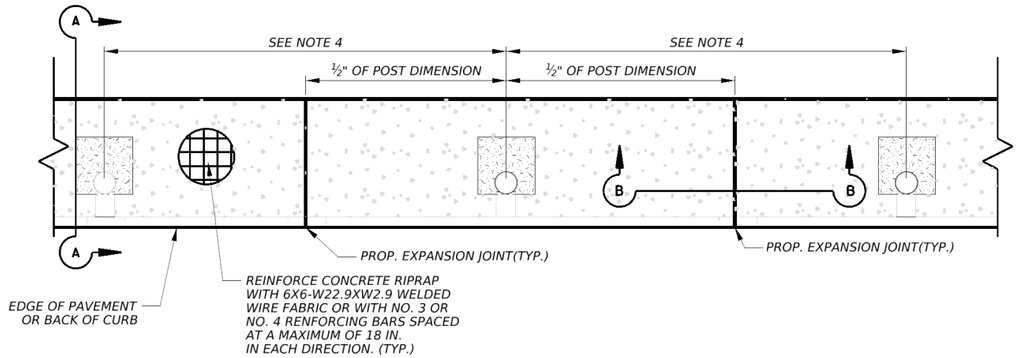
TYPICAL GUARDRAIL END TREATMENT MOW STRIP DETAIL

N.T.S.



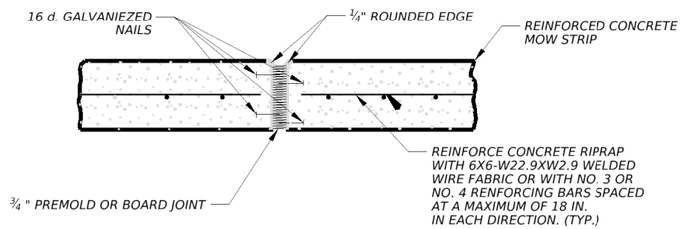
TYPICAL DOWNSTREAM ANCHOR TERMINAL MOW STRIP DETAIL

N.T.S.



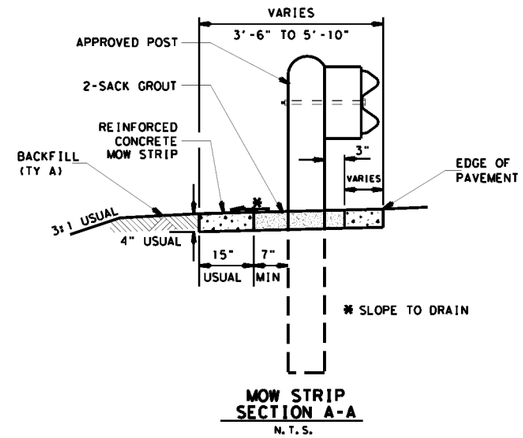
TYPICAL GUARDRAIL END TREATMENT MOW STRIP EXPANSION JOINT DETAIL

N.T.S.



SECTION B-B

N.T.S.



MOW STRIP SECTION A-A

N.T.S.

NOTES

1. PLACE CONCRETE MOW STRIPS AS SHOWN ON THE PLANS AND IN ACCORDANCE WITH ITEM 432 "RIPRAP". USE CLASS B REINFORCED CONCRETE.
2. PLACE THE MOW STRIP THE ENTIRE LENGTH OF THE GUARD FENCE PLUS ANY DOWNSTREAM ANCHOR TERMINAL (DAT) OR SINGLE GUARDRAIL TERMINAL (SGT) TO 2' BEYOND THE FACE OF THE OBJECT MARKER AT THE END OF THE TERMINAL. DO NOT ALLOW CONCRETE TO ADHERE TO THE GROUND LINE STRUT SHOWN ON THE SGT STANDARD SHEET.
3. MOWSTRIP TO BE CONVENTIONALLY FORMED CONCRETE. PROVIDE MOWSTRIP SECTIONS SEPARATED BY PREMOLD OR BOARD JOINT OF THE THICKNESS SHOWN ON THE PLANS IN LENGTHS GREATER THAN 8 FT. BUT LESS THAN OR EQUAL TO 12.5 FT, UNLESS OTHERWISE DIRECTED. TERMINATE WORKDAY PRODUCTION AT AN EXPANSION JOINT.
4. REFER TO TXDOT STANDARD GF(31)-19, GF(31)TRTL3-20, GF(31)MS-19, SGT(10S)31-16, SGT(11S)31-18, SGT(12S)31-18, SGT(15)31-20 SHEET(S) IF APPLICABLE FOR INSTALLATION, DIMENSIONS AND OTHER INFORMATION.
5. MOWSTRIP EXPANSION JOINT SPACING SHALL BE MINIMUM 24 FT. AND NO MORE THAN 40 FT.

MOWSTRIP QUANTITY CALCULATIONS

FOR ESTIMATION PURPOSES

EVERY THRIE-BEAM TRANS = 0.81 CY (7.29 SY)
EVERY 25 FT. OF MBGF = 1.08 CY (9.72 SY)
EVERY GET SYSTEM = 2.85 CY (25.74 SY)
EVERY DAT SYSTEM = 0.56 CY (5.0 SY)

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PROFESSIONAL ENGINEER

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1/31/2024

Texas Department of Transportation

IH 35, ETC

ROADWAY MISCELLANEOUS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		72

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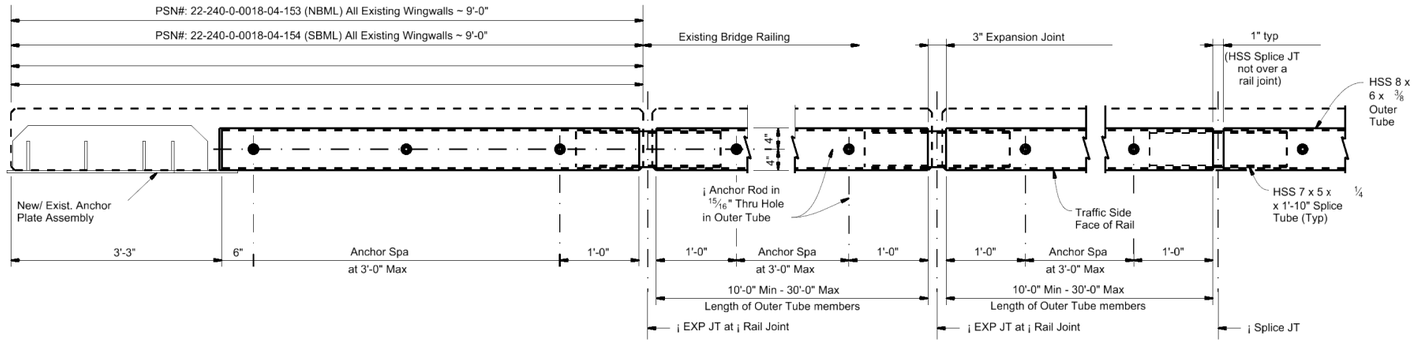
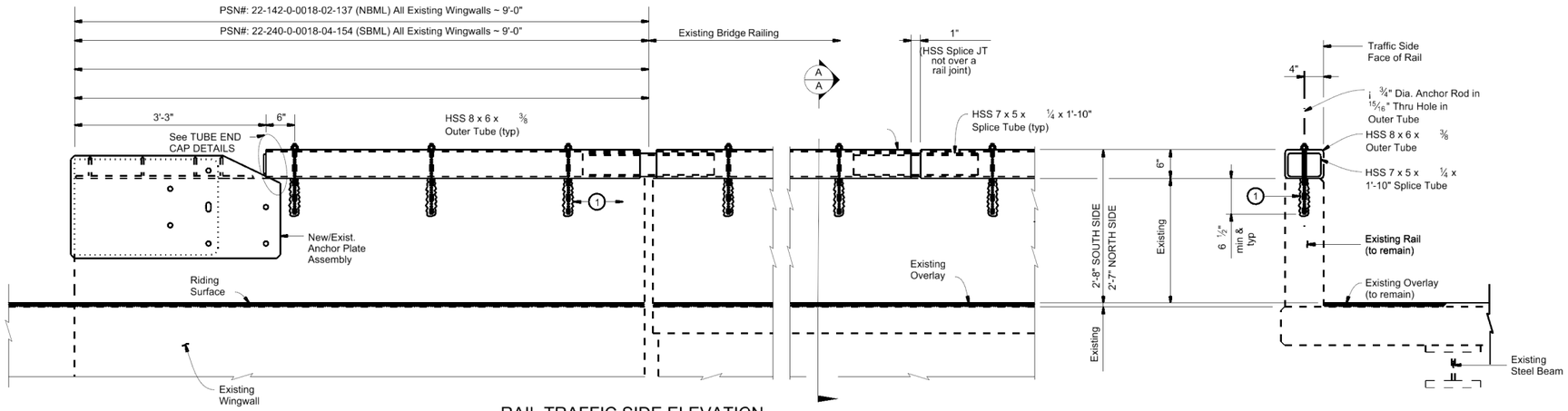
CK
DW
CK
DW

No additional overlay may be added to the existing bridge.
Mill down existing overlay prior to adding new overlay.
If future overlay is added, limit the depth of the new overlay such that the elevation of the existing riding surface is not exceeded.

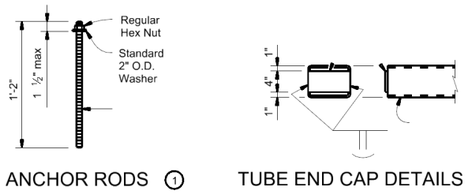


RAIL PLAN



RAIL TRAFFIC SIDE ELEVATION

SECTION A-A



ANCHOR RODS ① TUBE END CAP DETAILS

① Anchor bolts must be 3/4" Dia. ASTM-A36 threaded rods with one regular hex nut and one standard 2" O.D. washer each. Embed threaded rods 6 1/2" Min into concrete rail using a Type III, Class C epoxy adhesive anchor system capable of obtaining an ultimate load of 20 kips in tension per threaded rod. Anchor installation, including hole size, drilling, and clean-out must be in accordance with the manufacturer's instructions.

GENERAL NOTES:

Remove MBGF (W-shape) fascia and attachment hardware from the existing rail, if present, prior to the installation of new HSS steel tube and must be subsidiary to the bid item. Dispose of the removed materials as directed by the Engineer. Plug newly exposed bolt holes that are in conflict with the structural tubing anchors with epoxy grout prior to the coring of new anchor holes. Existing bolt holes not in conflict do not need to be plugged.

Provide ASTM A1085 beam member structural steel and provide ASTM A36 end cap structural steel. Structural steel must conform to Item 441, "Steel Structures", and must be free from burrs, sharp edges, and weld splatter. Exposed edges and corners must be ground to 1/16" flat or radius.

All steel components must be galvanized in accordance with Item 445, "Galvanizing". Provide anchor bolts, rods, and nuts of Class 2A and 2B fit tolerances. Provide nuts that are tapped after galvanizing. Nuts must be installed to snug tight. Burr threads after installation to prevent back turn of the nut.

Verify all dimensions in the field prior to commencement of work. Shop drawings are required for this rail.

HSS Quantity = 12,620 LB. For Contractor's information only.

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1/31/2024

NOT TO SCALE

Texas Department of Transportation

VARIOUS

BRIDGE RAIL RETROFIT HSS TUBE DETAIL

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		73

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Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw Height of Wingwall (1) (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
PSN: 22-240-0-0018-05-068 (IH35 WFR)(RT)	3 ~ 6'x 3'	2'	Non-Stndrd	SETB-FW-S	45°	4:1	6"	6"	0.250'	5.250'	19.667'	34.064'	39.333'	N/A	60.934'	11.5	2.1	14.8	329
PSN: 22-240-0-2988-02-006 (FM2895)(BOTH)	4 ~ 6'x 4'	1'	Non-Stndrd	SETB-FW-0	0°	4:1	6"	6"	0.250'	5.250'	19.667'	11.355'	22.709'	N/A	48.459'	19.8	2.0	23.0	N/A

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

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NOTES:
Skew = 0° on SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standard sheets;
30° maximum for safety end treatment

SL:1 = Horizontal : 1 Vertical
· Side slope at culvert for flared or straight wingwalls.
· Channel slope for parallel wingwalls.
· Slope must be 3:1 or flatter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.

U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.

C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of wingwall

A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)

B = Offset of end of wingwall (not applicable to parallel or straight wingwalls)

Lw = Length of longest wingwall.

Ltw = Length of culvert toewall (not applicable when using riprap apron)

Atw = Length of anchor toewall (applicable to safety end treatment only)
Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

(1) Round the wall heights shown to the nearest foot for bidding purposes.

(2) Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (RAC) standard sheet quantities shown must be increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.

(3) Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to provide culverts of a different type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

SPECIAL NOTE:

This sheet is a supplement to the box culvert standards. It is to be filled out by the culvert specifier and provides dimensions for the construction of the box culvert wingwalls and safety end treatments.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

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1/30/2024

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE:	bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		0922	00	075	VARIOUS
		DIST	COUNTY		SHEET NO.
		22	WEBB		74

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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for One Structure End)

Maximum Wingwall Height Hw (9)	W	X	Y	Z	Variable Reinforcing Bars J1 Size	Bars J1 Spa	Bars J2 Size	Bars J2 Spa	Estimated Quantities per ft of wing length (Two~Wings) (3) Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'- 8"	1'- 9"	1'- 3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'- 2"	2'- 0"	1'- 6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'- 8"	2'- 3"	1'- 9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'- 2"	2'- 6"	2'- 0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'- 8"	2'- 9"	2'- 3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'- 2"	3'- 0"	2'- 6"	9"	#7	6"	#5	6"	162.29	0.721

TABLE OF WING WALL REINFORCING
(Two~Wings)

Bar	Size	No.	Spa
D	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
R	#5	6	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4	~	1'-0"
Q	#4	1	~
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

TABLE OF ESTIMATED ANCHOR TOEWALL QUANTITIES

Bar	Size	No.	Spa
K	#4	~	1'-0"
N	#5	6	~
OL	#4	6	~
Reinf (Lb/Ft)			9.82
Conc (CY/Ft)			0.074

(1) Extend Bars P 3'-0" Min into bottom slab of box culvert.

(2) Adjust to fit as necessary to maintain 1 1#2" clear cover and 4" Min between bars.

(3) Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings multiply the tabulated values by Lw.

(4) Recommended values of slope are: 3:1, 4:1, and 6:1. Provide 3:1 or flatter slope.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, extend construction joints or grooved joints, oriented in the direction of flow, across the full distance of the riprap, at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B is not required.

(6) At Contractor's option, end the culvert toewall flush with wingwall toewall. Adjust reinforcing as needed.

(7) 3" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to the Extend Curb Details (ECD) standard sheet.

(8) For vehicle safety, reduce curb heights, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.

(9) See Table of Maximum Wing Heights for various slopes. Height is limited based on a 33'-6" maximum safety pipe runner length.

TABLE OF MAXIMUM WING HEIGHTS (9)

Side Slope	Hw Max
3:1	11'- 5"
4:1	8'-10"
6:1	6'- 1"

WING DIMENSION CALCULATIONS:

Hw = H + T + C - 0.250' (9)
A = (Hw - 0.333') (SL)
B = (A) (tan (30°))
Lw = (A) ÷ cos (30°))

For cast-in-place culverts:
Ltw = (N) (S) + (N + 1) (U)
For precast culverts:
Ltw = (N) (2U + S) + (N - 1) (0.500')

Lc = (Ltw) - (2U)
Atw = (Lc) + (2B)
Total Wingwall Area (two wings ~ SF)
= (Hw + 0.333') (Lw)

Hw = Height of wingwall (feet)
Atw = Anchor toewall length (feet)
Lw = Length of wingwall (feet)
N = Number of culvert barrels
SL:1 = Side slope ratio (horizontal : 1 vertical)
Ltw = Culvert toewall length (feet)
Lc = Culvert curb between wings (feet)

See applicable box culvert standard for H, S, T, and U values.
See Table of Maximum Wall Heights for limits on Hw.

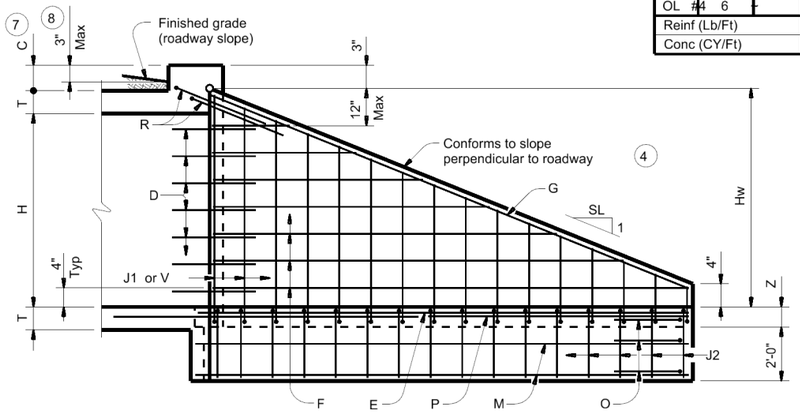
MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Provide Class "C" concrete (f'c = 3,600 psi).
Adjust reinforcing as necessary to provide a minimum clear cover of 1 ½".
Provide pipe runners and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts and nuts.
Provide ASTM A36 steel plates.
Galvanize all steel components, except reinforcing unless required elsewhere in the plans, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with the Item 445, "Galvanizing".
For optional adhesive anchors, install adhesive anchorages in accordance with the manufacturer's instructions including hole size, drilling equipment and method, hole cleaning equipment and method, mixing and dispensing adhesive, and anchor insertion. Do not alter the manufacturer's mixing nozzle or dispenser. Provide anchorage rods that are clean and free of grease, oil, or any other foreign material. Demonstrate hole cleaning method to the Engineer for approval and continue the approved process for all anchorage locations. Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

GENERAL NOTES:

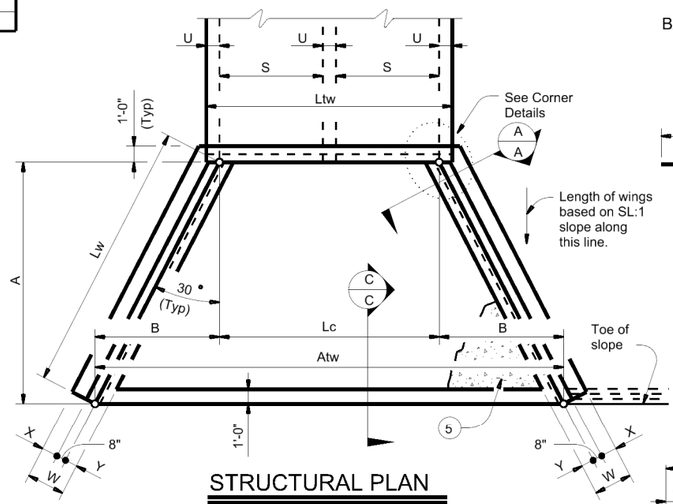
Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
All bolts, nuts, washers, brackets, angles, and pipe runners are considered parts of the safety end treatment for payment.
The quantities for pipe runners, reinforcing steel, and concrete, resulting from the formulas given herein are for Contractor's information only.
See the Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.

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



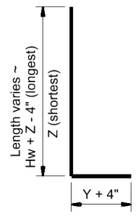
INSIDE ELEVATION OF WINGWALL

(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)

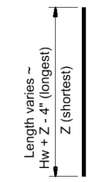


STRUCTURAL PLAN

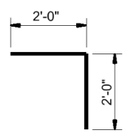
(Showing dimensions.)



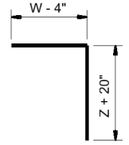
BARS J1



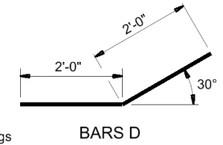
BARS V



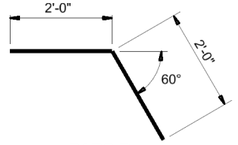
BARS L



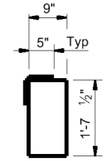
BARS J2



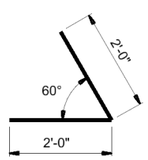
BARS D



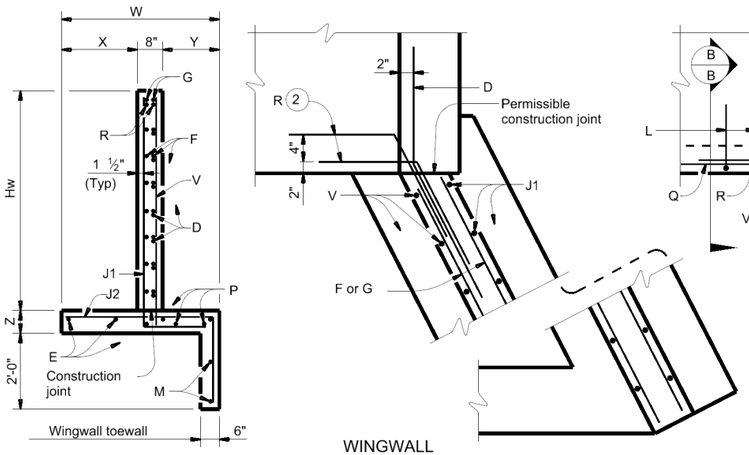
BARS R



BARS K
(Length = 5'-5")

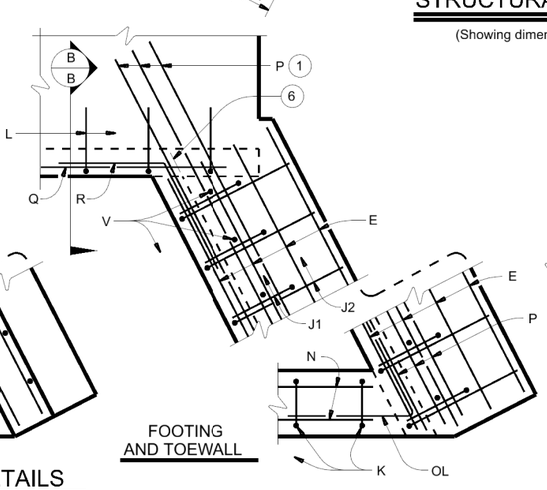


BARS OL



SECTION A-A

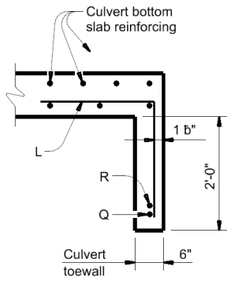
WINGWALL



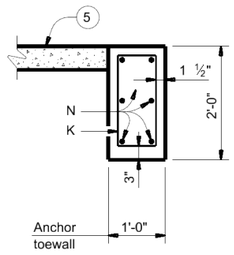
FOOTING AND TOEWALL

CORNER DETAILS

(Culvert and culvert toewall reinforcing not shown for clarity.)



SECTION B-B (5)



SECTION C-C

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SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

FILE: setbf0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
	DIST	COUNTY		SHEET NO.
	22	WEBB		75

DATE: 1/30/2024 3:47:11 PM
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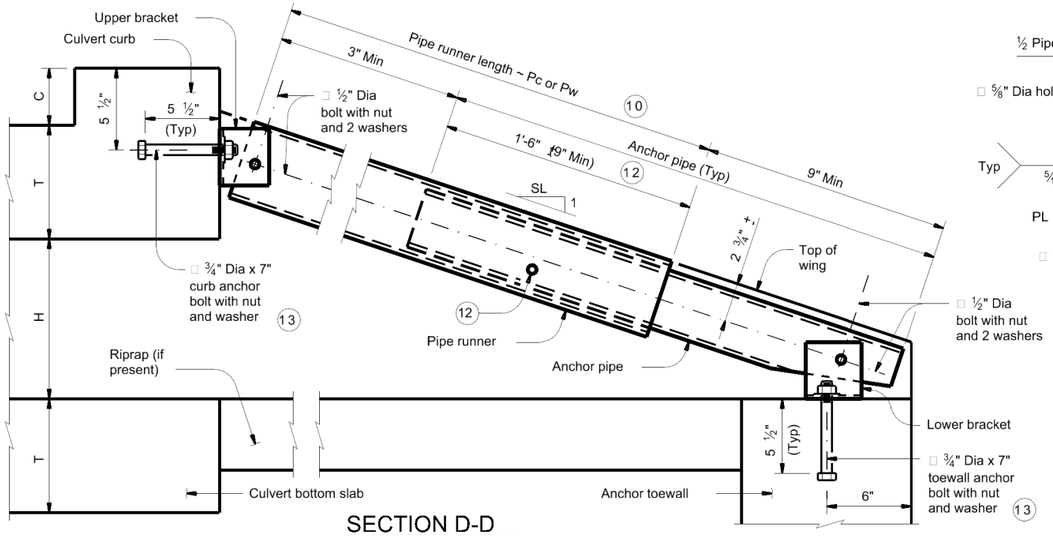
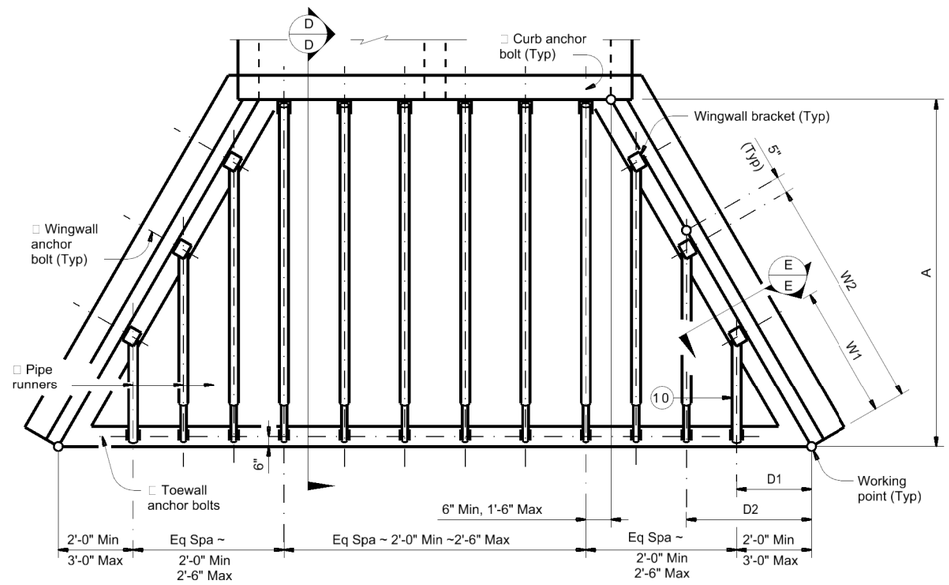
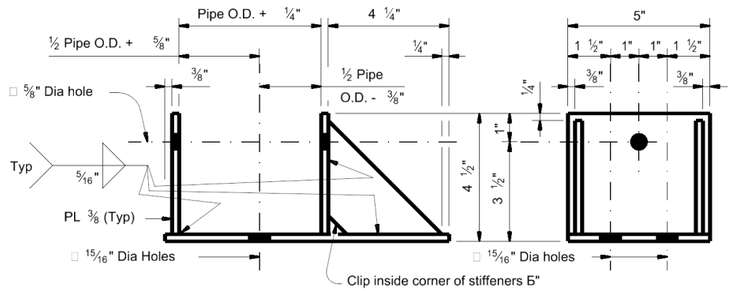


SECTION D-D

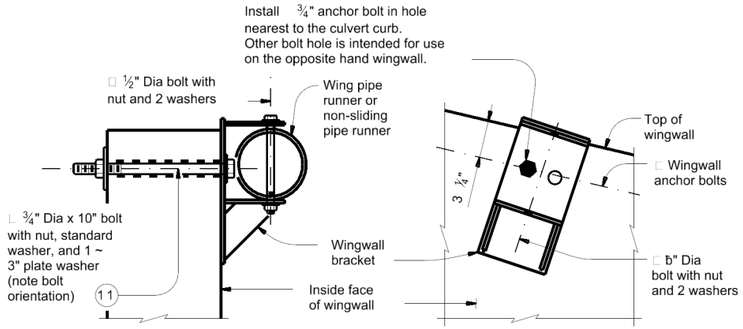
(Showing curb pipe runner. Except for upper bracket, wingwall pipe runners are similar.)



PIPE RUNNER PLAN



ELEVATION SIDE VIEW

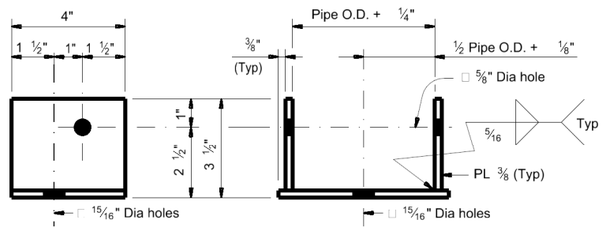


SECTION E-E
(Showing installed bracket.)

ELEVATION
(Showing installed bracket normal to wall. Pipe not shown for clarity.)

Note: Match wingwall bracket to the upper curb bracket size.

WINGWALL BRACKET DETAILS



SIDE VIEW ELEVATION

Note: Match upper and lower brackets, except for the brackets used with non-sliding pipe runners, to the required pipe diameters as shown in the table.

UPPER AND LOWER BRACKET DETAILS

MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER SIZES

Maximum Pipe Runner Length (Pc or Pw)	Required Pipe Runner Size			Required Anchor Pipe Size		
	Pipe Size	Pipe O.D.	Pipe I.D.	Pipe Size	Pipe O.D.	Pipe I.D.
9'-4"	3" STD	3.500"	3.068"	2" STD	2.375"	2.067"
19'-0"	4" STD	4.500"	4.026"	3" STD	3.500"	3.068"
33'-6"	5" STD	5.563"	5.047"	4" STD	4.500"	4.026"

(10) If pipe runner length (Pw) is 1'-9" or less replace the normal pipe runner and anchor pipe with a single non-sliding pipe runner. See Non-Sliding Pipe Runner Details for additional information.

(11) At Contractor's option, ⅞" diameter hole may be formed or cored drilled. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes.

(12) After installation of pipe runner, use the b" inspection hole to ensure that the lap of the anchor pipe with the pipe runner is adequate.

(13) At Contractor's option, an adhesive anchor may be used. Provide ¾" Dia adhesive anchors that meet the requirements of ASTM A307 Gr A fully threaded rods. Embed threaded rods into curb, wingwalls, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 5 b". Provide anchor adhesive able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.

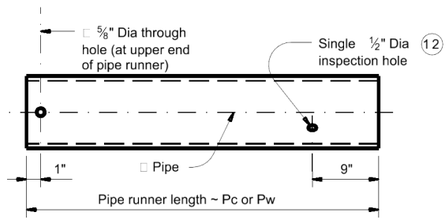
PIPE RUNNER DIMENSION CALCULATIONS:

Wn = (2.000) (Dn) - (0.416')
Pwn = (Dn) (K2) - (2.063')
Pw1 Non-Sliding Pipe Runner (If required)
= (D1) (K2) - (0.563')
Pc = (A) (K1) - (1.688')

Wn = Distance from working point to centerline anchor bolt measured along bottom inside face of wing (feet)
Dn = Distance from working point to centerline pipe runner measured along outside face of anchor toewall (feet)
Pw = Wingwall pipe runner length (feet)
Pc = Curb pipe runner length (feet)
K = Constant values for use in formulas

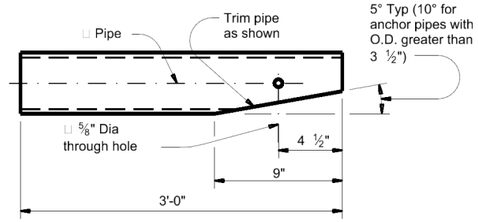
Slope SL:1	K1	K2
3:1	~ 1.054 ~	1.826
4:1	~ 1.031 ~	1.785
6:1	~ 1.014 ~	1.756

n = Wing pipe runner number

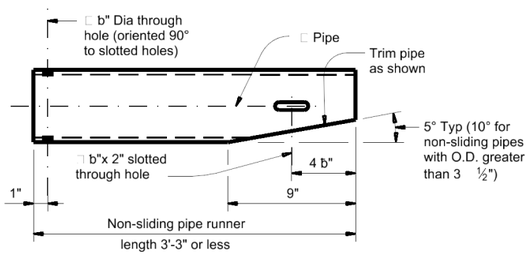


Note: Pipe diameter required for curb pipe runner is also used for wingwall pipe runner.

PIPE RUNNER DETAILS



ANCHOR PIPE DETAILS



Note: Pipe size is the same as required for curb pipe runner. Adjust the corresponding lower bracket accordingly.

NON-SLIDING PIPE RUNNER DETAILS

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SHEET 2 OF 3

Texas Department of Transportation
Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

FILE: setbf0se-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
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REVISIONS	0922	00	075	VARIOUS
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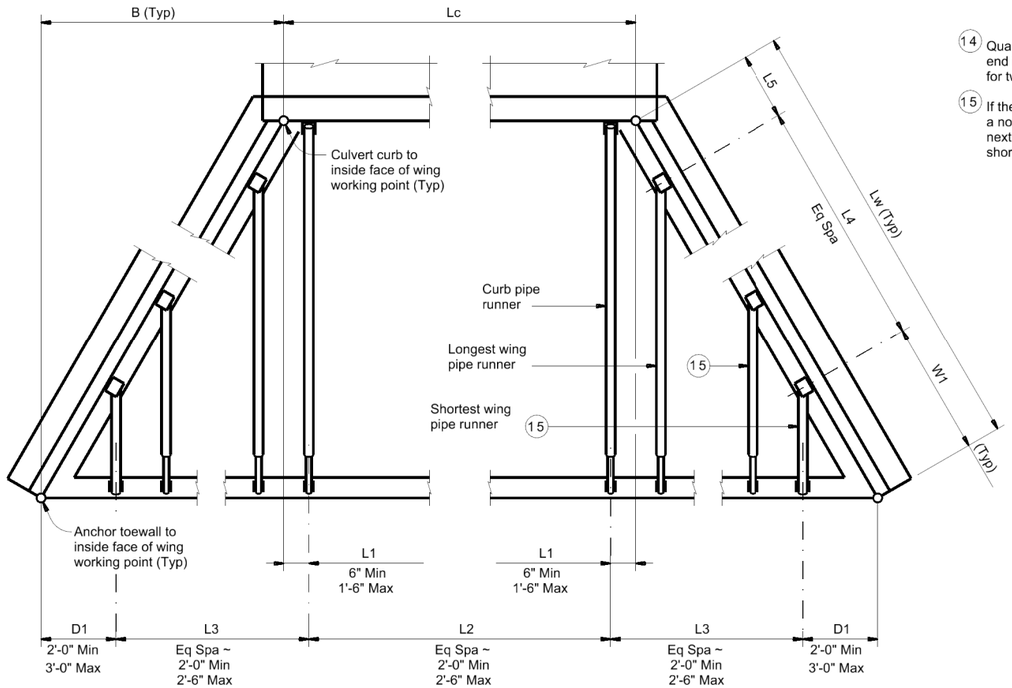
	22	WEBB		76

Culvert Station and/or Creek name followed by applicable end (Lt, Rt or Both) (14)	Lc	L1	L2			D1	L3			W1	L4			L5	Curb Pipe Runner (Pc)		Longest Wing Pipe Runner (Pw)	Shortest Wing Pipe Runner (Pw)	Non-Sliding Wing Pipe Runner (if applicable)	Curb, Wing, and/or Non-Sliding Pipe Runners		3'-0" Anchor Pipe	
			No. Spa	Spa at	Overall Length		No. Spa	Spa at	Overall Length		No. Spa	Spa at	Overall Length		No.	Length				Size (3",4" or 5")	Total Length (14)	Size (2",3" or 4")	Total Length (14)
	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)		(Ft)	(Ft)	(Ft)	(Ft)				
FM 2895 - 222400298802006 (BOTH)	25.750	0.500	10	2.475	24.750	3.000	4	2.214	8.855	5.583	3	4.427	13.282	3.844	11	18.583	15.146	3.292	N/A	4"	556.333	3"	114



PIPE RUNNER LAYOUT

(14) Quantities shown are for one structure end if Lt or Rt. Quantities shown are for two structure ends if Both.

(15) If the outermost wing pipe runner is a non-sliding pipe runner, consider the next outermost wing pipe runner as the shortest.

SPECIAL NOTE:

This tabular sheet is to be filled out by the culvert specifier and provides information for the construction details and quantities of pipe runners.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

Note that the tabular quantities are given for estimating purposes only. It is likely that these quantities will change due to field conditions. Therefore, all dimensions must be verified by the Contractor in the field prior to fabrication of the safety end treatment components.

STATE OF TEXAS
ROGELIO CHAPA JR.
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PROFESSIONAL ENGINEER

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Rogelio Chapa
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SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-0

FILE: setbf0se-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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DATE: 1/30/2024 3:47:35 PM
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TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for One Structure End)

Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing length (Two~Wings) (3)	
					Bars J1		Bars J2			
Maximum Wingwall Height Hw (10)	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'- 5"	1'- 0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'- 2"	1'- 6"	1'- 0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'- 8"	1'- 9"	1'- 3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'- 2"	2'- 0"	1'- 6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'- 8"	2'- 3"	1'- 9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'- 2"	2'- 6"	2'- 0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'- 8"	2'- 9"	2'- 3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'- 2"	3'- 0"	2'- 6"	9"	#7	6"	#5	6"	162.29	0.721

TABLE OF WINGWALL REINFORCING (Two~Wings)

Bar	Size	No.	Spa	
DL & DS	#5	~	1'-0"	
E	#4	-	1'-0"	
F	#4	-	1'-0"	
G	#6	4	~	
M	#4	4	~	
P	#4	-	1'-0"	
RL	#5	3	~	
RS	#5	3	~	
V	#4	-	1'-0"	

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa	
L	#4	-	1'-0"	
Q	#4	1	~	
Reinf (Lb/Ft)				2.45
Conc (CY/Ft)				0.037

TABLE OF ESTIMATED ANCHOR TOEWALL QUANTITIES

Bar	Size	No.	Spa	
K	#4	-	1'-0"	
N	#5	6	~	
OL	#4	3	~	
OS	#4	3	~	
Reinf (Lb/Ft)				9.82
Conc (CY/Ft)				0.074

(1) Extend Bars P 3'-0" Min into bottom slab of box culvert.

(2) Adjust to fit as necessary to maintain 11#2" clearcover and 4" Min between bars.

(3) Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings multiply the tabulated values by 0.5 (A Lw). +

(4) Recommended values of slope are: 3:1, 4:1, and 6:1. Provide 3:1 or flatter slope.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap." Unless otherwise shown on the plans or directed by the Engineer, extend construction joints or grooved joints, oriented in the direction of flow, across the full distance of the riprap, at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B is not required.

(6) At Contractor's option, end the culvert toewall flush with wingwall toewall. Adjust reinforcing as needed.

(7) 3" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet.

(8) For vehicle safety, reduce curb heights, if necessary, to provide a maximum 3" projection above finished grade. No changes will be made in quantities and no additional compensation will be allowed for this work.

(9) Culvert skew (limit to 15° or 30°)

(10) See Table of Maximum Wing Heights for various slopes. Height is limited based on a 33'-6" maximum safety pipe runner length.

(11) Typical wingwall angle for all skews.

TABLE OF MAXIMUM WING HEIGHTS (10)

Side Slope	Hw Max
3:1	11'- 5"
4:1	8'-10"
6:1	6'- 1"

WING DIMENSION CALCULATIONS:

Formulas:

Hw = H + T + C - 0.250' (10)
A = (Hw - 0.333') (SL)
B = (A) [tan (θ + 15°)]
Lw = (A) ÷ [cos (θ + 15°)]

For cast-in-place culverts:

Ltw = [(N) (S) + (N + 1) (U)] ÷ (cos θ)

For precast culverts:

Ltw = [(N) (2U + S) + (N - 1) (0.500')] ÷ (cos θ)

Lc = (Ltw) - (2U) ÷ (cos θ)
Atw = (Lc) + (B)
Total Wingwall Area (two wings ~ S.F.)
= (0.5) (Hw 0.333') (Lw + A)

Hw = Height of wingwall (feet)
SL:1 = Side slope ratio (horizontal : 1 vertical)
Lw = Length of wingwall (feet)
Ltw = Culvert toewall length (feet)
Lc = Culvert curb between wings (feet)
Atw = Anchor toewall length (feet)
N = Number of culvert spans
θ = Culvert skew
See applicable box culvert standard for H, S, T, and U values.
See Table of Maximum Wall Heights for limits on Hw.

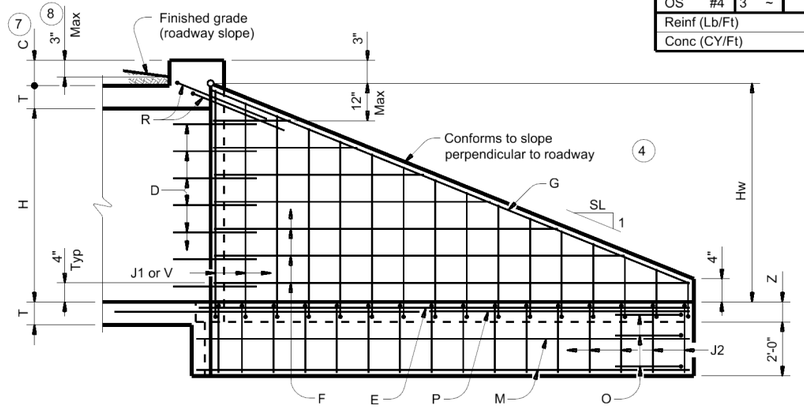
MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Provide Class "C" concrete (f'c = 3,600 psi).
Adjust reinforcing as necessary to provide a minimum clear cover of 1½".
Provide pipe runners and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts and nuts.
Provide ASTM A36 steel plates.
Galvanize all steel components, except reinforcing unless required elsewhere in the plans, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with the Item 445, "Galvanizing."
For optional adhesive anchors, install adhesive anchorages in accordance with the manufacturer's instructions including hole size, drilling equipment and method, hole cleaning equipment and method, mixing and dispensing adhesive, and anchor insertion. Do not alter the manufacturer's mixing nozzle or dispenser. Provide anchorage rods that are clean and free of grease, oil, or any other foreign material. Demonstrate hole cleaning method to the Engineer for approval and continue the approved process for all anchorage locations. Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

GENERAL NOTES:

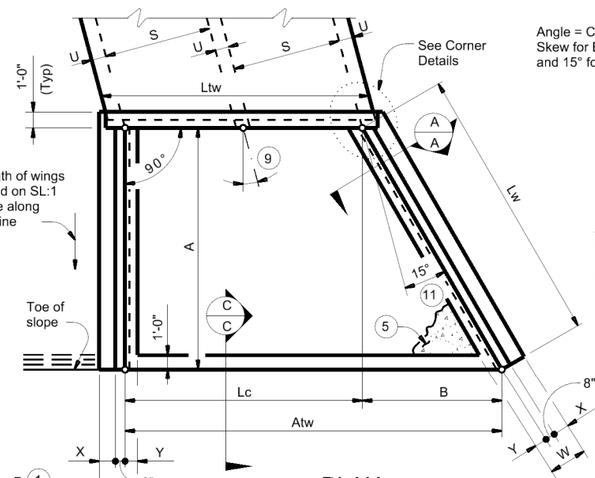
Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
All bolts, nuts, washers, brackets, angles, and pipe runners are considered parts of the safety end treatment for payment
The quantities for pipe runners, reinforcing steel, and concrete, resulting from the formulas given herein are for Contractor's information only.
See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.

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



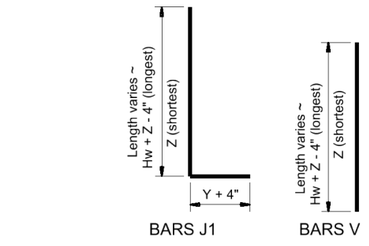
INSIDE ELEVATION OF WINGWALL

(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)

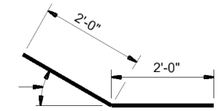


PLAN

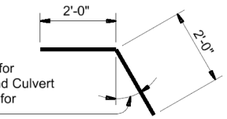
(Showing dimensions and 15° skew.)



Angle = Culvert Skew for Bars DS and 15° for Bars DL

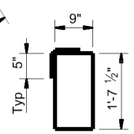


BARS DS and DL
(DS ~ Short wing and DL ~ Long wing)



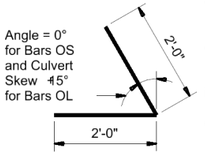
Angle = 0° for Bars RS and Culvert Skew 15° for Bars RL

BARS RS and RL
(RS ~ Short wing and RL ~ Long wing)

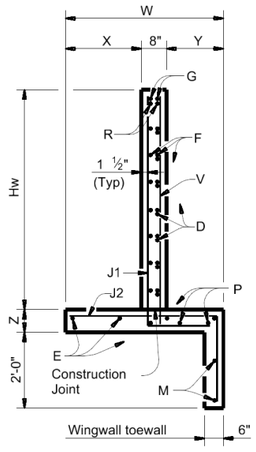


BARS K
(Length = 5'-5")

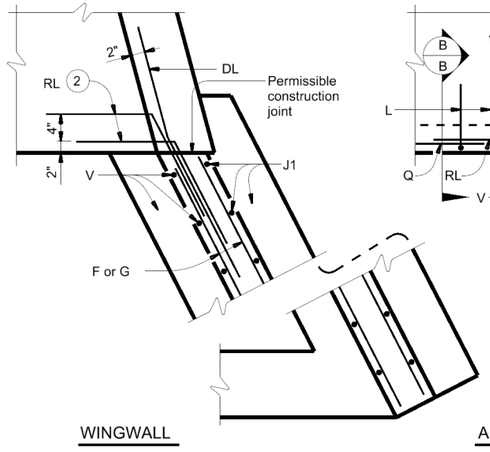
Angle = 0° for Bars OS and Culvert Skew 15° for Bars OL

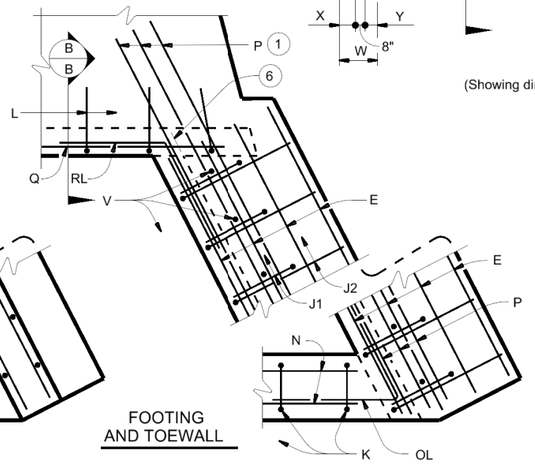


BARS OS and OL
(OS ~ Short wing and OL ~ Long wing)



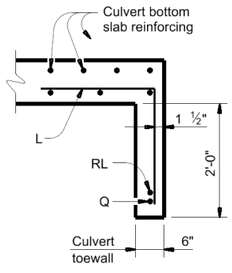
SECTION A-A



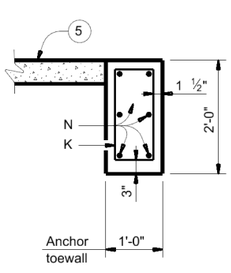


CORNER DETAILS

(Culvert and culvert toewall reinforcing not shown for clarity.)



SECTION B-B (5)



SECTION C-C

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1/30/2024

SHEET 1 OF 3

Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS
FOR 15° & 30° & 45° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE
SETB-FW-S (MOD)

FILE:	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
	DIST	COUNTY		SHEET NO.
	22	WEBB		78

DATE: 1/30/2024 3:47:38 PM
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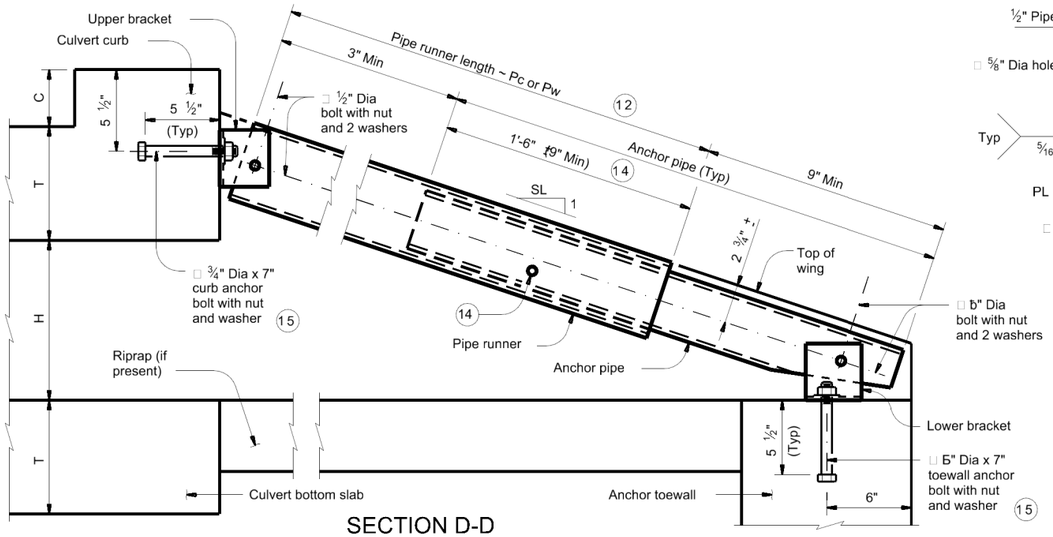
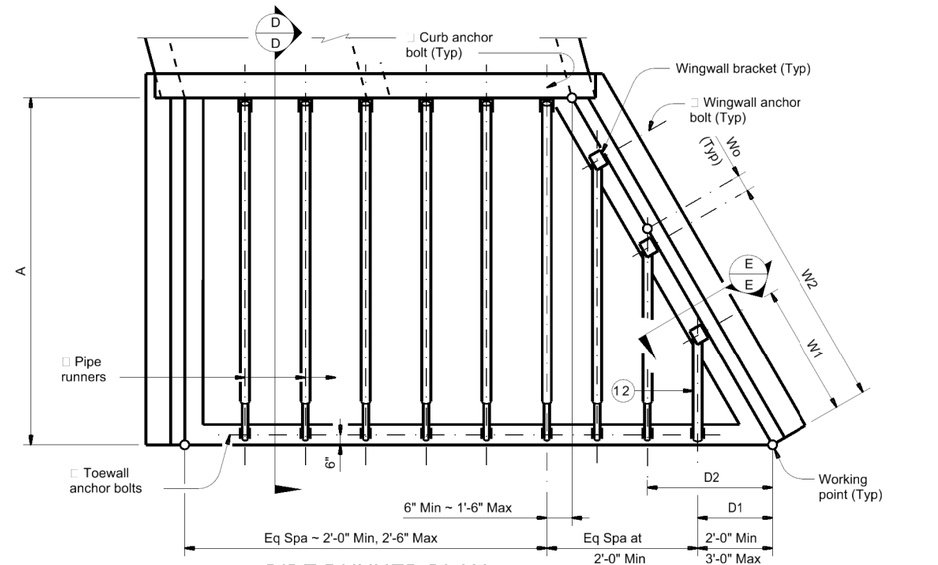
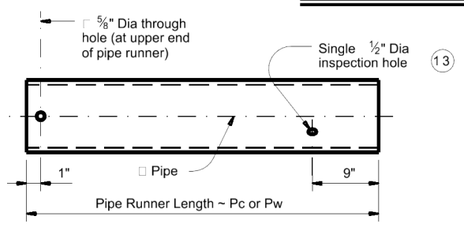


SECTION D-D

(Showing curb pipe runner. Except for upper bracket, wingwall pipe runners are similar.)

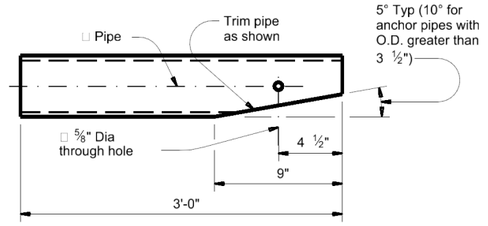


PIPE RUNNER PLAN

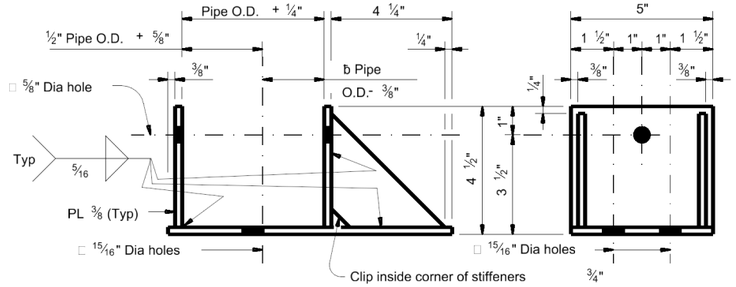


Note: Use pipe diameter required for curb pipe runner for wingwall pipe runner.

PIPE RUNNER DETAILS

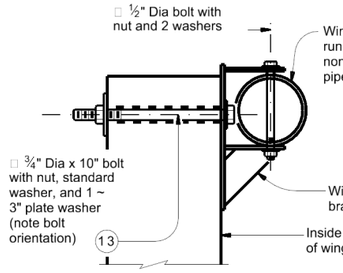


ANCHOR PIPE DETAILS



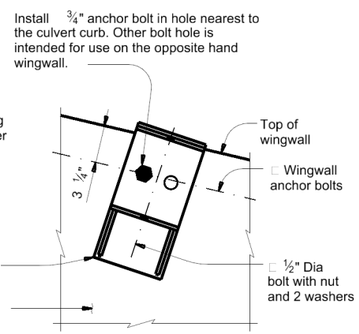
ELEVATION

SIDE VIEW



SECTION E-E

(Showing installed bracket.)

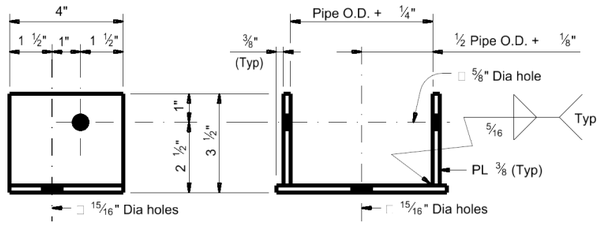


ELEVATION

(Showing installed bracket normal to wall. Pipe not shown for clarity.)

Note: Match wingwall bracket to the upper curb bracket size.

WINGWALL BRACKET DETAILS

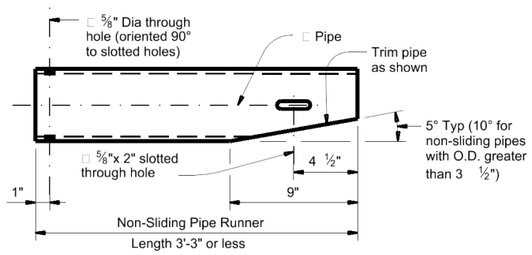


SIDE VIEW

ELEVATION

Note: Match upper and lower brackets, except for the brackets used with non-sliding pipe runners, to the required pipe diameters as shown in the table.

UPPER AND LOWER BRACKET DETAILS



Note: Pipe size is the same as required for curb pipe runner. Adjust the corresponding lower bracket accordingly.

NON-SLIDING PIPE RUNNER DETAILS

MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER AND ANCHOR PIPE SIZES

Maximum Pipe Runner Length (Pc or Pw)	Required Pipe Runner Size			Required Anchor Pipe Size		
	Pipe Size	Pipe O.D.	Pipe I.D.	Pipe Size	Pipe O.D.	Pipe I.D.
9'-4"	3" STD	3.500"	3.068"	2" STD	2.375"	2.067"
19'-0"	4" STD	4.500"	4.026"	3" STD	3.500"	3.068"
33'-6"	5" STD	5.563"	5.047"	4" STD	4.500"	4.026"

(12) If pipe runner length (Pw) is 1'-9" or less, replace the normal pipe runner and anchor pipe with a single non-sliding pipe runner. See Non-Sliding Pipe Runner Details for additional information.

(13) At Contractor's option, ⅞" diameter hole may be formed or cored drilled. Percussion drilling is not permitted. Adjust placement of reinforcing steel as necessary to avoid bolt holes.

(14) After installation of pipe runner, use the ½" inspection hole to ensure that the lap of the anchor pipe with the pipe runner is adequate.

(15) At Contractor's option, an adhesive anchor may be used. Provide ¾" Dia adhesive anchors that meet the requirements of ASTM A307, Gr A fully threaded rods. Embed threaded rods into curb, wingwalls, and toewall using a Type III, Class C, D, E, or F anchor adhesive. Minimum embedment depth is 5 ½". Provide anchor adhesive able to achieve a basic bond strength in tension, Nba, of 20 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use.

PIPE RUNNER DIMENSION CALCULATIONS:

Wn = (K3) (Dn) - (Wo)
Pwn = (Dn) (K2) - (2.063')
Pw1 Non-Sliding Pipe Runner (If required)
= (D1) (K2) - (0.563')
Pc = (A) (K1) - (1.688')

W"n" = Distance from Working Point to centerline Anchor Bolt measured along bottom inside face of Wing
D"n" = Distance from Working Point to centerline Pipe Runner measured along outside face of Anchor Toewall
Pw = Wingwall Pipe Runner Length
Pc = Curb Pipe Runner Length
K = Constant Values for use in formulas

Slope SL:1	K1	K2~15° Skew	K2~30° Skew	K2~45 Skew
3:1	~ 1.054	~ 1.826	~ 1.054	~ 0.609
4:1	~ 1.031	~ 1.785	~ 1.031	~ 1.595
6:1	~ 1.014	~ 1.756	~ 1.014	~ 0.585

K3 = 15° Skew ~ 2.000
30° Skew ~ 1.414
45° Skew ~ 1.155

"n" = Wing Pipe Runner Number
Wo = 15° Skew ~ 5"
30° Skew ~ 2 ½"
45° Skew ~ 1"

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SHEET 2 OF 3

Texas Department of Transportation
Bridge Division Standard

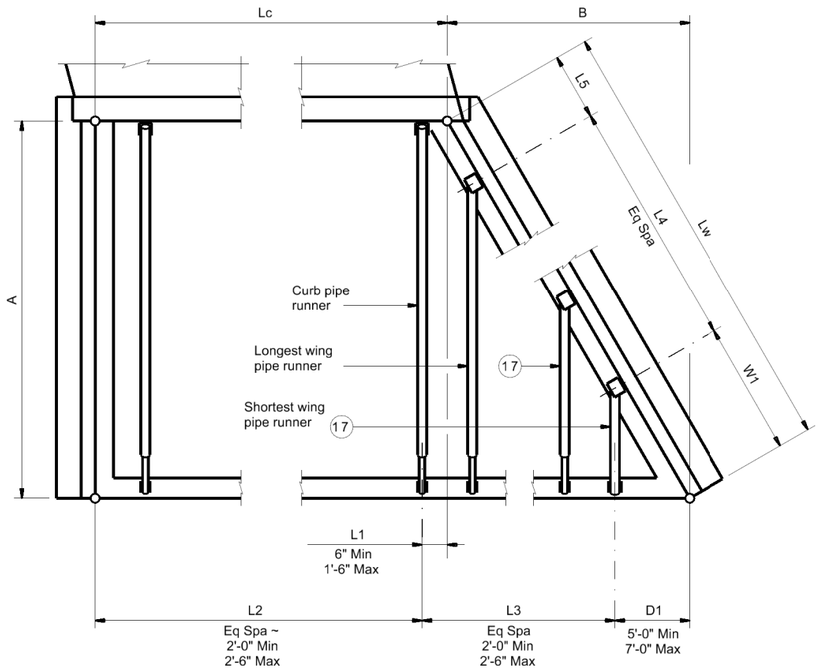
SAFETY END TREATMENT WITH FLARED WINGS

FOR 15° & 30° & 45° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE

SETB-FW-S (MOD)

FILE:	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
	DIST	COUNTY		SHEET NO.
	22	WEBB		79

Culvert Station and/or Creek name followed by applicable end (Lt, Rt or Both) (16)	Lc	L1	L2			D1	L3			W1	L4			L5	Curb Pipe Runner (Pc)		Longest Wing Pipe Runner (Pw)	Shortest Wing Pipe Runner (Pw)	Non-Sliding Wing Pipe Runner (if applicable)	Curb, Wing, and/or Non-Sliding Pipe Runners		3'-0" Anchor Pipe	
	(Ft)	(Ft)	No. Spa	Spa at (Ft)	Overall Length (Ft)	(Ft)	No. Spa	Spa at (Ft)	Overall Length (Ft)	(Ft)	No. Spa	Spa at (Ft)	Overall Length (Ft)	(Ft)	No.	Length (Ft)	(Ft)	(Ft)	(Ft)	Size (3",4" or 5")	Total Length (Ft) (16)	Size (2",3" or 4")	Total Length (Ft) (16)
PSN: 22-240-0-0018-05-068(Rt)	26.870'	0.500'	11	2.397'	26.370'	5.000'	12	2.464'	29.564'	5.692'	11	2.846'	31.301'	2.341'	11	18.583'	17.042'	2.375'	2.417'	4"	313.625'	4"	66.00'



PIPE RUNNER LAYOUT

Note: Right forward culvert skew shown, actual culvert skew may be opposite hand.

(16) Quantities shown are for one structure end if Lt or Rt. Quantities shown are for two structure ends if Both.

(17) If the outermost wing pipe runner is a non-sliding pipe runner, consider the next outermost wing pipe runner as the shortest.

SPECIAL NOTE:

This tabular sheet is to be filled out by the culvert specifier and provides information for the construction details and quantities of pipe runners.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

Note that the tabular quantities are given for estimating purposes only. It is likely that these quantities will change due to field conditions. Therefore, all dimensions must be verified by the Contractor in the field prior to fabrication of the safety end treatment components.

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ROGELIO CHAPA JR.
148468
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PROFESSIONAL ENGINEER

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Rogelio Chapa
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1/30/2024

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT WITH FLARED WINGS

FOR 15° & 30° & 45° SKEW BOX CULVERTS TYPE I ~ CROSS DRAINAGE

SETB-FW-S (MOD)

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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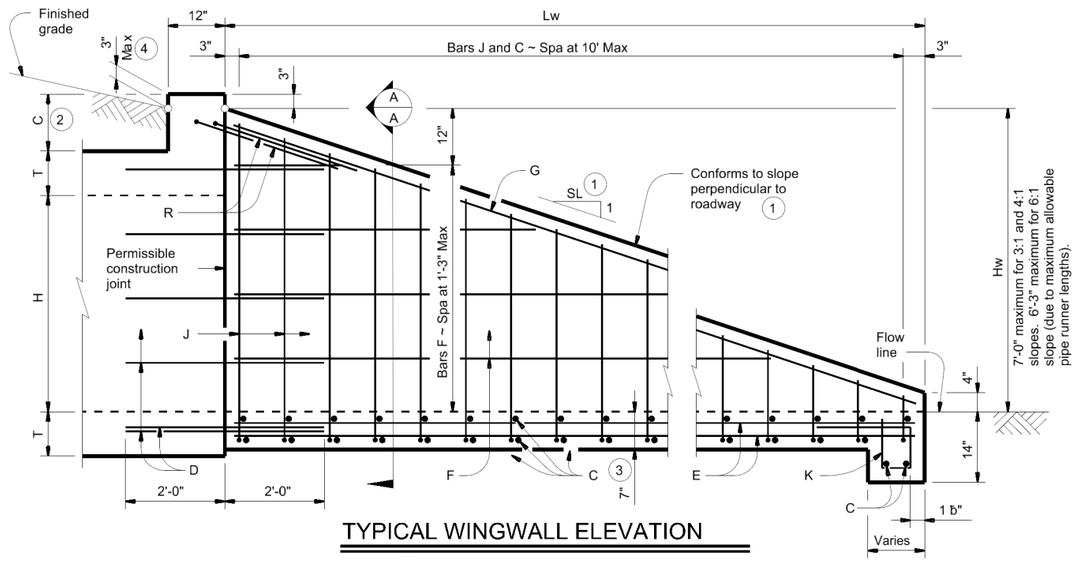
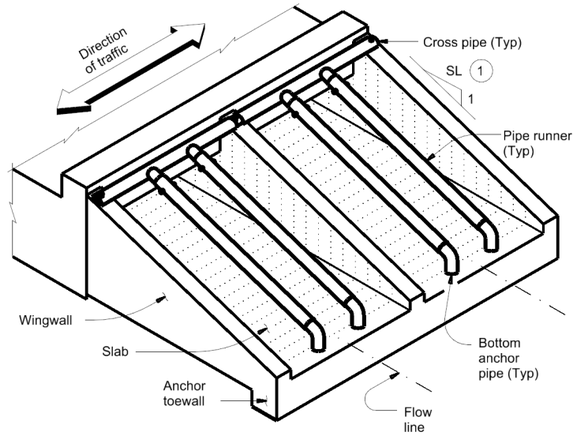


TYPICAL WINGWALL ELEVATION

(Pipe runners not shown for clarity.)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

WING DIMENSION CALCULATIONS:

Hw = H + T + C - 0.250'
Lw = (Hw - 0.333') (SL)

For cast-in-place culverts:
Atw = (N) (S) + (N + 1) (U)
For precast culverts:
Atw = (N) (2U + S) + (N - 1) (0.500')

Total Wingwall Area (SF)
= (0.5) (Hw + 0.333') (Lw) (N + 1)
Total Concrete Volume (CY)
= [(Wingwall Area) (0.583') +
(Lw) (Atw) (0.583') +
(Atw) (1.167') (1.167' - 0.583')] ÷ (27)

PIPE RUNNER DIMENSION CALCULATIONS:

Pipe Runner Length
= (Lw) (K1) (1.917')
Total Reinforcing (Lb)
= (1.55) (Lw) (Atw) +
(4.43) (Atw) +
(K2) (Hw) (N + 1) (Lw)

C = Height of curb above top of top slab (feet)
Hw = Height of wingwall (feet)
K = Constant value for use in formulas

Slope SL:1	K1	K2
3:1	~ 1.054 ~	7.45
4:1	~ 1.031 ~	8.49
6:1	~ 1.014 ~	10.30

Atw = Anchor toewall length (feet)
Lw = Length of wingwall (feet)
N = Number of culvert barrels
SL:1 = Side slope ratio (horizontal : 1 vertical)

See applicable box culvert standard for H, S, T, and U values.

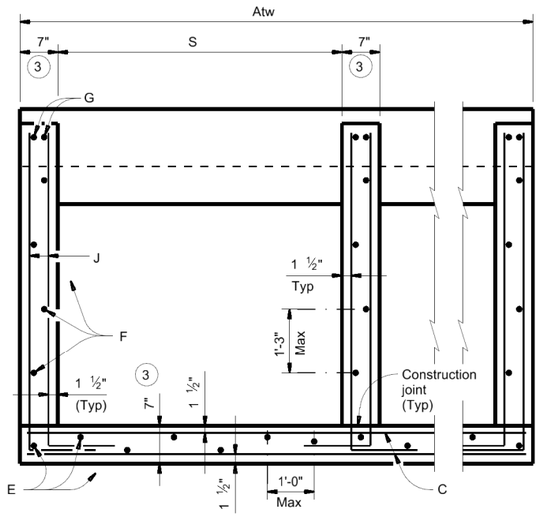
MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Adjust reinforcing as necessary to provide a minimum clear cover of 1 ½".
Provide Class "C" concrete (f'c = 3,600 psi).
Provide pipe runners, cross pipes, and anchor pipes meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.
Provide ASTM A307 bolts.
Galvanize all steel components, except the concrete reinforcing, unless required elsewhere in the plans, after fabrication.
Repair galvanizing damaged during transport or construction in accordance with the Item 445, "Galvanizing."

GENERAL NOTES:

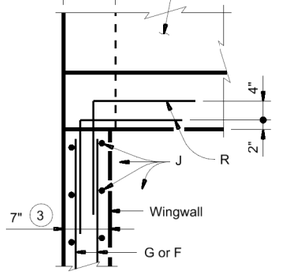
Designed according to AASHTO LRFD Bridge Design Specifications.
The safety end treatments shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.
Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.
The quantities for pipe runners, reinforcing steel, and concrete resulting from the formulas given herein are for Contractor's information only.
See the Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
Alternate design drawings bearing the seal of a professional engineer will be acceptable for precast construction of the safety end treatments.

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

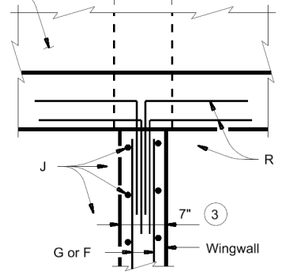


SECTION A-A

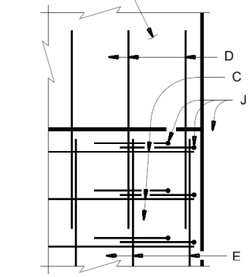
(Showing typical wingwall and wing slab reinforcing. Pipe runners not shown for clarity.)



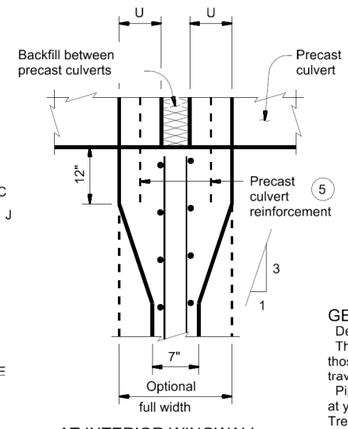
AT TOP OF EXTERIOR WINGWALL
(Cast-in-place culvert)



AT TOP OF INTERIOR WINGWALL
(Cast-in-place culvert)



AT OUTSIDE OF BOTTOM SLAB
(Cast-in-place culvert)



AT INTERIOR WINGWALL
(Precast culvert)

PLAN VIEWS OF CORNER DETAILS

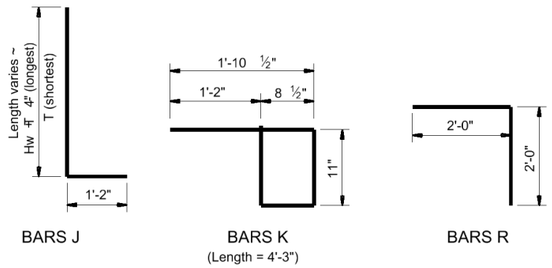


TABLE OF REINFORCING BAR SIZES AND SPACING		
Bar	Size	Spacing
C	#4	10" Max
D	#4	Match F and E
E	#4	1'-0" Max
F	#4	1'-3" Max
G	#6	As shown
J	#4	10" Max
K	#4	1'-0" Max
R	#4	As shown

1. Recommended values of slope are: 3:1, 4:1, and 6:1. Provide 3:1 or flatter slope.
2. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures without railing and curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet.
3. Wingwall and slab thicknesses may be the same as the adjacent culvert wall and slab thicknesses (7" minimum). If thicknesses greater than the minimum (7") are used, no changes will be made in quantities and no additional compensation will be allowed.
4. For vehicle safety, reduce curb height, if necessary, to provide a maximum 3" projection. No changes will be made in quantities and no additional compensation will be allowed for this work.
5. For culverts with C = 0", the precast culvert reinforcing may extend 1'-0" minimum into wingwall. Wingwall Bars D and R may be omitted. Otherwise, refer to the Wingwall Connection detail on the Box Culvert Precast Miscellaneous Details (SCP-MD) standard sheet.

SHEET 1 OF 2

Texas Department of Transportation
Bridge Division Standard

SAFETY END TREATMENT
FOR 0° SKEW BOX CULVERTS
(MAXIMUM Hw = 7'-0")
TYPE I ~ CROSS DRAINAGE

SETB-CD

FILE: CD-SETBCD-20 (1).dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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	22	WEBB		81

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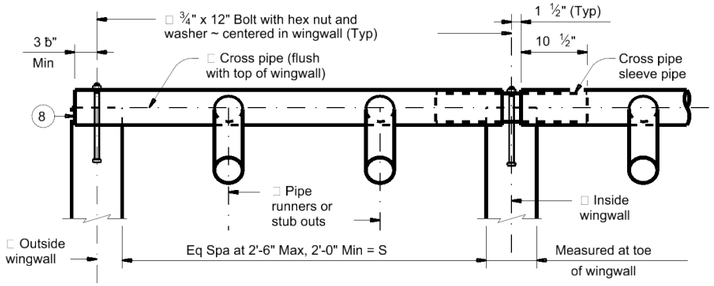
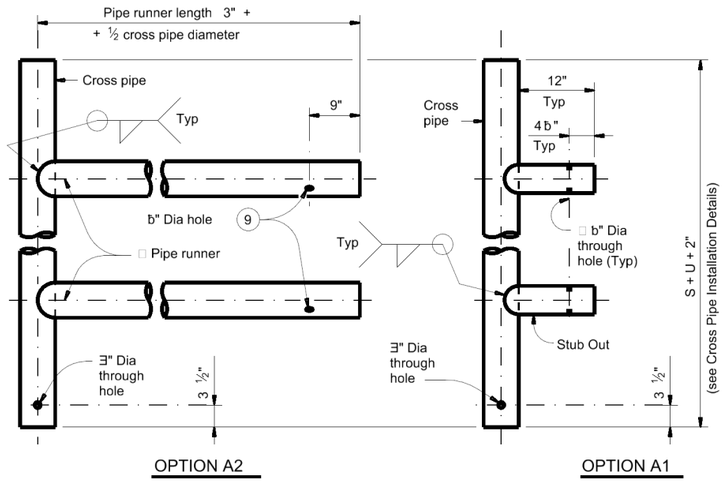


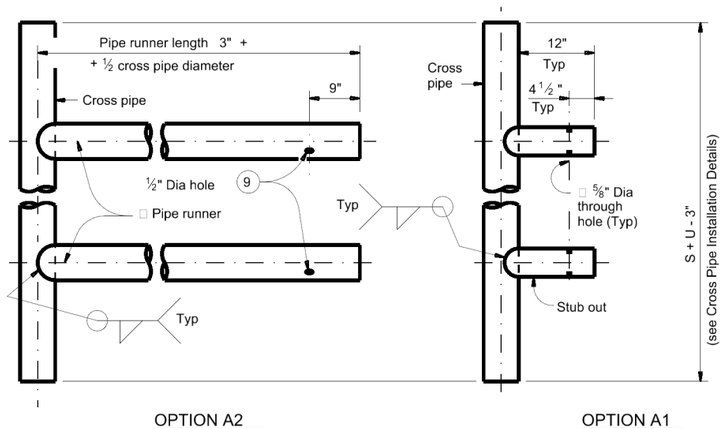
NOTE: At Contractor's option, make the cross pipe continuous across the inside wingwalls. If option is selected, omit the sleeve pipe and make a ∃" diameter through hole in the cross pipe to accept the anchor bolt at the centerline of each inside wingwall.

CROSS PIPE INSTALLATION DETAILS



OPTION A2 OPTION A1

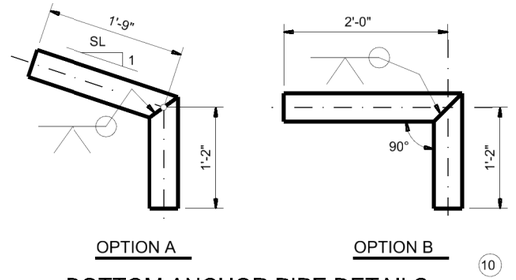
FOR USE IN OUTSIDE CULVERT BAY



OPTION A2 OPTION A1

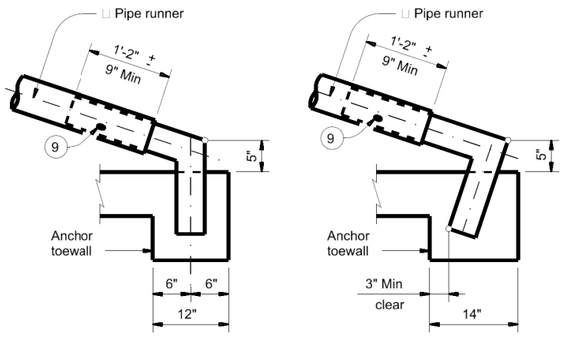
FOR USE IN INSIDE CULVERT BAY

CROSS PIPE AND CONNECTIONS DETAILS



OPTION A OPTION B

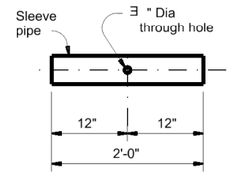
BOTTOM ANCHOR PIPE DETAILS



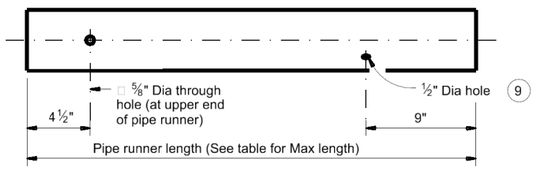
OPTION B1 OPTION B2

BOTTOM ANCHOR TOEWALL DETAILS

(Wingwall not shown for clarity.)

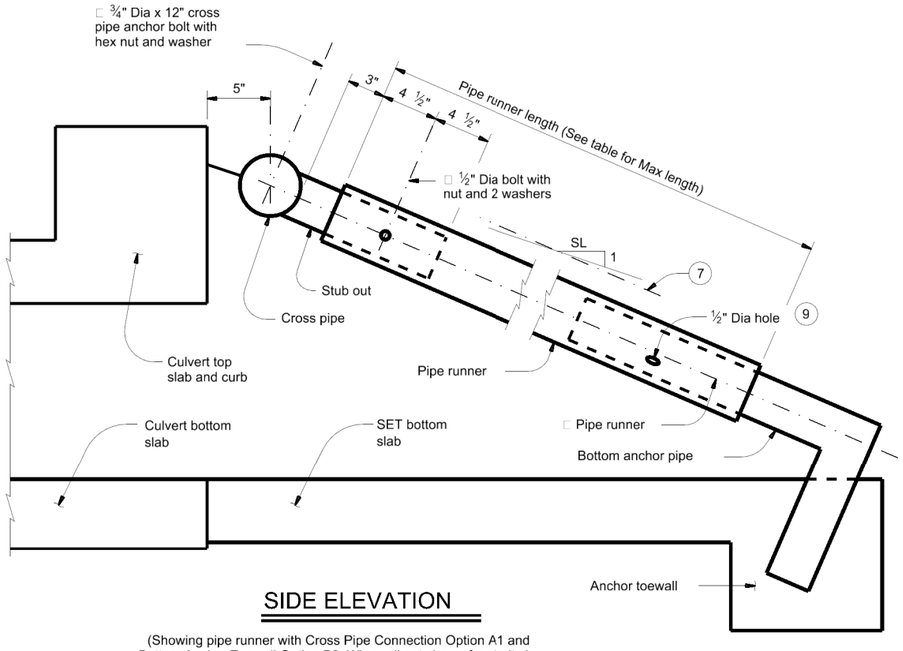


CROSS PIPE SLEEVE PIPE DETAILS



NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS



SIDE ELEVATION

(Showing pipe runner with Cross Pipe Connection Option A1 and Bottom Anchor Toewall Option B2. Wingwall not shown for clarity.)

6 Cross pipe is the same size as the pipe runner. Cross pipe stub out is the same size as the anchor pipe.

7 Note that actual slope of safety pipe runner may vary slightly from side slope.

8 Take care to ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

9 After installation, inspect the 1#2" hole to ensure that the lap of the safety pipe runner with the bottom anchor pipe is adequate.

10 At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the runner) may be substituted for the mitered and welded joint in the bottom anchor pipe.

MAXIMUM PIPE RUNNER LENGTHS AND REQUIRED PIPE RUNNER AND ANCHOR PIPE SIZES (6)

Maximum Pipe Runner Length	Required Pipe Runner Size			Required Anchor Pipe Size		
	Pipe Size	Pipe O.D.	Pipe I.D.	Pipe Size	Pipe O.D.	Pipe I.D.
10'- 0"	3" STD	3.500"	3.068"	2" STD	2.375"	2.067"
19'- 8"	4" STD	4.500"	4.026"	3" STD	3.500"	3.068"
34'- 2"	5" STD	5.563"	5.047"	4" STD	4.500"	4.026"

SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

SAFETY END TREATMENT
FOR 0° SKEW BOX CULVERTS (MAXIMUM Hw = 7'-0")
TYPE I ~ CROSS DRAINAGE
SETB-CD

FILE: CD-SETBCD-20 (1).dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
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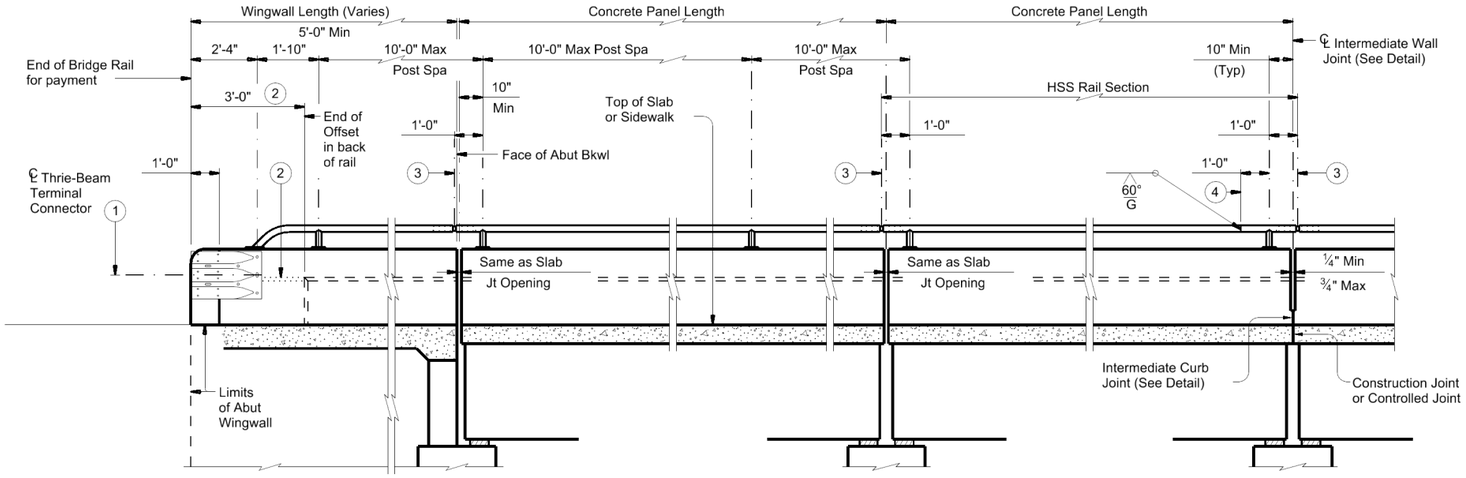
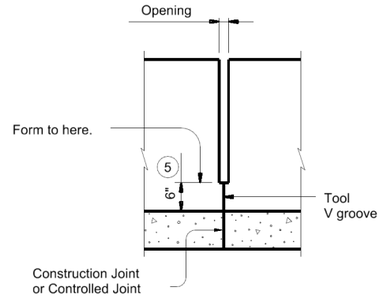


AT ABUTMENTS

AT BENTS WITH SLAB EXP JOINTS

AT BENTS WITHOUT SLAB EXP JOINTS

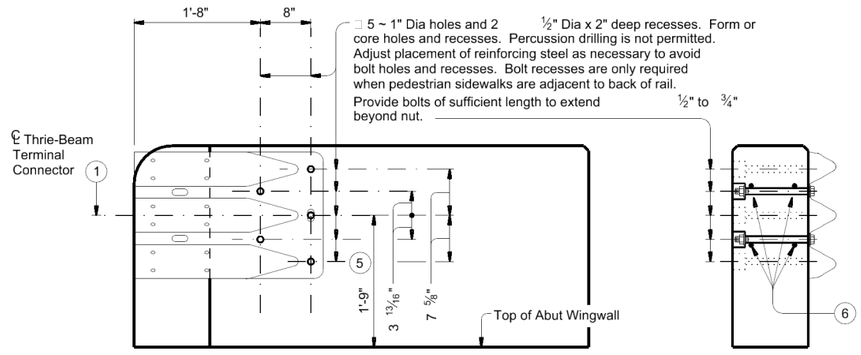
ROADWAY ELEVATION OF RAIL



INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.

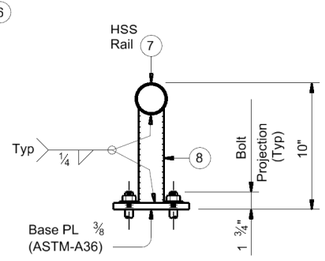
1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence." Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
2. Back of rail offset may, with Engineer's approval, be continued to the end of the railing.
3. ¡ Expansion joint or splice joint as required.
4. One shop splice per HSS rail section is permitted with minimum 85 percent penetration. The weld may be square groove, or single V groove. Grind smooth.
5. Increase 2" for structures with overlay.
6. Place 4 additional Bars R(#4) 3'-8" in length inside Bars S(#4) and centered 2'-0" from end of rail when Terminal Connections are required. Field bend as needed.
7. HSS 2.875 x 0.203
8. HSS 2.375 x 0.154
9. ⅜" Dia Hole in bottom of HSS rail (Minimum 1 hole between posts ~ Typ)



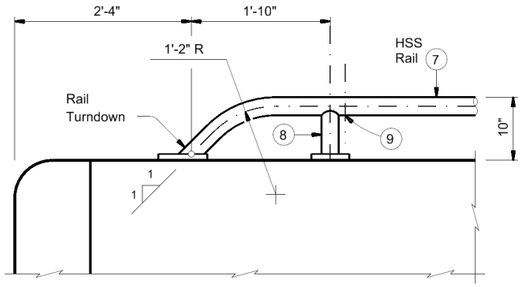
ELEVATION

SECTION

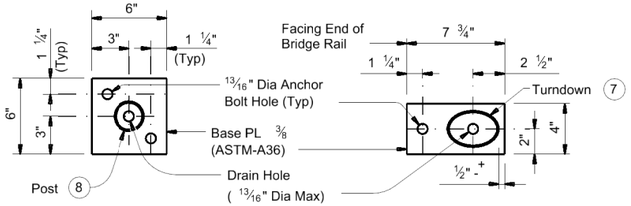
TERMINAL CONNECTION DETAILS



TRANSVERSE SECTION



Note that at least two anchor points (as shown) are required for the Bridge Rail on the Abutment Wingwall. Longer Wingwalls may require more than two Rail anchorages.

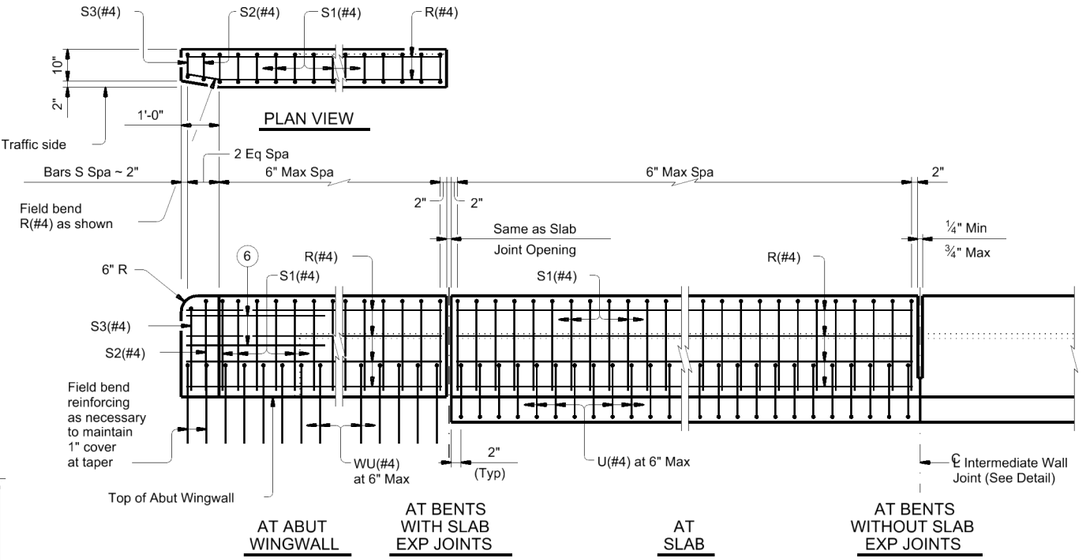


POST BASE PLATE PLAN

RAIL TURNDOWN BASE PLATE PLAN

HSS RAIL TERMINAL DETAIL

HSS RAIL DETAILS



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

(Showing without raised sidewalk)

SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

COMBINATION RAIL

TYPE C221

FILE:	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
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	22	WEBB		83

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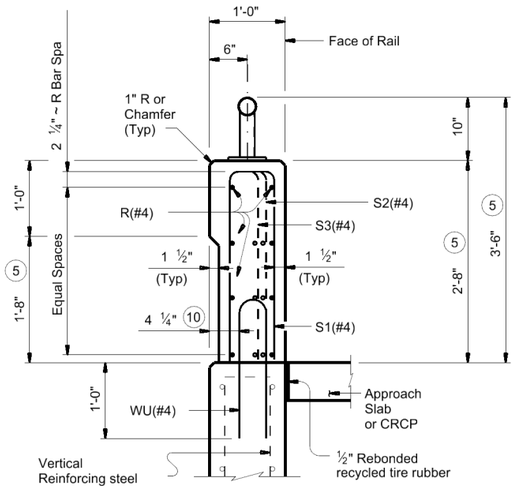
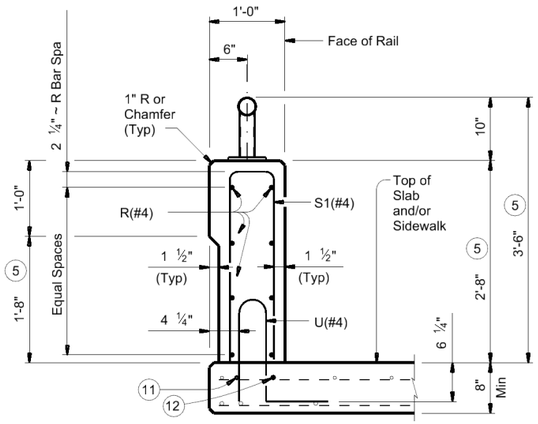
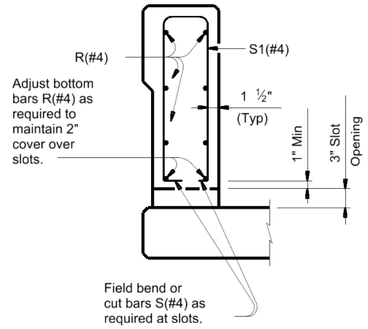


ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS

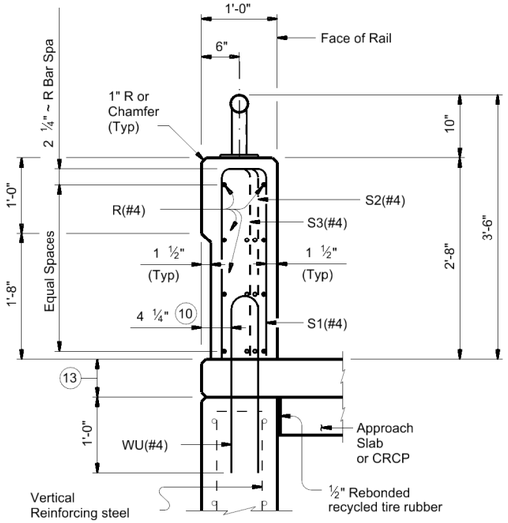


ON BRIDGE SLAB

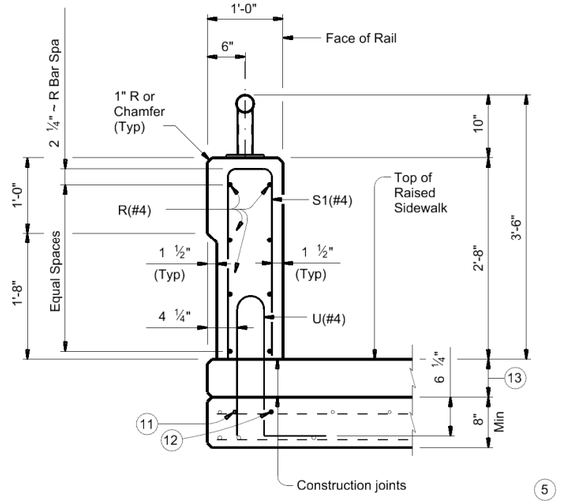
SECTIONS THRU RAIL WITHOUT RAISED SIDEWALK



SECTION THRU OPTIONAL SIDE SLOT DRAIN

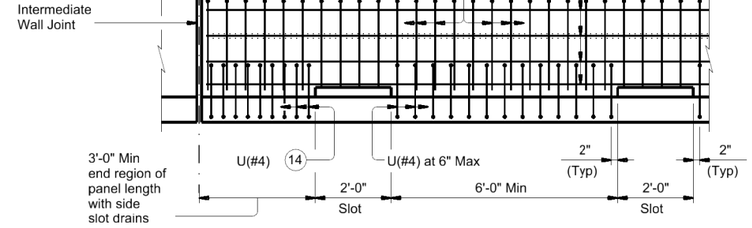


ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS



ON BRIDGE SLAB

SECTIONS THRU RAIL WITH RAISED SIDEWALK



OPTIONAL SIDE SLOT DRAIN DETAIL

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

(5) Increase 2" for structures with overlay.

(10) 5 ¼" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

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

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

(13) Raised Sidewalk

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

Texas Department of Transportation

Bridge Division Standard

COMBINATION RAIL

TYPE C221

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©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
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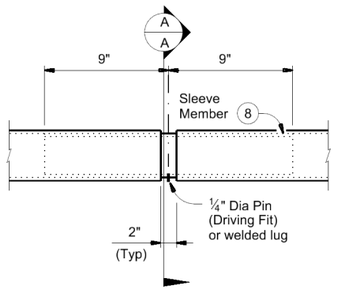
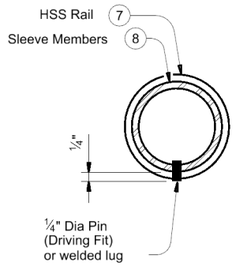
RAIL DATA FOR HORIZONTAL CURVES

	RADIUS TO FACE OF RAIL	MAX CHORD LENGTH	CONSTRUCT OR FABRICATE
HSS Rail	Over 2800'	29'-0"	Straight rail panels
	Over 1400' thru 2800'	14'-6"	To required radius or to chords shown
	Over 700' thru 1400'	7'-3"	
	Thru 700'	Zero	To required radius

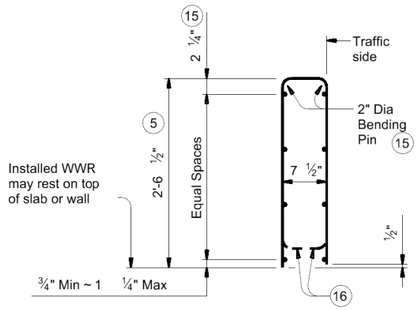


AT SPLICE OR EXP JTS



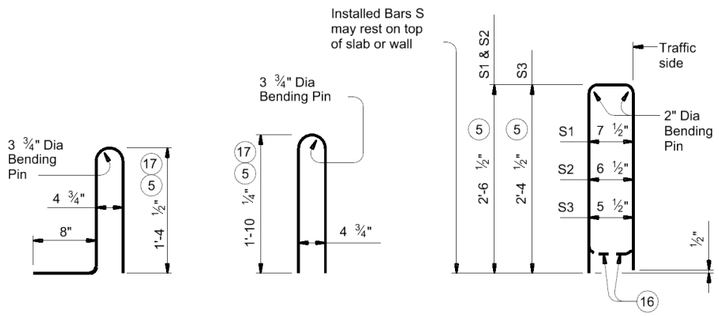
SECTION A-A

PIPE SPLICE DETAILS

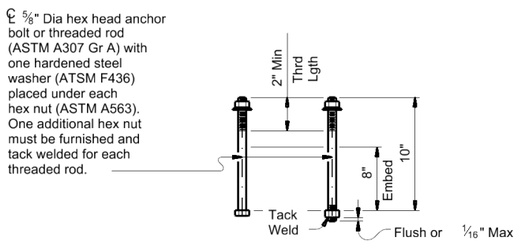


OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

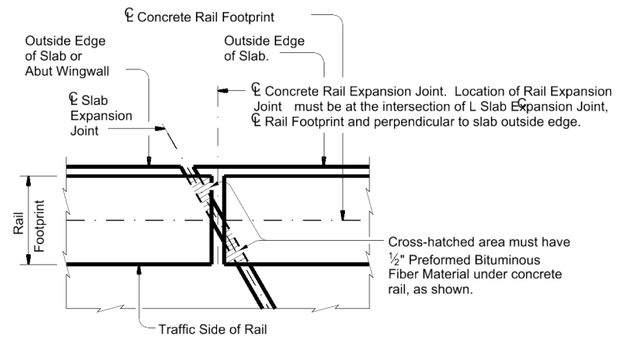
DESCRIPTION	LONGITUDINAL WIRES	VERTICAL WIRES
Minimum (Cumulative Total) Wire Area	1.067 Sq In.	0.267 Sq In. per Ft
	No. of Wires	Spacing
Minimum	8	4"
Maximum	10	8"
Maximum Wire Size Differential	The smaller wire must have an area of 40% or more of the larger wire.	



BARS U (#4) BARS WU (#4) BARS S (#4)



CAST-IN-PLACE ANCHOR BOLT OPTIONS 18



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

(5) Increase 2" for structures with overlay.

(7) HSS 2.875 x 0.203

(8) HSS 2.375 x 0.154

(15) No longitudinal wires may be in top center of cage.

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

(17) For raised sidewalks, add sidewalk height to total bar height. Use sidewalk height at rail's location.

(18) See "Material Notes" for anchor bolt information.

CONSTRUCTION NOTES:

This railing may be constructed by the slipform process when approved by the Engineer, with equipment approved by the Engineer and when adhesive anchor bolts are used. Slipforming parapet is not allowed if anchor bolts are cast with parapet wall. Provide sensor control for both line and grade. Tack welding to provide bracing for slipform operations is acceptable. Welding may be performed at a minimum spacing of 3 ft between the cage and the anchorage. It is permissible to weld to bars U, WU and S at any location on the cage. If increased bracing is needed, provide additional anchorage devices and weld in the upper two thirds of the cage. Paint welded areas on epoxy coated and/or galvanized reinforcing with an organic zinc rich paint in accordance with Item 445 "Galvanizing".

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

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

At the Contractor's option anchor bolts may be cast with the parapet. See "Material Notes."

Face of rail, parapet must be plumb unless otherwise approved by the Engineer. HSS rail posts must be square to the top of parapet. Use epoxy mortar under post base plates if gaps larger than 1/16" exist.

Round or chamfer exposed edges of HSS rail and HSS rail posts to approximately 1/16" by grinding.

HSS rail sections must not include less than two posts, and no more than four (except at Abutments).

Chamfer all parapet exposed corners.

MATERIAL NOTES:

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

Provide Grade 60 reinforcing steel.

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

Provide ASTM A1085 or A500 Gr B or A53 Gr B for all HSS.

Galvanize all metal components of steel rail system. Apply additional coatings when shown elsewhere on the plans. When plans require paint over galvanizing, follow the requirements for painting galvanized steel in Item 445, "Galvanizing" and when field painting, Item 446, "Field Cleaning and Painting Steel." Sleeve members and anchor bolts must receive galvanization prior to installation and only field paint after installation unless directed otherwise by Engineer.

Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U and WU unless noted otherwise. Deformed WWR (ASTM 1064) may be substituted for Bars R and S, as shown. Combinations of reinforcing steel and WWR or configurations of WWR other that shown are permitted if conditions in the table are satisfied. Provide the same laps as required for reinforcing bars.

Anchor bolts must be ⅝" Dia ASTM A307 Gr A fully threaded rods with one hex nut and one hardened steel washer (ASTM F436) each. Nuts must conform to ASTM A563 requirements. Embed fully threaded rods into parapet wall with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 3". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 5 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

Optional cast-in-place anchor bolts must be ⅝" Dia ASTM A307 Gr A bolts (or threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer (ATSM F436) at each bolt. Nuts must conform to ASTM A563 requirements.

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

GENERAL NOTES:

This rail has been evaluated and accepted to be of equal strength to railings with like geometry, which have been crash tested to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

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

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

Submit erection drawings showing panel lengths, rail post spacing, and anchor bolt setting to the Engineer for approval.

Average weight of railing with no overlay: 380 plf (total)
370 plf (Conc)
10 plf (Steel)

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

Texas Department of Transportation

Bridge Division Standard

COMBINATION RAIL

TYPE C221

FILE:	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT September 2019 REVISIONS	CONT.	SECT	JOB	HIGHWAY
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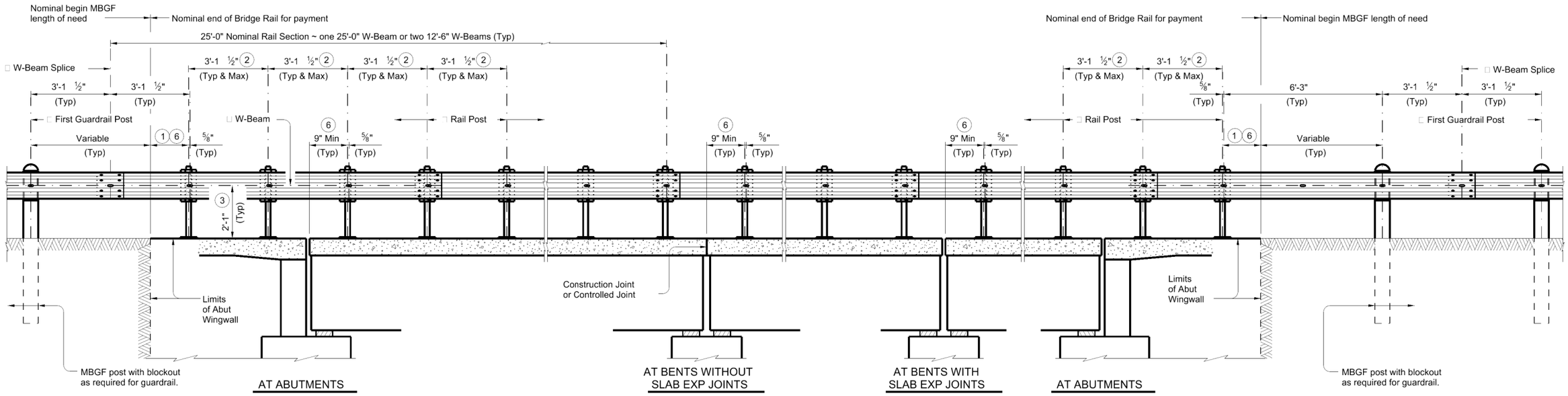
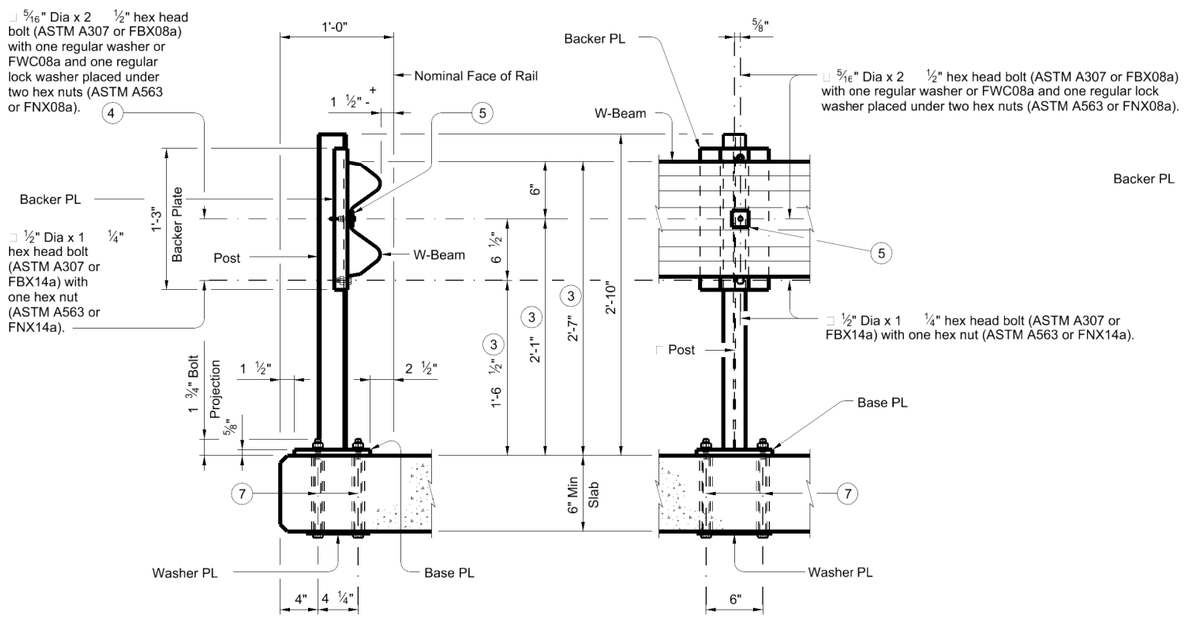


ROADWAY ELEVATION OF RAIL

Showing without overlay.

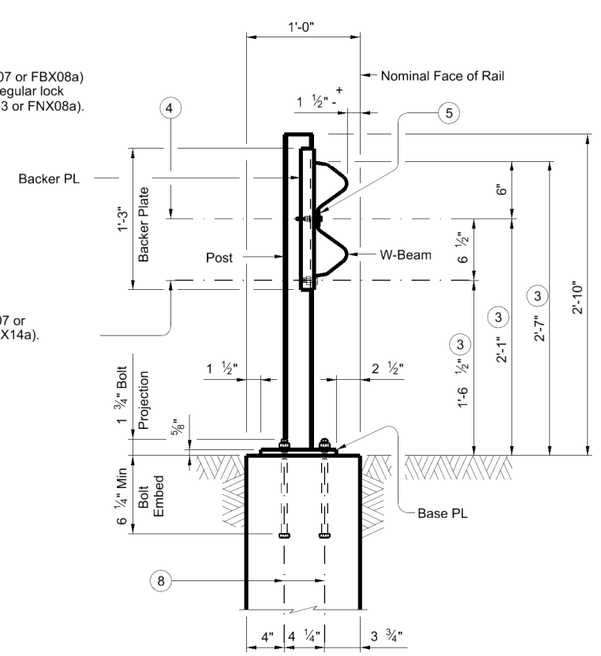


RAIL SECTION

TRAFFIC SIDE RAIL VIEW

RAIL DETAILS ON BRIDGE SLAB

Showing without overlay.



RAIL SECTION ON ABUTMENT WINGWALL

Showing without overlay.

(1) 9" Min, 5'-9" Max

(2) Maintain 3'-1 ½" Rail Post spacing wherever possible for use with nominal 25'-0" or 12'-6" W-Beam sections. Symmetry of post spacing on both sides and along the structure is not necessary.

(3) Increase 2" for structures with overlay.

(4) Tighten the first hex nut by hand until the top and bottom edges of the W-Beam engage the Backer Plate (Backer Plate should be snug against the post). Then tighten hex nut one revolution with wrench and secure with the second hex nut.

(5) PL ⅛ x 1 ¾ x 1 ¾ with ⅜ Dia Hole centered in PL (ASTM A36). Square Guardrail Washer (FWR01).

(6) The post nearest to a slab joint or end of structure may be shifted up to 9" in order to satisfy the minimum offset dimension. Drill a new ¾" Dia hole on the centerline of W-beam for shifted post. Paint hole with two coats of zinc-rich paint conforming to the Item "Galvanizing". All other posts must remain on the typical spacing.

(7) ⅞" Dia formed holes for ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".

(8) ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod. See "Cast-In-Place & Formed Hole Anchor Bolt Options".

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T631

FILE:	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
07/2020: Allowing 9'-4 ½" or 6'-3" W-Beam sections. 03/2023: MBGF Notes.	DIST	COUNTY		SHEET NO.
	22	WEBB		86

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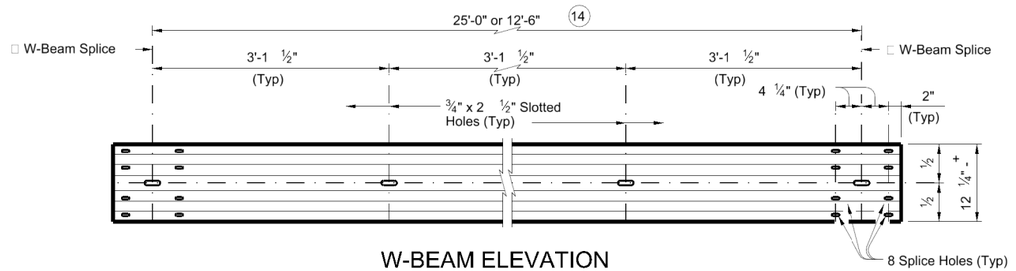
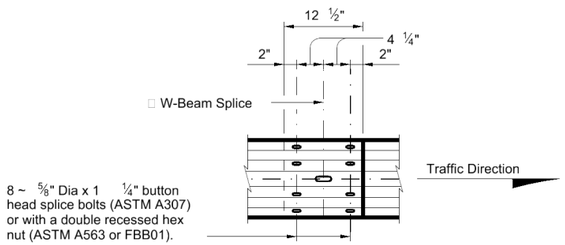
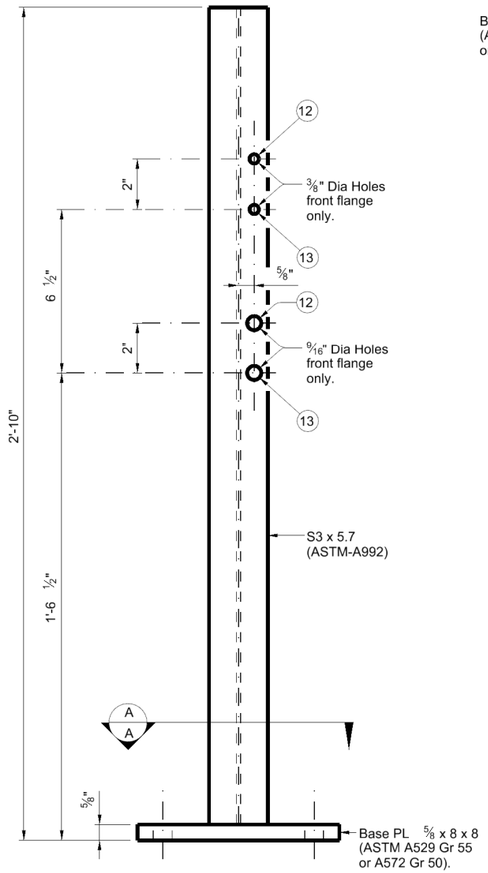


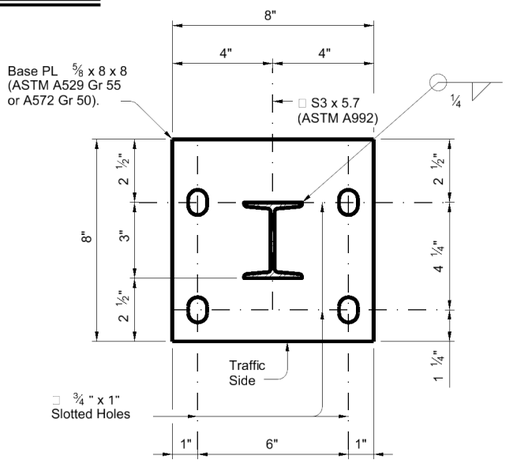
W-BEAM ELEVATION



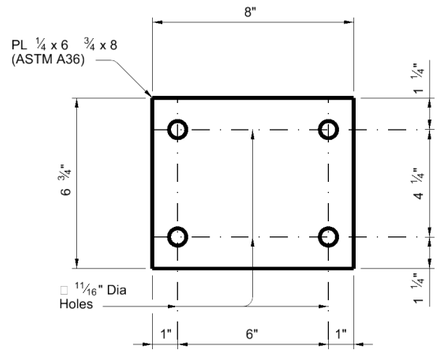
W-BEAM SPLICE ELEVATION



POST ELEVATION

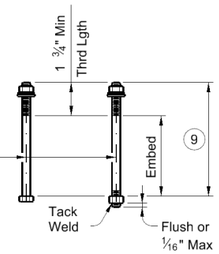


SECTION A-A



WASHER PLATE DETAIL

⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod.



CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS 10

(9) See "Rail Details On Bridge Slab" and/or "Rail Section On Abutment Wingwall".

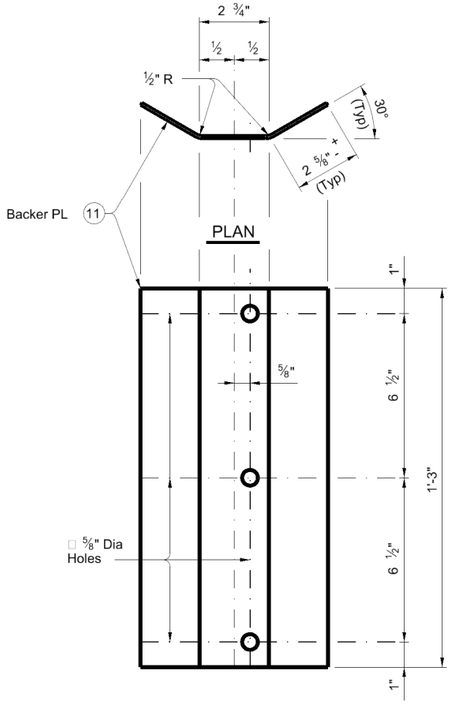
(10) See "Material Notes" for anchor bolt information.

(11) Backer PL ⅛ x 8 x 1'-3" (ASTM A1011 CS or SS Gr 33, or A1008 CS or SS Gr 33 (11 Gage acceptable)).

(12) Used for structures with overlay.

(13) Used for structures without overlay.

(14) At the nominal end of the bridge rail for payment, one 9'-4 ½" or 6'-3" W-beam section is permitted in order to achieve the required W-Beam splice location on the MBGF.



ELEVATION

BACKER PLATE

MBGF AND END TREATMENT NOTES:

This traffic railing must be anchored by metal beam guard fence (MBGF) and guard fence end treatments. Determine MBGF length of need in accordance with the Roadway Design Manual, unless otherwise specified. The minimum MBGF length of need required for anchoring the railing is 25' of MBGF plus the appropriate end treatment installed tangent to the primary roadway.

CONSTRUCTION NOTES:

Face of rail post must be plumb unless otherwise approved by the Engineer. Post must be perpendicular to adjacent roadway grade. Use epoxy mortar under post base plates if gaps larger than 1/16" exist.

Fully anchored guardrail must be attached to each end of rail. A metal beam guard fence transition is not used with this rail.

At the Contractor's option anchor bolts may be an adhesive anchor system. See "Material Notes".

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

It is recommended to show a Rail Layout with rail posts and W-beam splices. Fabricator must submit erection drawings to the Engineer for approval.

Round or chamfer exposed edges of rail post and backer plate to approximately 1/16" by grinding.

Shop drawings are not required for this rail.

MATERIAL NOTES:

Galvanize all steel components.

Anchor bolts for base plate must be ⅝" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

Optional adhesive anchorage system must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

W-beam must 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" (Nominal) lengths and a single rail element of 9'-4 ½" or 6'-3" (Nominal) length. W-Beam must have slotted holes at 3'-1 ½".

Some part numbers from the "Task Force 13" Guide to Standardized Highway Barrier Hardware have been furnished for quick reference.

GENERAL NOTES:

This railing has been successfully evaluated by full-scale crash test to meet MASH TL-3 criteria. This railing can be used for speeds of 50 mph and greater.

This rail is designed to deflect approximately 4' to 4'-6" as it contains and redirects the errant vehicle. This rail may not be installed on top of or behind curbs that project above finished grade, on bridges with expansion joints providing more than 5" movement, on retaining walls, or on grade separations and interchanges.

Repairs to impact-damaged post and base plate unit are not permitted. Replace all impact-damaged posts with a new post and base plate unit.

Average weight of railing with no overlay: 20 plf total.

Texas Department of Transportation — Bridge Division Standard

TRAFFIC RAIL

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07/2020: Allowing 9'-4 ½" or 6'-3" W-Beam sections.		DIST	COUNTY		SHEET NO.
03/2023: MBGF Notes.		22	WEBB		87

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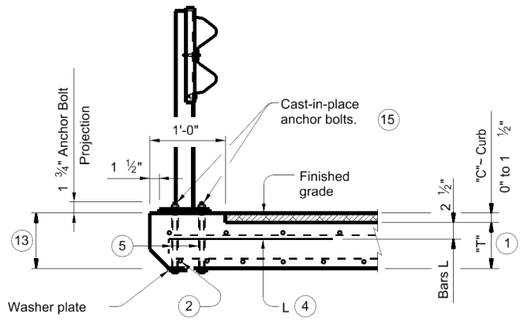
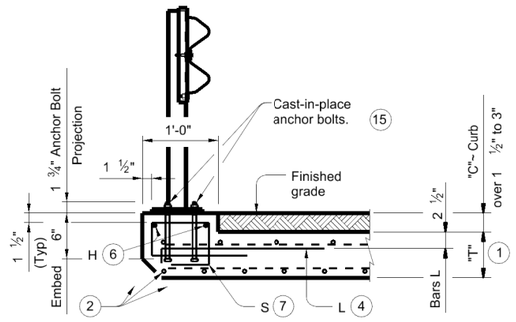


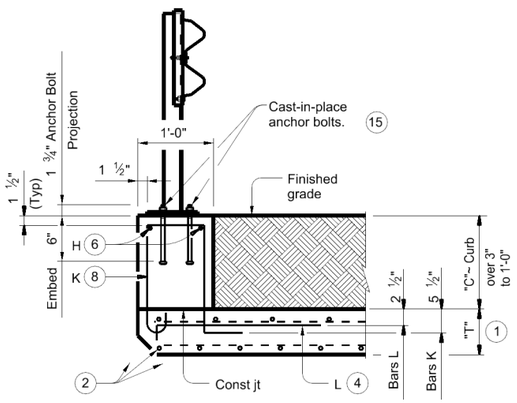
SECTION - TYPE 1 (3)

Used for curbs 1 ½" and Less
(Showing "C"= 1 ½")



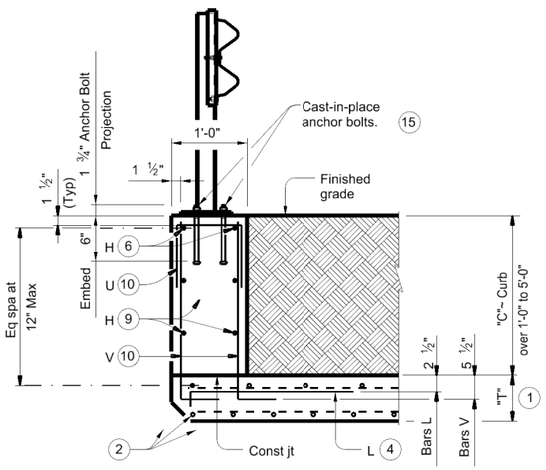
SECTION - TYPE 2

Used for curbs over 1 ½" to 3"
(Showing "C"= 3")



SECTION - TYPE 3

Used for curbs over 3" to 1'-0"
(Showing "C"= 1'-0")



SECTION - TYPE 4

Used for curbs over 1'-0" to 5'-0"
(Showing "C"= 2'-0")

1 Dimension "T" is equal to the culvert top slab thickness. For precast boxes with slabs less than 8" thick, see SCP-MD standard for additional details.

2 Adjust normal culvert slab bars as necessary to clear obstructions.

3 Omit normal culvert curb Bars K and H.

4 Place Bars L as shown. Tilt hook as necessary to maintain cover.

5 4 formed holes for anchor bolts at each rail post. See rail standard for information not shown.

6 Place normal culvert curb Bars H (#4) as shown. Adjust as necessary to clear obstructions.

7 Omit normal culvert curb Bars K. Place Bars S as shown. Tilt Bars S as necessary to maintain cover.

8 Place normal culvert curb Bars K spaced at 12" Max as shown. Tilt Bars K as necessary to maintain cover. Refer to box culvert details sheets for Bars K details.

9 Additional Bars H (#4) as required to maintain 12" Max spa.

10 At TYPE 4 mountings, replace normal culvert curb Bars K with one Bar U and two Bars V as shown spaced at 12" Max. Adjust length of Bars V as necessary to maintain clear cover.

11 Adjust parallel wing Bars G to positions shown.

12 Optional Bars L are to be used only for precast box culverts with 3'-0" closure pour.

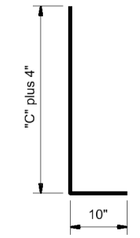
13 If "T" plus "C" is greater than 8", provide reinforcement per TYPE 1 mounting and anchor bolts per TYPE 2 mounting.

14 Quantities shown are for Contractor's information only. Quantities are per linear foot of curb length. The values for each section type in table can be interpolated for intermediate values of curb height, "C". Quantity includes Bars K (when applicable).

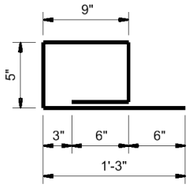
15 See "Cast-In-Place & Formed Hole Anchor Bolt Options."

TABLE OF ESTIMATED CURB QUANTITIES (14)

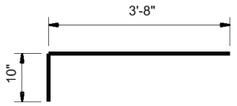
Curb Height "C"	Section Type	Conc (CY/LF)	Reinf Steel (Lb/LF)
1 ½"	1	0.005	4.7
3"	2	0.009	8.4
6"	3	0.019	8.9
1'-0"	3	0.037	8.9
1'-6"	4	0.056	14.3
2'-0"	4	0.074	15.4
2'-6"	4	0.093	17.7
3'-0"	4	0.111	18.8
3'-6"	4	0.130	21.2
4'-0"	4	0.148	22.2
4'-6"	4	0.167	24.6
5'-0"	4	0.185	25.6



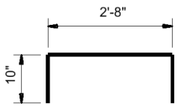
BARS V (#5) (10)
Spaced at 12" Max



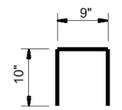
BARS S (#4) (7)
Spaced at 12" Max



BARS L (#5) (4) (12)
Spaced at 12" Max



OPTIONAL BARS L (#5) (4) (12)
Spaced at 12" Max



BARS U (#4) (10)
Spaced at 12" Max

CONSTRUCTION NOTES:

For vehicle safety, finished grade must be flush with top of curb.

Adjust reinforcing as necessary to provide 1 ¼" cover.

At the Contractor's option, anchor bolts may be an adhesive anchor system.

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

MATERIAL NOTES:

Provide concrete for curb of the same Class and strength as the box culvert top slab.

Galvanize all steel components of steel rail system.

Provide Grade 60 reinforcing steel.

Galvanize all reinforcing steel if required elsewhere.

Anchor bolts for base plate must be ⅝" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

Optional adhesive anchor system must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive.

Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tersion of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

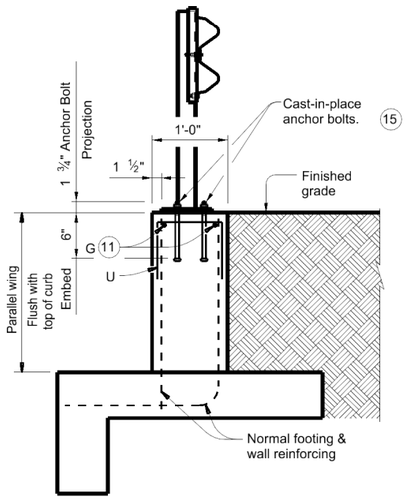
See T631LS or T631 rail standard for approved speed restrictions, notes and details not shown.

The curb is considered as part of the box culvert for payment.

These details are for use with curbs that are 5'-0" tall and less only. Curb heights that are less than or greater than those shown will require special design.

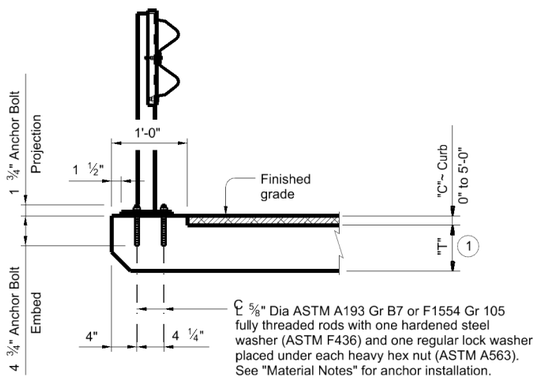
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

The use of the T631LS rail is restricted to speeds of 45 mph or less.



TYPICAL SECTION THRU PARALLEL WINGWALL (15)

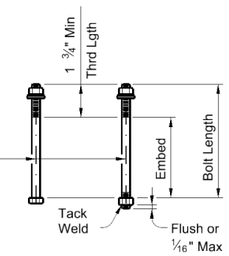
Use with all curb heights shown



OPTIONAL ADHESIVE ANCHORAGE

Optional adhesive anchor may replace cast-in-place anchor bolts for Type 1 thru Type 4 and on Typical Section Thru Parallel Wingwalls. Reinforcement for optional adhesive anchorage matches details shown for Type 1 thru Type 4 and on Typical Section Thru Parallel Wingwalls.

⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod.



CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS

Applies to T631LS and T631 traffic rails.

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT MOUNTING DETAILS FOR TYPE T631LS & T631 RAILS (CURBS 5' TALL AND LESS ONLY)

T631-CM

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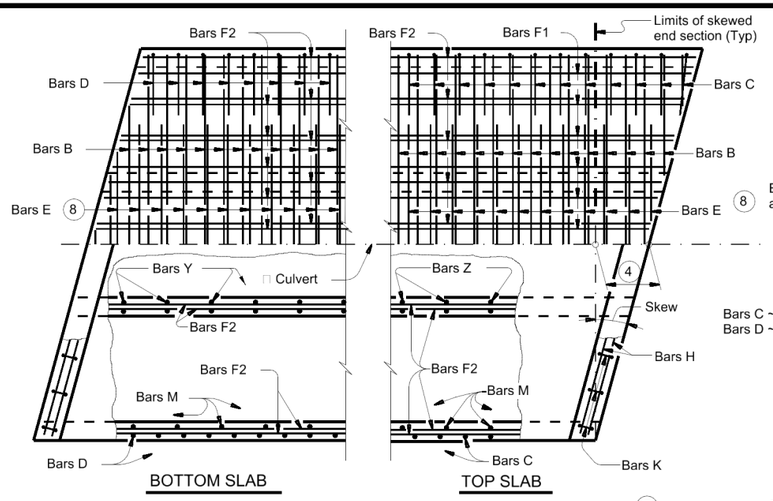
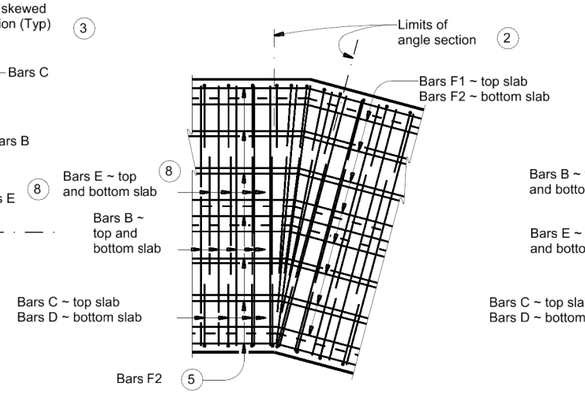
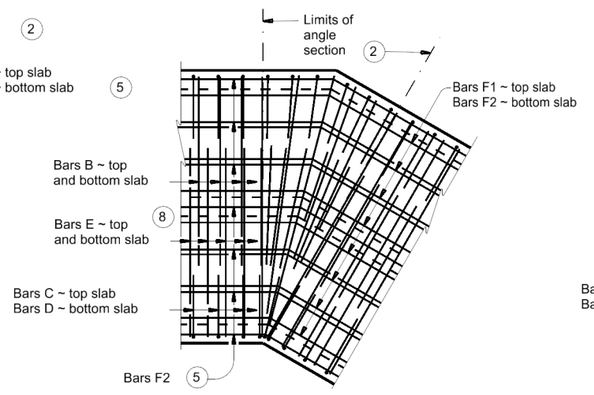


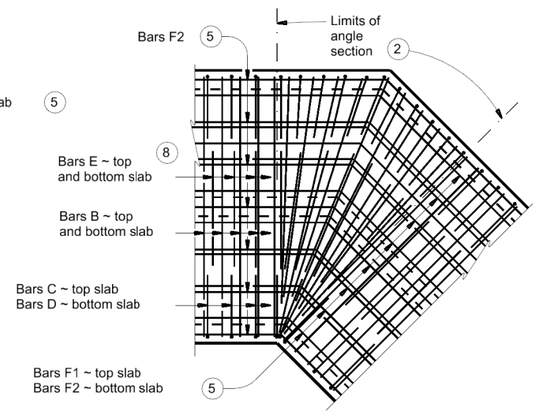
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° (7)



PLAN OF ANGLE SECTION ~ FROM 0° TO 15°



PLAN OF ANGLE SECTION ~ OVER 15° TO 30°

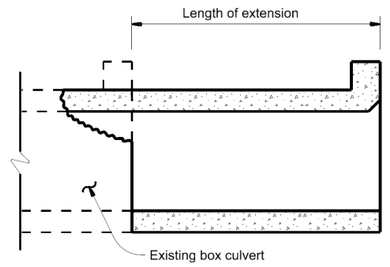


PLAN OF ANGLE SECTION ~ OVER 30° TO 45°

PLAN OF SKEWED ENDS ~ OVER 15° TO 30°

PLAN OF SKEWED ENDS ~ OVER 30° TO 45°

1. For skewed box culverts with less than 2'-0" of fill, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension.
   For non-skewed box culverts with less than 2'-0" of fill and for skewed or non-skewed culverts with a fill depth of 2'-0" or greater, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. Alternatively, if the box is non-skewed, embed #6 anchor bars with a Type III, Class C, D, E, or F anchor adhesive into the existing walls, top and bottom slab at 1'-6" center-to-center spacing. Minimum embedment depth is 8". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26.4 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing." Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.
   Break back wings and apron as necessary to install the extension. Clean and extend the exposed wingwall and apron reinforcing into the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, form horizontal and vertical transitions as directed by the Engineer. Match bottom slabs to maintain an uninterrupted flow line. Field bend existing and new reinforcing into transitions and maintain specified cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface, adjust the "H" dimension to provide a smooth riding surface.
2. When the spacing between Bars B or Bars E becomes less than half of the normal spacing, cut bars to avoid conflict.
3. The length of Bars B and Bars E will vary in the skewed end sections.
4. [One half of overall width] x [tangent of the skew angle]
5. Place Bars F1 and F2 continuously through the angle section. Bend Bars F1 and F2 to remain parallel to the walls of the box culvert.
6. When necessary to avoid conflict in acute corners, shorten the slab extension leg of Bars C and Bars D to a minimum of 1'-6" for skews of 30° thru 45°.
7. At the Contractor's option, for skews of 15° or less, place Bars B, C, D, and E parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B and Bars E shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets to accommodate the skew.
8. Extend Bars E as shown on the MC standard sheet for direct traffic culverts.



LENGTHENING DETAIL (1)

CONSTRUCTION NOTES:
Do not use permanent forms.
When required, lap Bars H 1'-8" for uncoated or galvanized bars.
Provide a minimum of 1 ½" clear cover.

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel, if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) with these exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for details of straight sections of culvert.
For skewed sections and angle sections, refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for slab and wall dimensions, bar sizes, maximum bar spacing, and any other details not shown.
For skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume, and reinforcing steel weight by dividing the values shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets by the cosine of the skew angle.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

MC-MD

FILE: mc-mdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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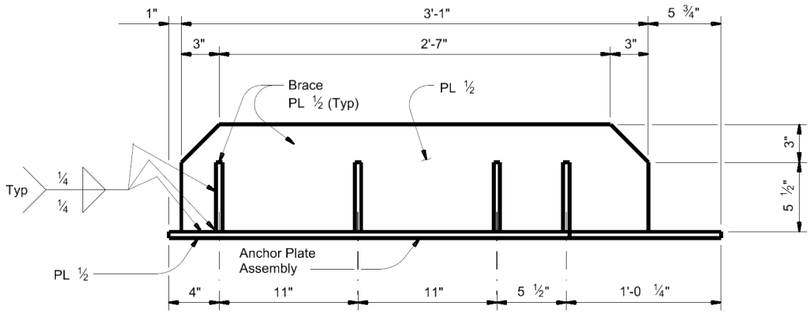
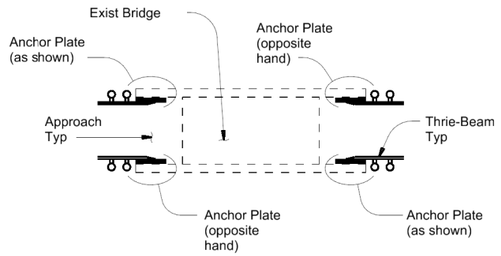
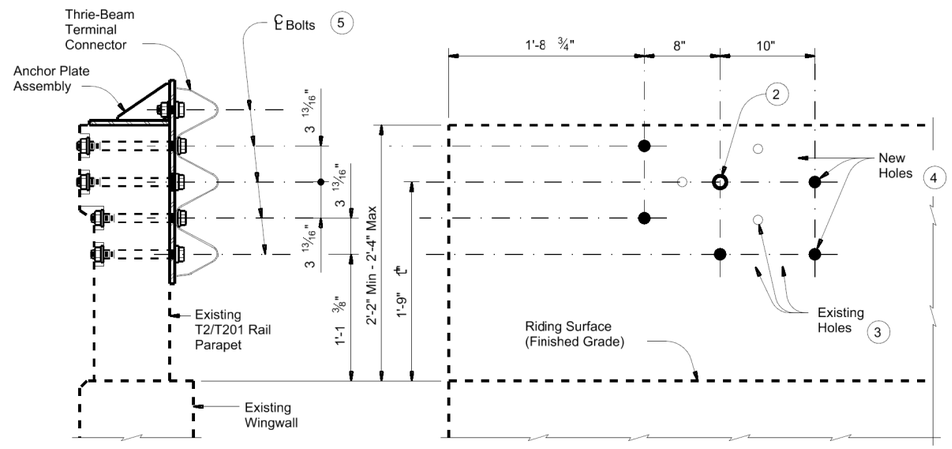


PLAN



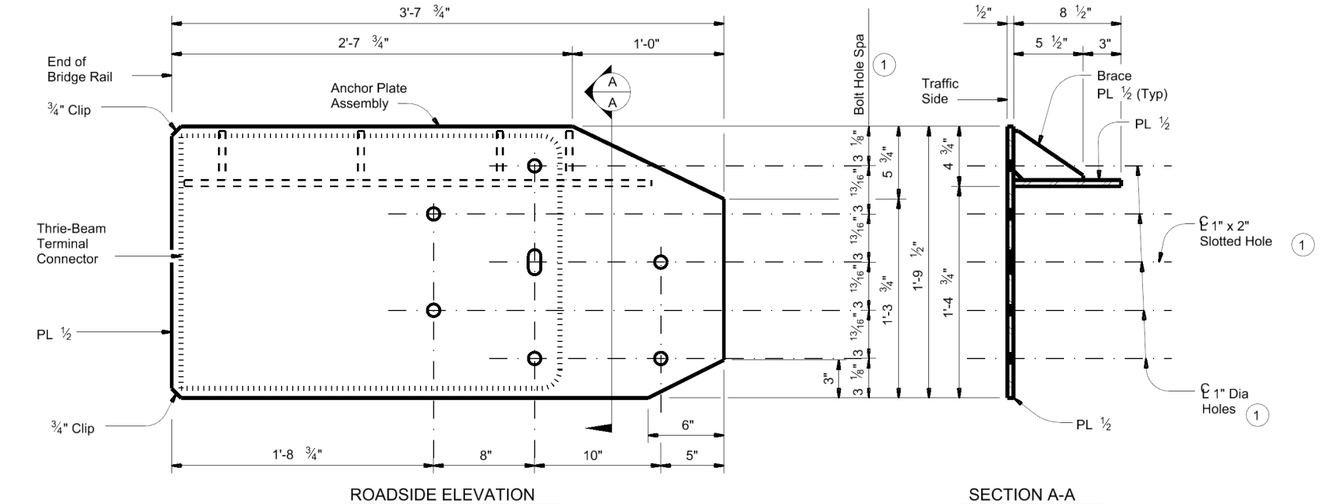
LOCATION DETAILS



SECTION
Showing completed installation

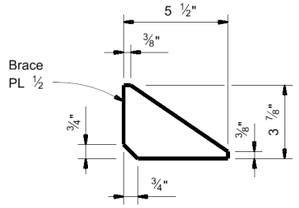
ROADSIDE ELEVATION
Anchor Plate assembly and Thrie-Beam Terminal Connector not shown for clarity

THRIE-BEAM TERMINAL CONNECTION DETAILS (1)



ROADSIDE ELEVATION

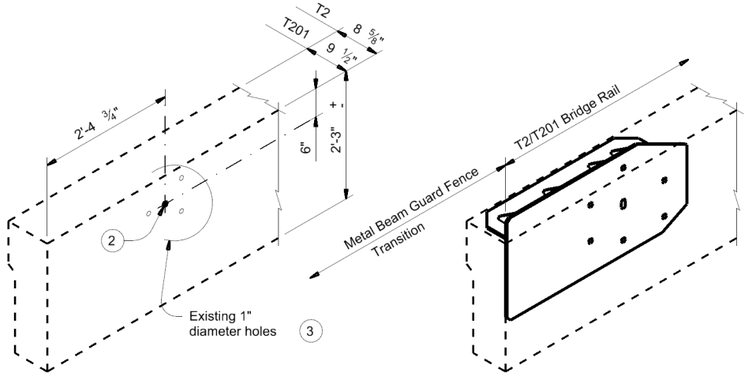
SECTION A-A



BRACE PLATE DETAIL

ANCHOR PLATE DETAILS

Anchor Plate shown is detailed for one end of one side of rail only.
For other side, Anchor Plate must be built opposite hand.



EXISTING PARAPET
Shown after removal of existing MBGF Transition connector and prior to coring new bolt holes

ANCHOR PLATE PLACEMENT

INSTALLATION DETAILS

IH35 - LOC.6 - PSN:22-240-0-0018-04-153
IH35 - LOC.7 - PSN:22-240-0-0018-04-154

(1) The Contractor must verify that locations of bolt holes match those in the Thrie-Beam Terminal Connector to be installed in that location, prior to fabrication of Anchor Plate assembly and prior to coring bolt holes in the existing T2/T201 parapet.

(2) If the existing holes are aligned as expected, use the indicated existing 1" diameter hole in the installation of the Anchor Plate assembly and the Thrie-Beam Terminal Connector.

(3) If the existing holes are not aligned as expected, holes that cannot be utilized in the installation and are within 3" of a new bolt hole must be filled with epoxy grout prior to coring new holes.

(4) Drill new 1" diameter holes, each with a 2 ½" diameter x 1" deep recess, through existing railing parapet. Note that recesses are only required when pedestrian sidewalks are adjacent to back of rail unless directed otherwise by the Engineer. Holes should be perpendicular to the roadside face of the parapet. Drill holes and recesses with coring type equipment. Percussion drilling is not allowed. Patch spalls, when directed by the Engineer, in accordance with Item 429, "Concrete Structure Repair", at the Contractor's expense.

(5) 7 ~ 7/8" diameter ASTM F3125 Gr A325 Hex Head Anchor Bolts each with 2 ~ 1 ¾" O.D. washers. Place washer under each head and nut. Provide bolts of sufficient length to extend a minimum of ½" beyond nut. Cut excess bolt length and paint cut surface with zinc-rich paint if directed by the Engineer.

CONSTRUCTION NOTES:

Field verify dimensions before commencing work and ordering materials.

On T2 rail remove any MBGF (W-beam) and attachment hardware, from the face of rail if present, prior to installation of new MBGF Transition. Dispose of these materials as directed by the Engineer. Plugging of newly exposed existing bolt holes is not necessary except as stated here in or otherwise indicated on the plans. This work is considered subsidiary to the pertinent bid items.

Attach the MBGF Transition to the existing parapet using the Anchor Plate assembly and the Thrie-Beam Terminal Connection. Splice the Thrie-Beam Terminal Connection and Thrie-Beam with the normal 12 connection bolts. Refer to Metal Beam Guard Fence Transition and Metal Beam Guard Fence detail sheets for additional details and information not shown herein.

MATERIAL NOTES:

Fabricate Anchor Plate assembly with steel conforming to either ASTM A36 or A572 Gr 50. Anchor Plate assembly must be free of burrs, sharp edges and weld splatter. Grind edges and corners to a 1/16" flat or radius. Hot-dip galvanize Anchor Plate assembly in accordance with Item 445, "Galvanizing". Anchor bolts, nuts, and washers must conform to Item 449, "Anchor Bolts".

GENERAL NOTES:

These details are for retrofitting existing rails only, not new construction, with a Thrie-Beam Terminal Connection.

Shop drawings are not required for this installation.

Payment for materials, fabrication, and installation of this assembly are to be included in unit price bid in accordance with Item 540 "Mtl Bm Gd Fen Trans (Anchor Plate)".

Estimated weight of a single Anchor Plate assembly, including bolts, nuts, and washers, but not including the Thrie-Beam Terminal Connector = 190 Lbs.

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Bridge Division Standard

T2/T201 TRANSITION RETROFIT GUIDE

T2/T201TR (MOD)

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
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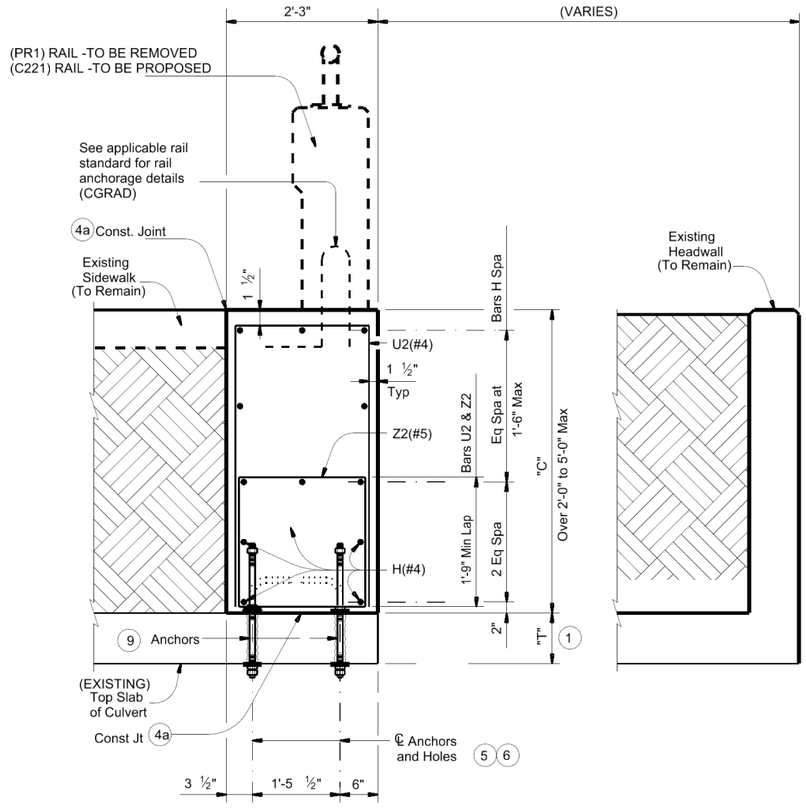
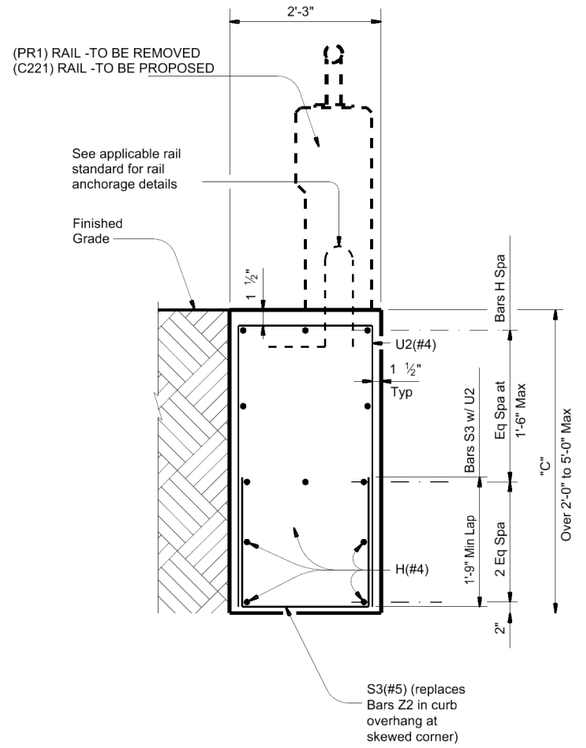


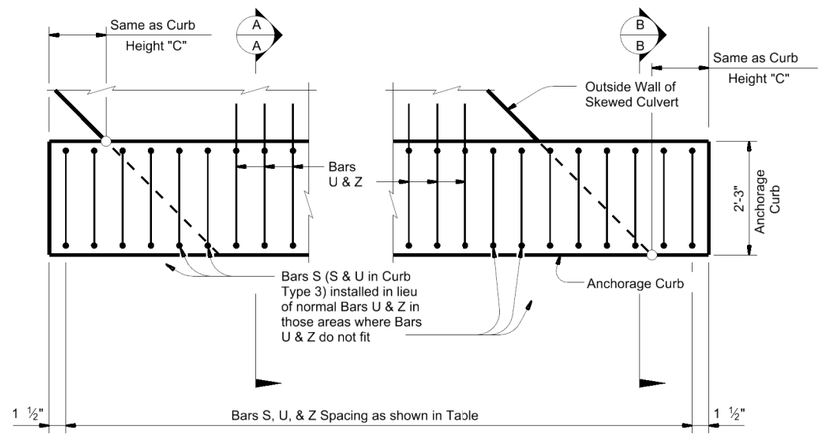
SECTION A-A



SECTION B-B

TYPE 3 CURB

Used for curbs over 2'-0" to 5'-0" (Showing "C" = 4'-0"). Showing T223 Rail, other rails similar. (Bars L(#5) on T223 and C223 Rails are not used for this structure). Bars RH(#5) required on standards T80HT, T80SS and T224 are not required when used with the RAC standard.



TYPICAL CURB PLAN

Showing typical installation on skewed culvert. (Bars L(#5) on T223 and C223 Rails are not used for this structure). Bars RH(#5) required on standards T80HT, T80SS and T224 are not required when used with the RAC standard.

1. "T" is equal to the culvert top slab thickness. For Precast Boxes with slabs less than 8" thick, see SCP-MD Standard for additional details.
2. Tilt Bars L hook as necessary to maintain cover.
3. Optional Bars L are to be used only for Precast Box Culverts with 3'-0" closure pours.
4. Quantities shown are for Contractor's information only. Quantities are per Linear Foot of curb length. The values for each section type in table can be interpolated for intermediate values of Curb Height, "C".
4a. Saw cut (score) 1" deep flush with top of existing culvert slab, on the field side face of existing curb, if present. After scoring, remove shaded portion of existing concrete to Breakback Line shown. Do not damage existing reinforcing. Clean, bend and incorporate existing reinforcing into new concrete construction. Note that new anchors, as shown in the detail, are required even when existing reinforcing remains in use. Remove existing overlay and/or base material to flush with top of culvert in areas of new construction. Care must be taken to not damage the existing slab. In order to prevent existing asphalt remnants from acting as a bond breaker between the exposed, existing concrete and the retrofitted concrete curb, clean the newly exposed concrete with abrasive blasting or shot blasting. Remove all loose debris prior to placing new anchorage curb.
5. Core drill 1" diameter holes through existing slab. Percussion drilling is not permitted. Patch spalls, when directed by the Engineer, in accordance with Item 429, "Concrete Structure Repair", at the Contractor's expense. Tighten nuts snug tight.
6. Space field side anchors at 36" maximum. Space traffic side anchors at 11" maximum. Do not align field side and traffic side anchors transversely.
9. Use straight anchors if retrofit anchorage curb is 1'-2" or greater in thickness. Use hooked anchors for retrofit anchorage curb less than 1'-2" thick.

TABLE OF REINFORCING SPACING

Curb Height "C"	Section Type	Bars S, U, & Z Spa
8" to 9"	1	12"
Over 9" to 2'-0"	2	9"
Over 2'-0" to 3'-0"	3	7"
Over 3'-0" to 5'-0"	3	5"

TABLE OF ESTIMATED QUANTITIES (4)

Curb Height "C"	Section Type	Reinf Steel (Lb/LF)	Class "C" Concrete (CY/LF)
8"	1	21.5	0.056
9"	1	21.5	0.063
1'-0"	2	29.7	0.083
1'-6"	2	30.6	0.125
2'-0"	2	31.5	0.167
3'-0"	3	44.6	0.250
4'-0"	3	56.8	0.333
5'-0"	3	60.0	0.417

CONSTRUCTION NOTES:

When using this anchorage curb, omit normal culvert curb reinforcing bars K and H shown on the culvert standard sheets.
For vehicle safety, the top of the curb must be flush with the finished grade.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Galvanize all reinforcing steel if required elsewhere.
Provide bar laps, where required, as follows:
Uncoated or galvanized ~ #4 = 1'-11"
Provide Class "C" concrete (f'c=3,600 psi). Provide Class "C" (HPC) concrete if shown elsewhere in the plans.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
The rail anchorage curb details have sufficient strength for use with all standard rail types.
See appropriate rail standard for approved design speed restrictions, notes and details not shown.
This anchorage curb is considered part of the Box Culvert for payment.
These details are for use with curbs that are 8" to 5'-0" tall only. Curb heights that are less than or greater than those shown will require special design.

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LOC.20 - PSN:22-240-0-0086-14-005, (T = 12") (C = 36") (TYPE 3)

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

RAIL ANCHORAGE CURB
BOX CULVERT
RAIL MOUNTING DETAILS
(CURBS 8" TO 5'-0" TALL ONLY)

RAC (MOD)

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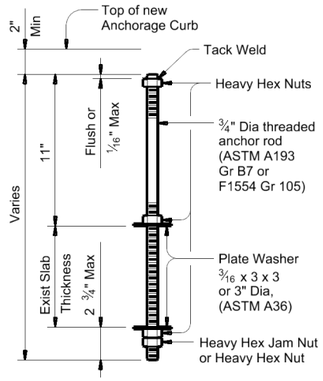
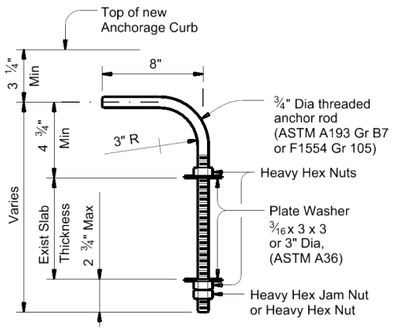
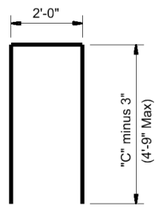


STRAIGHT ANCHOR (9)

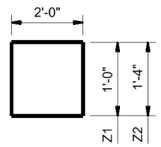


HOOKED ANCHOR (9)

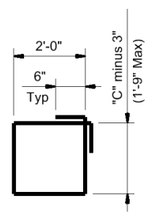
ANCHOR DETAILS



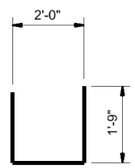
BARS U2 (#4)



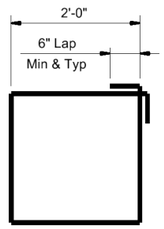
BARS Z (#5)



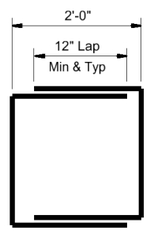
BARS S2 (#5)



BARS S3 (#5)



OPTIONAL BARS Z (#5)



OPTIONAL BARS Z (#5)

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SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

RAIL ANCHORAGE CURB
BOX CULVERT
RAIL MOUNTING DETAILS
(CURBS 8" TO 5'-0" TALL ONLY)

RAC (MOD)

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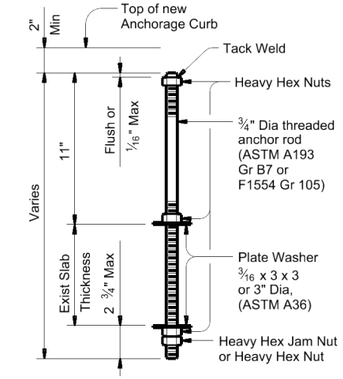
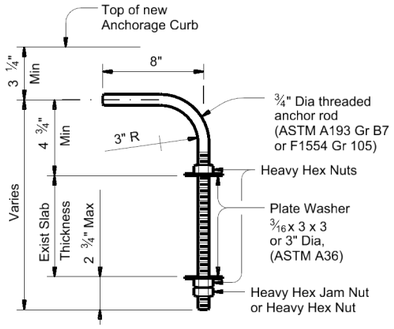
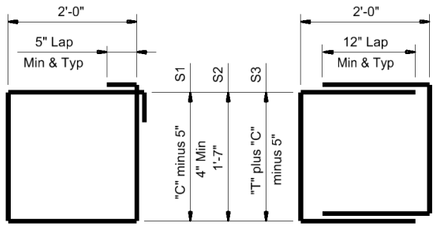


STRAIGHT ANCHOR (9)



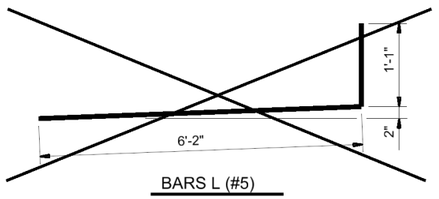
HOOKED ANCHOR (9)

ANCHOR DETAILS

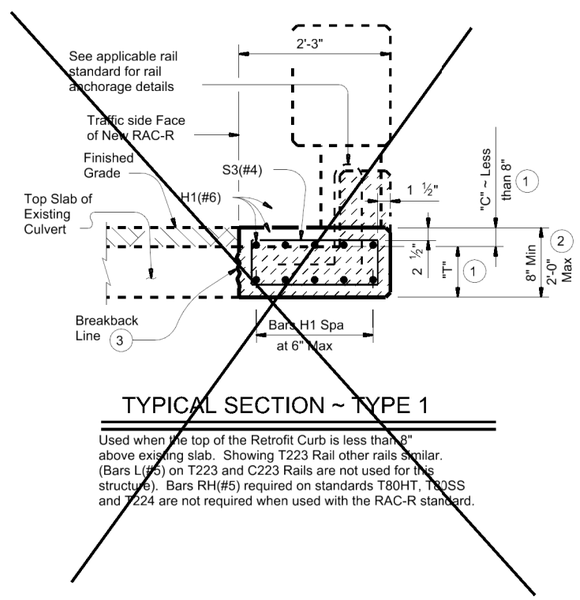


BARS S (#4)

OPTIONAL BARS S (#4)

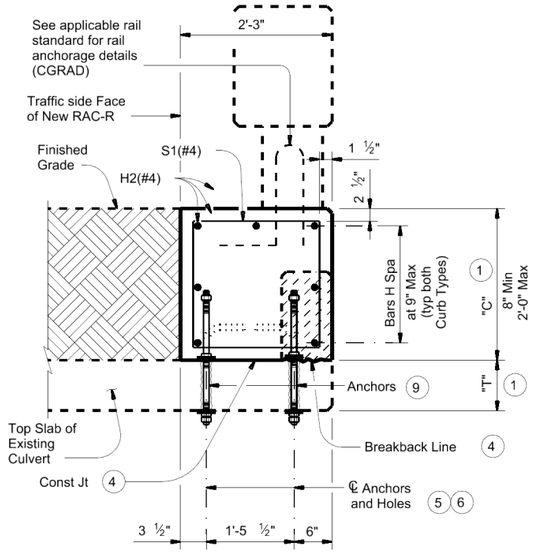


BARS L (#5)



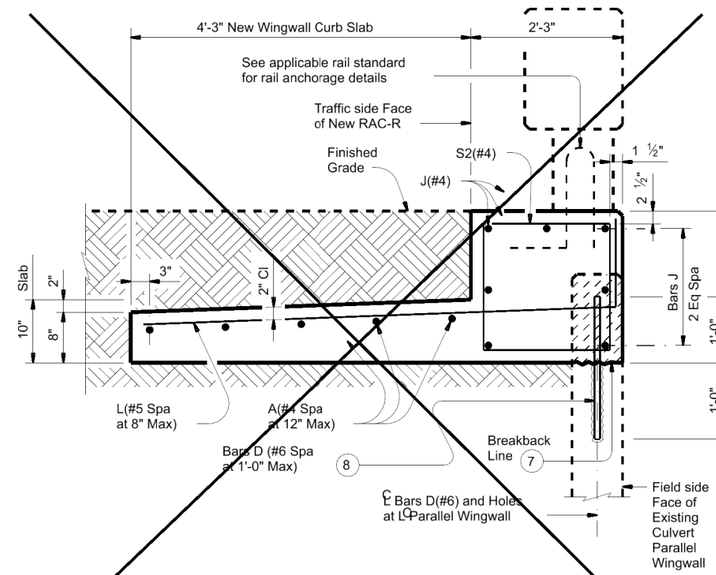
TYPICAL SECTION ~ TYPE 1

Used when the top of the Retrofit Curb is less than 8" above existing slab. Showing T223 Rail other rails similar. (Bars L(#5) on T223 and C223 Rails are not used for this structure). Bars RH(#5) required on standards T80HT, T80SS and T224 are not required when used with the RAC-R standard.



TYPICAL SECTION ~ TYPE 2

Used when the Retrofit Curb is 8" in height or greater. Showing T223 Rail, other rails similar. (Bars L(#5) on T223 and C223 Rails are not used for this structure). Bars RH(#5) required on standards T80HT, T80SS and T224 are not required when used with the RAC-R standard.



TYPICAL SECTION ~ PARALLEL WINGWALL

Wingwall Anchorage Curb is required on Parallel Wingwalls only. Omit Wingwall Anchorage Curb on Flared and Straight Wingwalls. Showing T223 Rail, other rails similar. (Bars L(#5) on T223 and C223 Rails are not used for this structure). Bars RH(#5) required on standards T80HT, T80SS and T224 are not required when used with RAC-R standard.

(1) "T" is equal to the existing culvert top slab thickness.
If "T" is less than 6", a special design will be required.
"C" is equal to the Retrofit Rail Anchorage Curb thickness.

The total thickness ("T" plus "C") must be 8" minimum in order to properly install the railing anchorage reinforcing.

Remove shaded portion of existing concrete to Breakback Line shown. Care must be taken so as to not damage existing reinforcing. Replace damaged reinforcing with new, like reinforcing. Clean existing reinforcing and incorporate into new concrete construction.

(4) Saw cut (score) 1" deep flush with top of existing culvert slab, on the field side face of existing curb, if present. After scoring, remove shaded portion of existing concrete to Breakback Line shown. Do not damage existing reinforcing. Clean, bend and incorporate existing reinforcing into new concrete construction. Note that new anchors, as shown in the detail, are required even when existing reinforcing remains in use. Remove existing overlay and/or base material to flush with top of culvert in areas of new construction. Care must be taken to not damage the existing slab. In order to prevent existing asphalt remnants from acting as a bond breaker between the exposed, existing concrete and the retrofitted concrete curb, clean the newly exposed concrete with abrasive blasting or shot blasting. Remove all loose debris prior to placing new anchorage curb.

(5) Core drill 1" diameter holes through existing slab. Percussion drilling is not permitted. Patch spalls, when directed by the Engineer, in accordance with Item 429, "Concrete Structure Repair", at the Contractor's expense. Tighten nuts snug tight.

(6) Space field side anchors at 36" maximum. Space traffic side anchors at 11" maximum. Do not align field side and traffic side anchors transversely.

Retrofit Wingwall Anchorage Curb must always be 2'-0" in height. Breakback existing wingwall as needed in order to properly align the wingwall Anchorage Curb with that placed on the existing culvert. Saw cut (score) 1" deep on field side face of the existing wingwall prior to breakback. Care must be taken so as to not damage existing reinforcing. Clean and extend existing reinforcing into new construction. Note that new Bars D(#6), as shown in the detail, are required even when existing reinforcing remains in use.

Embed bars D(#6) into existing wingwall with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 12". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing." If existing parallel wingwall thickness is less than 8", a special design will be required.

(9) Use straight anchors if retrofit anchorage curb is 1'-2" or greater in thickness. Use hooked anchors for retrofit anchorage curb less than 1'-2" thick.

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LOC.21 - PSN:22-240-0-0086-14-182, (T = 12") (C = 24") (TYPE 2)

LOC.13 - PSN:22-240-0-2150-04-022, (T = 6") (C = 15") (TYPE 2)

CONSTRUCTION NOTES:

Field verify dimensions before commencing work and ordering materials.

MATERIAL NOTES:

Provide Class "C" concrete (f'c=3,600 psi). Provide Class "C" (HPC) concrete if shown elsewhere in the plans.

Chamfer all exposed corners ¾" unless shown otherwise.
Provide Grade 60 reinforcing steel.
Galvanize all reinforcing steel if required elsewhere.
Provide bar laps, where required, as follows: Uncoated or galvanized ~ #4 = 1'-11"
Galvanize ¾" Dia threaded rods, heavy hex nuts and plate washers, unless otherwise shown on plans.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
The rail anchorage curb details have sufficient strength for use with all standard rail types.
See appropriate rail standard for approved speed restrictions, notes and details not shown.
For vehicle safety, the top of the new curb must be flush with the finished grade.
These details are for use with curbs with a maximum height of 2'-0" only. Curb heights greater than 2'-0" will require special design.
Removal and replacement of backfill, subgrade, and asphalt or concrete pavement necessary for this installation is considered subsidiary to the rail anchorage curb.
Payment for rail anchorage curb (including wingwall curb slab) will be by CY of Class "C" or Class "C" (HPC) concrete.
Not all possible combinations of existing box culverts, curbs, wingwalls etc. have been shown on this sheet. Other combinations and reinforcement arrangements are permissible if they meet the same strength requirements as indicated on this sheet.

Texas Department of Transportation

Bridge Division Standard

RAIL ANCHORAGE CURB RETROFIT GUIDE

BOX CULVERT RAIL MOUNTING DETAILS
(CURBS 2'-0" TALL AND LESS ONLY)

RAC-R (MOD)

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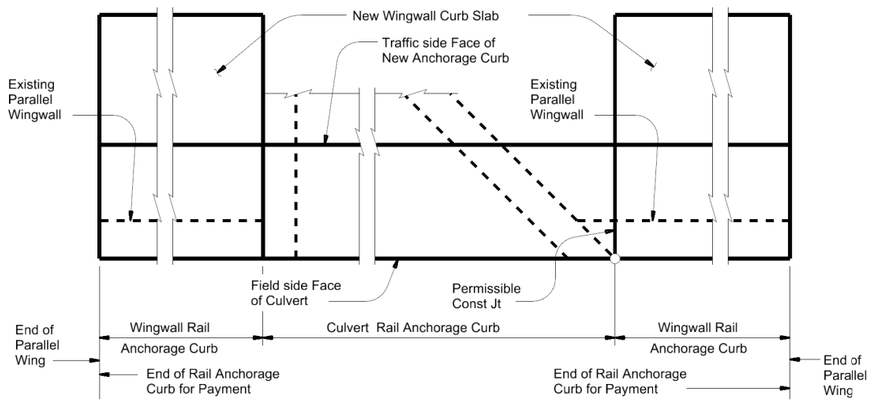
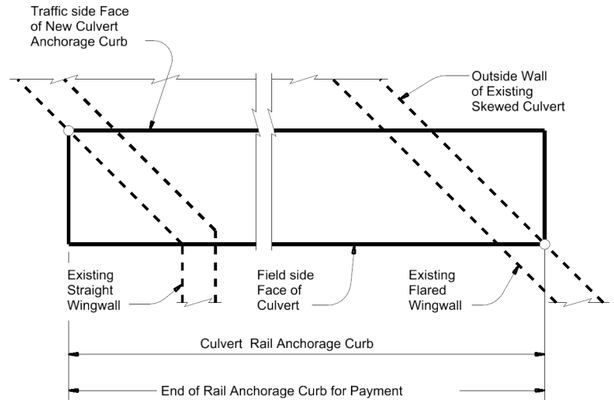


PARALLEL WINGWALL AT 0° SKEW CULVERT

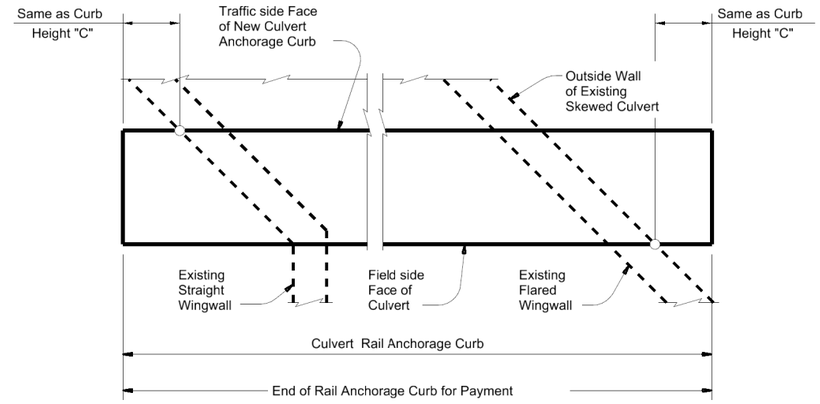
PARALLEL WINGWALL AT SKEWED CULVERT

Note that Wingwall Rail Anchorage Curb is used only at culverts with parallel wingwalls.



OPTION A ~ STRAIGHT WINGWALL AT SKEWED CULVERT (10)

OPTION A ~ FLARED WINGWALL AT SKEWED CULVERT (10)

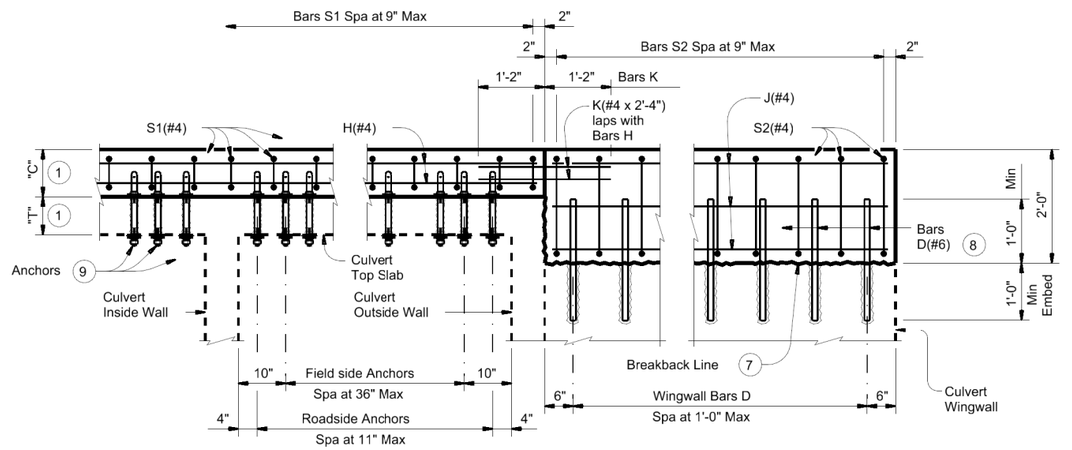


OPTION B ~ STRAIGHT WINGWALL AT SKEWED CULVERT (11)

OPTION B ~ FLARED WINGWALL AT SKEWED CULVERT (11)

TYPICAL CURB PLANS

Showing Geometry only. Reinforcing, Curb Anchors, and Railing not shown for clarity.



SHOWING CULVERT ANCHORAGE CURB

Showing Anchorage Curb Type 2. Anchor and Bars S spacing are the same for Anchorage Type 1.

SHOWING WINGWALL ANCHORAGE CURB

Curb Slab and Slab reinforcing not shown for clarity.

TYPICAL ELEVATIONS OF INSTALLATION

(1) "T" is equal to the existing culvert top slab thickness. If "T" is less than 6", a special design will be required. "C" is equal to the Retrofit Rail Anchorage Curb thickness.

(7) Retrofit Wingwall Anchorage Curb must always be 2'-0" in height. Breakback existing wingwall as needed in order to properly align the wingwall Anchorage Curb with that placed on the existing culvert. Saw cut (score) 1" deep on field side face of the existing wingwall prior to breakback. Care must be taken so as to not damage existing reinforcing. Clean and extend existing reinforcing into new construction. Note that new Bars D(#6), as shown in the detail, are required even when existing reinforcing remains in use.

(8) Embed bars D(#6) into existing wingwall with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 12". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing." If existing parallel wingwall thickness is less than 8", a special design will be required.

(9) Use straight anchors if retrofit anchorage curb is 1'-2" or greater in thickness. Use hooked anchors for retrofit anchorage curb less than 1'-2" thick.

(10) Use Option A if finished grade at face of rail anchorage curb remains unchanged, or if both wingwalls and rail anchorage curb will be vertically raised. Existing wingwalls must be checked for suitability of vertically raising.

(11) Use Option B if wingwalls will not be vertically raised when the curb height is increased. Verify adequacy cf existing or proposed finished grade between end of rail anchorage curb and wingwall. Extension of rail anchorage curb beyond wingwall may need to be greater than "C" depending on side slope conditions.

Texas Department of Transportation

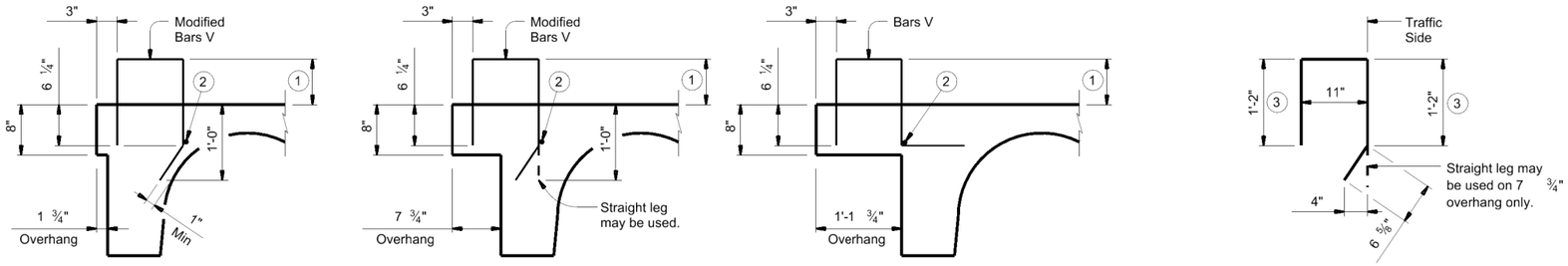
Bridge Division Standard

RAIL ANCHORAGE CURB RETROFIT GUIDE

BOX CULVERT RAIL MOUNTING DETAILS
(CURBS 2'-0" TALL AND LESS ONLY)

RAC-R (MOD)

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
	DIST	COUNTY		SHEET NO.
	22	WEBB		94



T1F, T1W, T2P, C1W & C2P RAILS

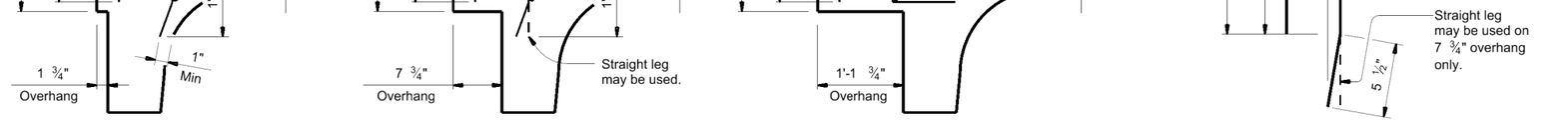
MODIFIED BARS V FOR
T1F, T1W, T2P, C1W & C2P RAILS AT
1 ¾" & 7 ¾" OVERHANGS (4)

(1) See Rail standard for projection from finished grade or top of sidewalk.

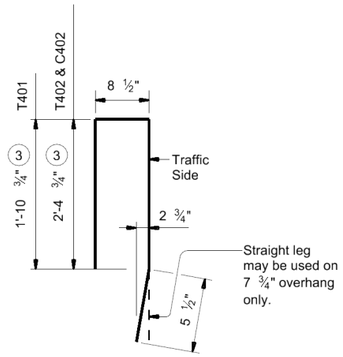
(2) Place additional #4 longitudinal bar. Bar embedded in slab must be provided by the contractor, included as part of railing reinforcement. Bar shown is required to control alignment of rail anchorage steel. Bar shown may be placed outside of slab at the contractor's option and removed after slab has cured.

(3) Length shown for 6 ¼" Min bar embedment with no overlay or raised sidewalk. Adjust as required.

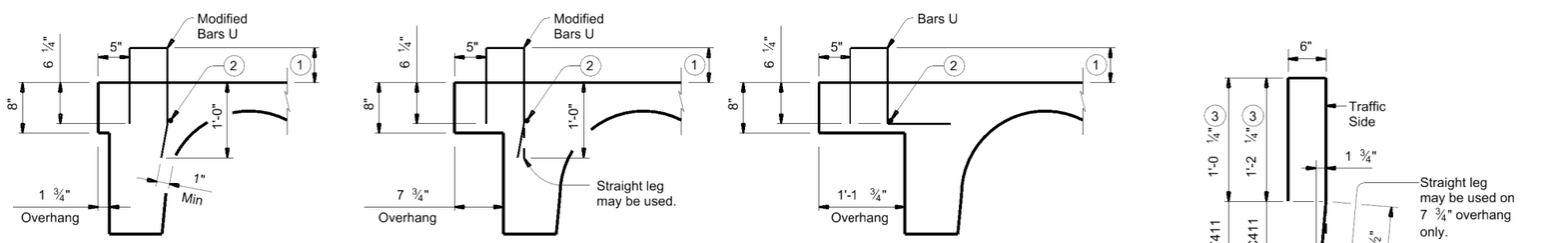
(4) See Rail standard for Bar size.



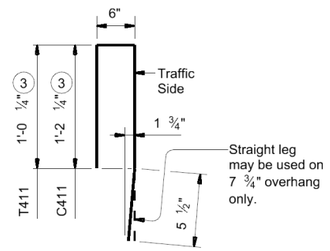
T401, T402 & C402 RAILS



MODIFIED BARS V FOR
T401, T402 & C402 RAILS AT
1 ¾" & 7 ¾" OVERHANGS (4)



T411 & C411 RAILS



MODIFIED BARS U FOR
T411 & C411 RAILS AT
1 ¾" & 7 ¾" OVERHANGS (4)

TYPICAL ANCHORAGE PLACEMENT

CONSTRUCTION NOTES:

Rail anchorage bars may be field bent as required to clear rail reinforcing or to provide minimum cover shown on standard rail detail sheets.

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

MATERIAL NOTES:

Galvanize all steel components of steel rail system.

Provide Grade 60 reinforcing.

Cast-in-place anchor system for T631LS and T631 Rail must be ⅝" Dia ASTM F3125 Gr A325 or A449 bolts (or ASTM A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements.

Adhesive anchors for T631LS and T631 Rail must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

Epoxy coat or galvanize reinforcing steel shown on this standard if rail reinforcement is epoxy coated or galvanized.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

The rail anchorage details shown on this standard are only applicable for 8" deep overhangs with the following overhang widths: 1 ¾", 7 ¾" and 1'-1 ¾".

This standard only applies to rails at the outside edge of the bridge, and not in conditions where interior rails and median barriers are used.

This standard does not support the use of Type T66, T224, T80HT, T80SS, C412, C66, PR11, PR22 and PR3 Rail on CG Span bridges.

See Rail standard sheets for approved speed restrictions, notes and details not shown.

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

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

CONCRETE SLAB & GIRDER RAIL ANCHORAGE DETAILS

CGRAD

FILE: cgradste-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT October 2005	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
04-09: Updated for new rails. 07-14: Removed T101 & T6. Added T631. 03-16: T224 in general notes. 03-18: Adhesive anchorage option for T631.	DIST	COUNTY		SHEET NO.
	22	WEBB		95

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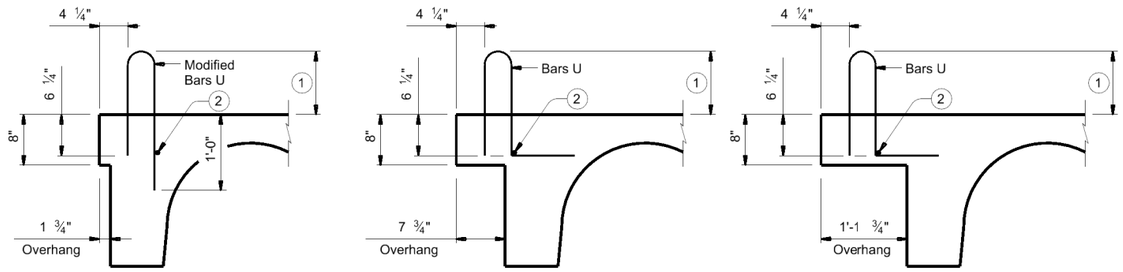
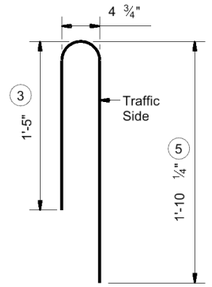
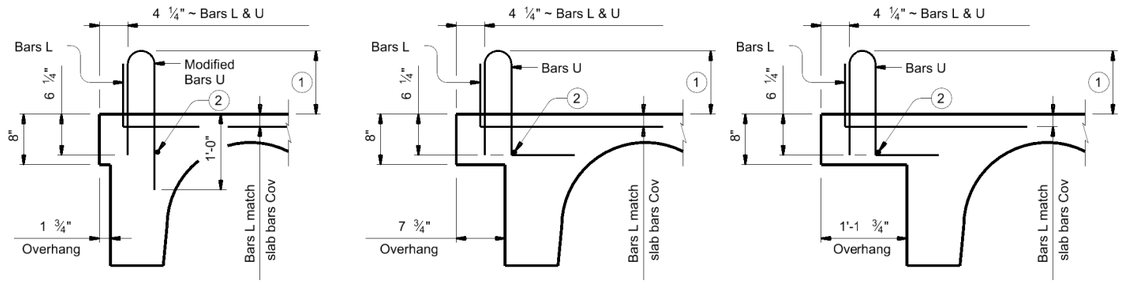


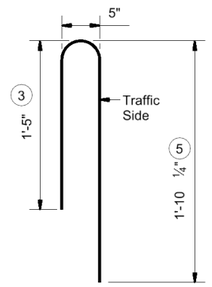
T221, T222, T551, T552, C221 & SSTR RAILS



MODIFIED BARS U
FOR T221, T222, T551, T552, C221 & SSTR RAILS AT 1 ¾" OVERHANG (4)

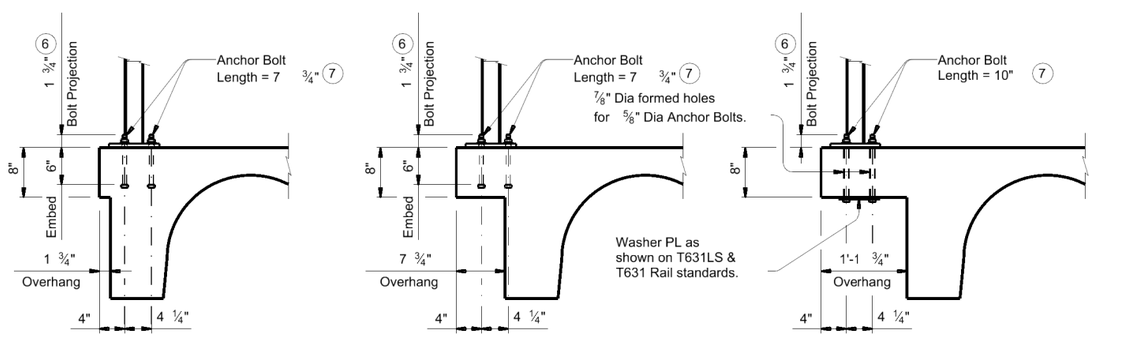


T223 & C223 RAILS



MODIFIED BARS U
FOR T223 & C223 RAILS AT 1 ¾" OVERHANG (4)

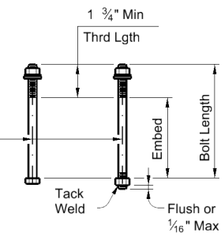
1. See Rail standard for projection from finished grade or top of sidewalk.
2. Place additional #4 longitudinal bar. Bar embedded in slab must be provided by the contractor, included as part of railing reinforcement. Bar shown is required to control alignment of rail anchorage steel. Bar shown may be placed outside of slab at the contractor's option and removed after slab has cured.
3. Length shown for 6 ¼" Min bar embedment with no overlay or raised sidewalk. Adjust as required.
4. See Rail standard for Bar size.
5. Length shown for 1'-0" Min bar embedment with no overlay or raised sidewalk. Adjust as required.
6. After posts have been set and bolts tightened, bolt projection above nuts of more than ½" must be cut off and painted with two coats zinc-rich paint conforming to Item 445, "Galvanizing".
7. See "Cast-In-Place & Formed Hole Anchor Bolt Options".
8. □ ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut (ASTM A563). See "Material Notes" for installation.



T631LS & T631 RAILS CAST-IN-PLACE ANCHOR OPTION

T631LS & T631 RAILS ADHESIVE ANCHOR OPTION

□ ⅝" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) or threaded rod (ATSM A193 Gr B7 or F1554 Gr 105) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563). One additional heavy hex nut must be furnished and tack welded for each threaded rod.



CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS

Applies to T631LS and T631 traffic rails.

TYPICAL ANCHORAGE PLACEMENT

SHEET 2 OF 2

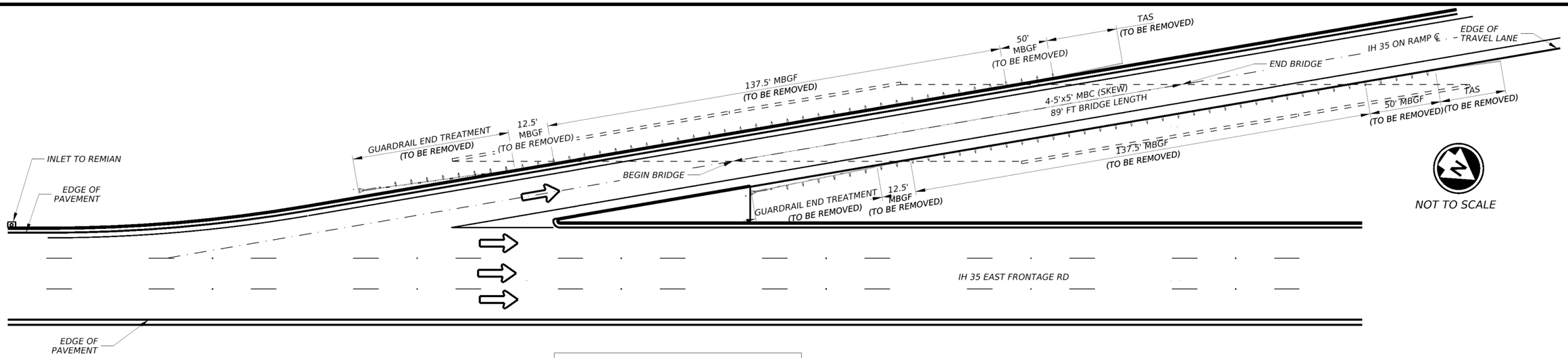
Texas Department of Transportation

Bridge Division Standard

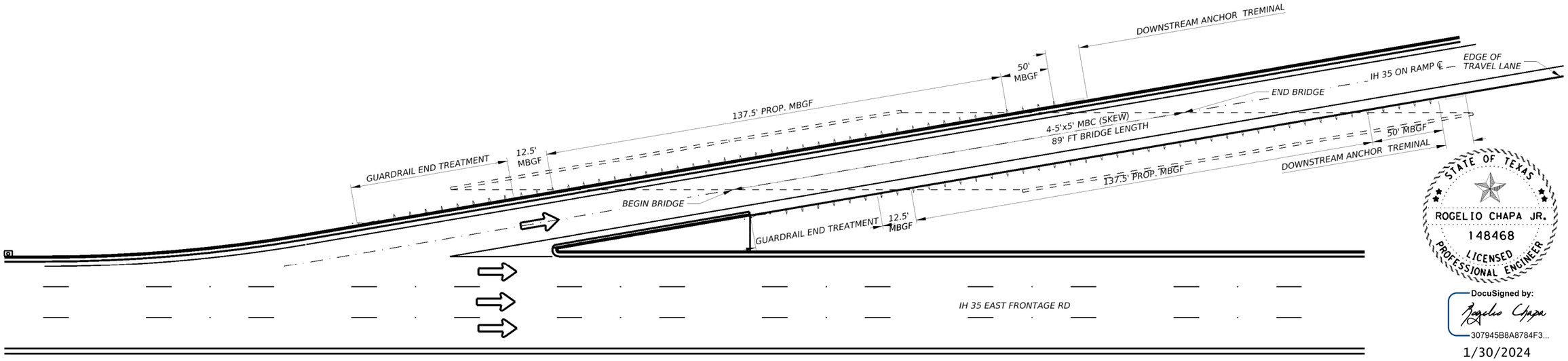
CONCRETE SLAB & GIRDER RAIL ANCHORAGE DETAILS

CGRAD

FILE: cgradste-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT October 2005	CONT	SECT	JOB	HIGHWAY
REVISIONS	0922	00	075	VARIOUS
04-09: Updated for new rails. 07-14: Removed T101 & T6. Added T631. 03-16: T224 in general notes. 03-18: Adhesive anchorage option for T631.	DIST	COUNTY		SHEET NO.
	22	WEBB		96



PSN: 22-240-0-0018-06-082
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-06-082
PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #1 - IH 35 NB ON RAMP

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
307945B8A8784F3...
1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 1 OF 36

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
22	WEBB		97

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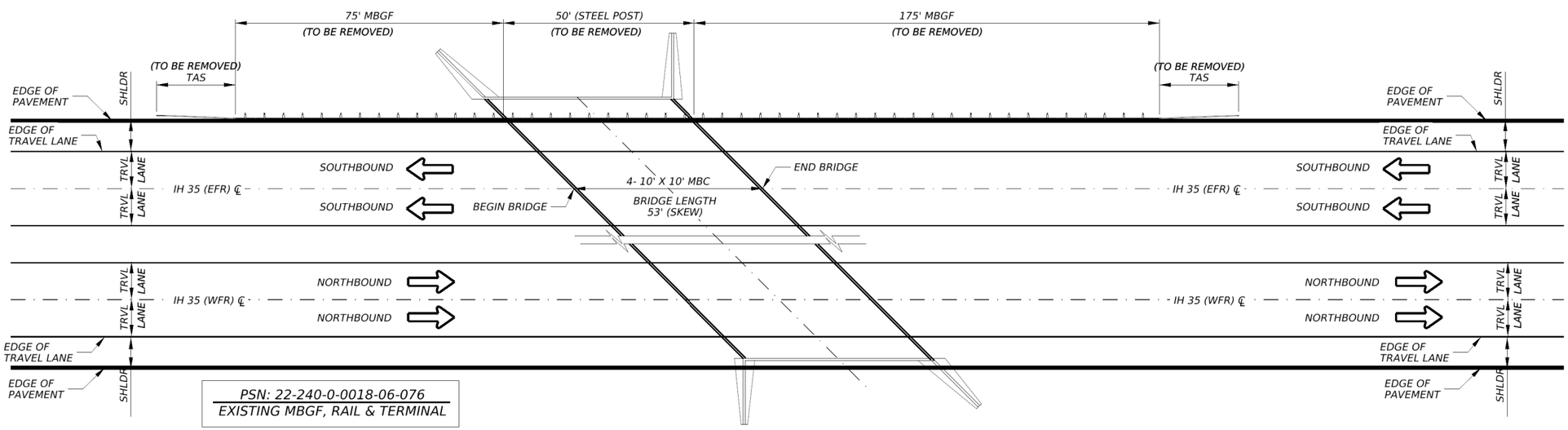

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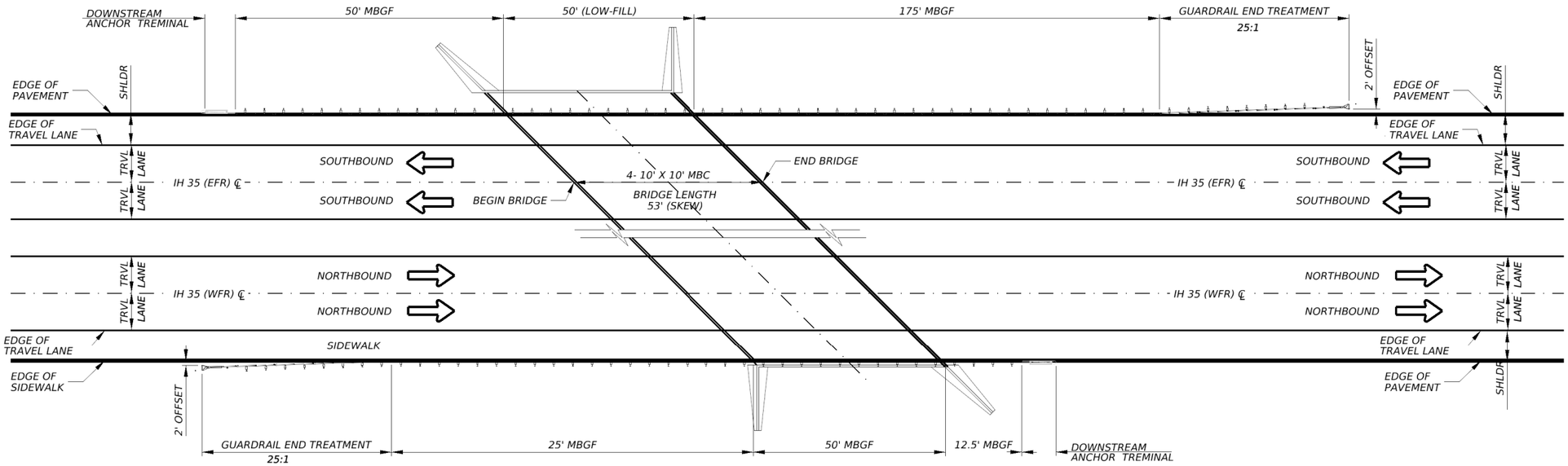
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-06-076
PROPOSED MBGF, RAIL & TERMINAL

NOT TO SCALE

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
307945B8A8784F3...

1/31/2024

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #2 - IH 35 EFR/WFR

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 2 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS

DIST	COUNTY	SHEET NO.
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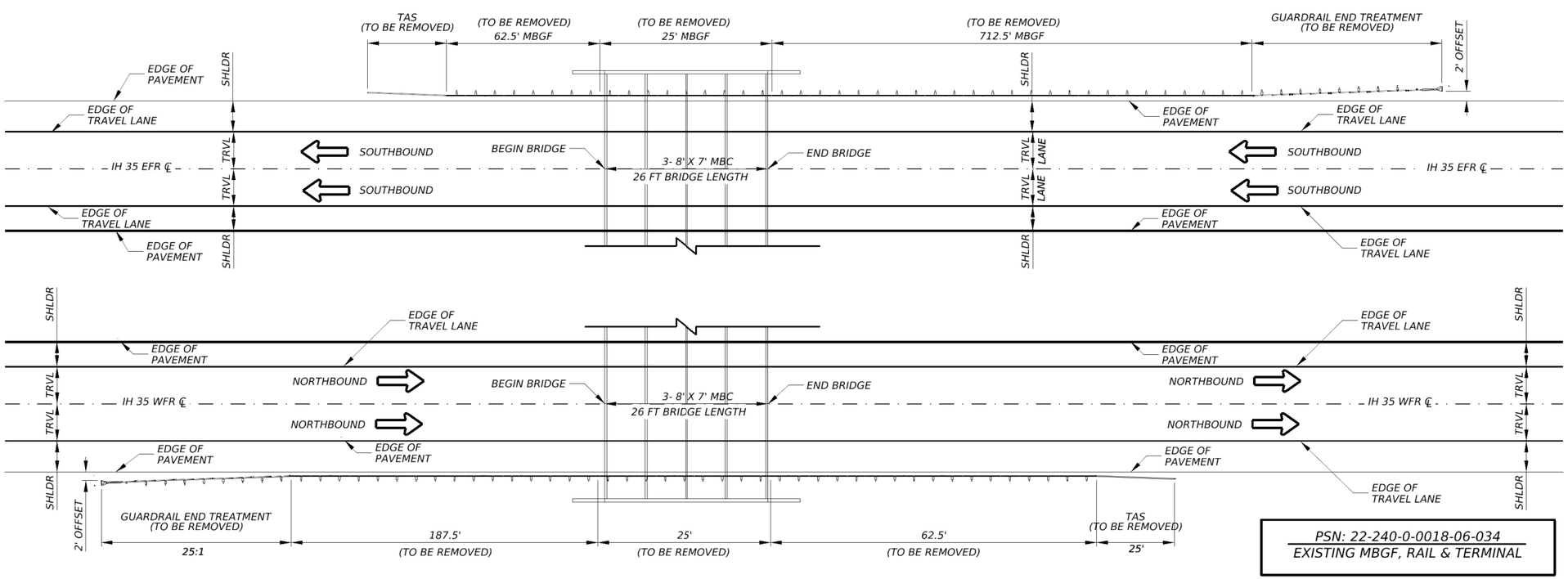
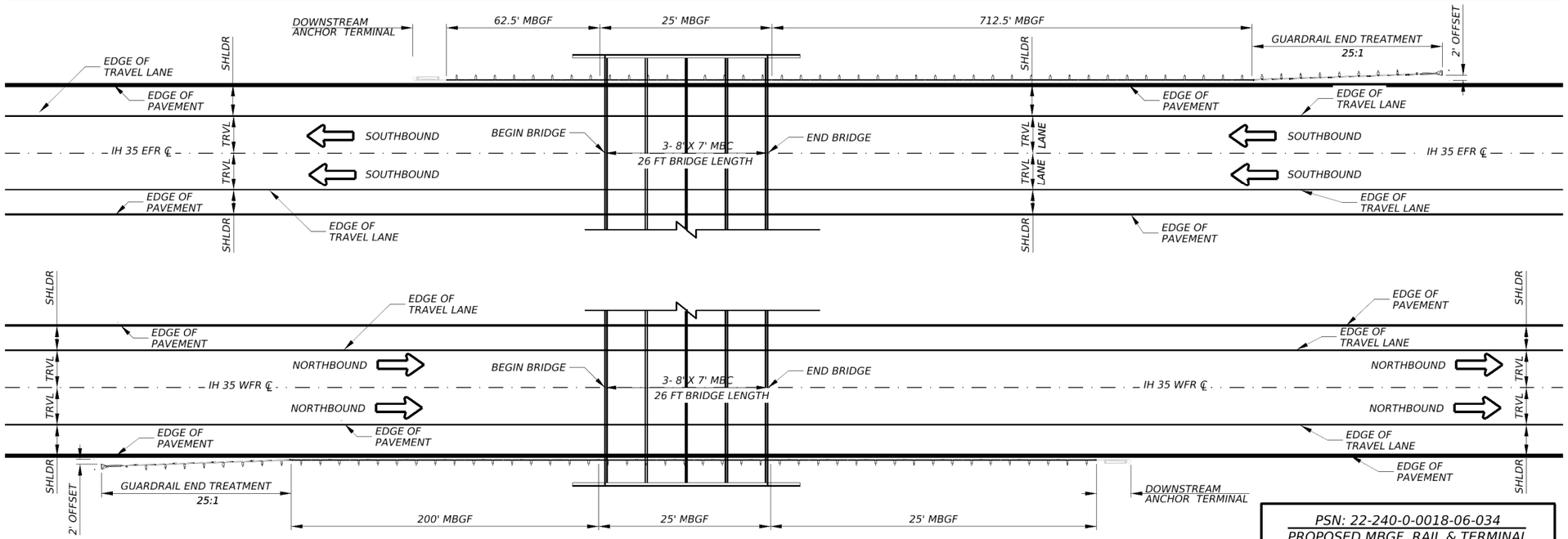


NOT TO SCALE

PSN: 22-240-0-0018-06-034
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-06-034
PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.
2. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.
3. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

LOCATION #3 - IH 35 WFR & EFR

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...

2/1/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 3 OF 36

CONT	SECT	JOB	HIGHWAY
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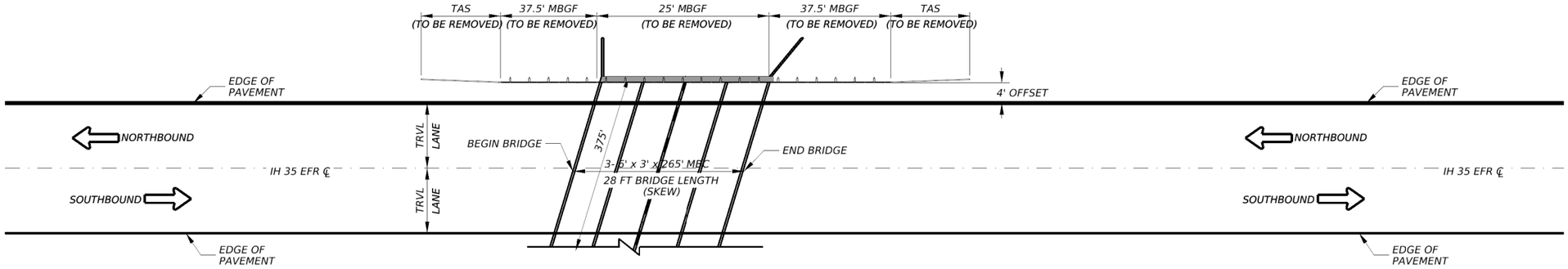
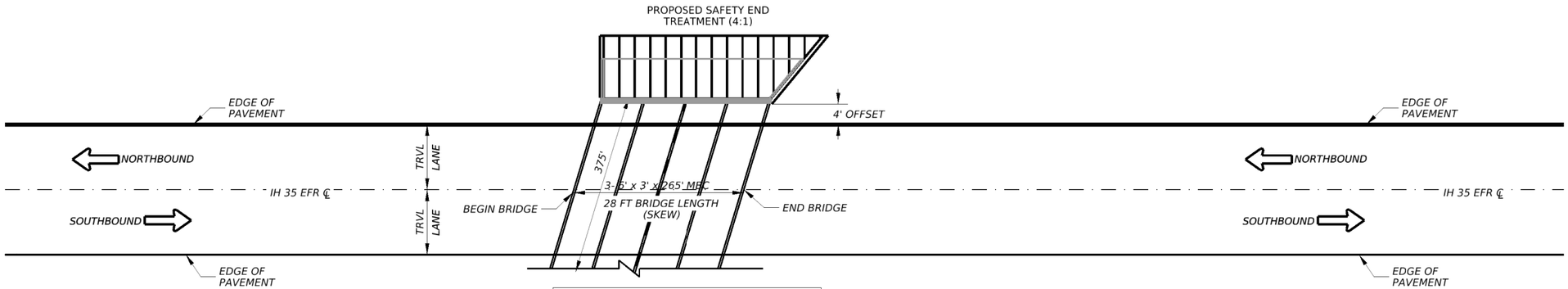


PSN: 22-240-0-0018-05-068 (RT SIDE)
EXISTING MBGF, RAIL & TERMINAL

NOT TO SCALE



PSN: 22-240-0-0018-05-068 (RT SIDE)
PROPOSED BRIDGE PROTECTION

NOTES:

1. ON EXISTING DRAINAGE STRUCTURES, THE HEADWALL AND WINGWALL ARE TO BE REMOVED & UPGRADED WITH A NEW SAFETY END TREATMENT (S.E.T.) WITH PIPE RUNNER ASSEMBLIES. PROVIDE A SMOOTH DRAINAGE TRANSITION IN ADJACENT AREAS TO THE EXISTING FLOW LINE AND IT WILL BE CONSIDERED SUBSIDIARY TO ITEM 467.
2. REFER TO APPLICABLE TXDOT STANDARDS "SETB-FW-0", SETB-FW-S", "SETB-CD" AND "SUMMARY OF DRAINAGE STRUCTURES" DETAIL SHEET(S) FOR MORE INFORMATION.
3. MAINTAIN A PROPER SIGHT DISTANCE CLEAR ZONE FOR DRIVEWAYS & METAL BEAM GUARD FENCE INSTALLATION.

LOCATION #4 - IH 35 EFR

NOT TO SCALE

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...

2/1/2024

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION
INSTALLATION LAYOUT

SHEET 4 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		100

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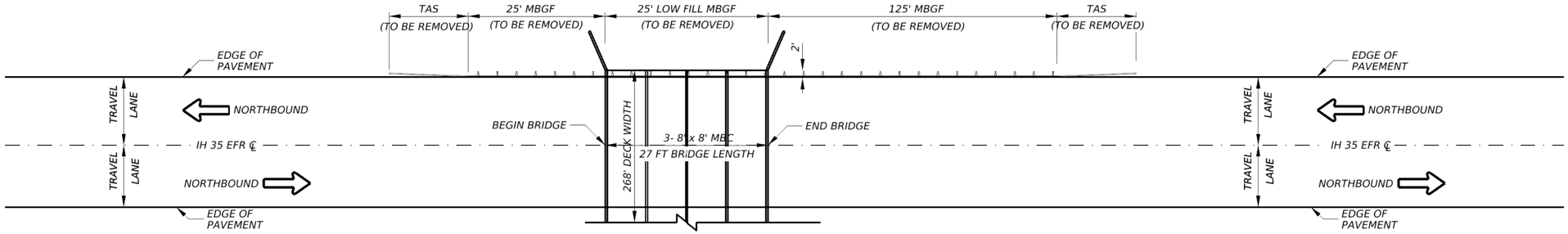
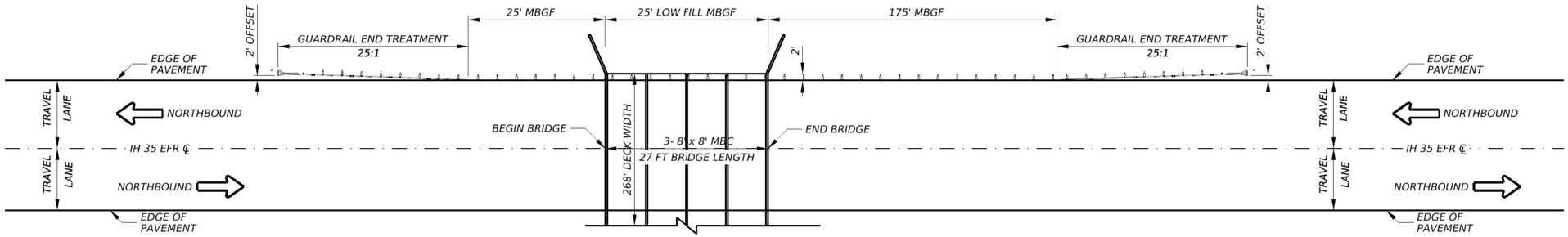


NOT TO SCALE

PSN: 22-240-0-0018-05-067
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-05-067
PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #5 - IH 35 EFR

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...

2/1/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 5 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		101

DATE: 2/1/2024 3:29:34 PM
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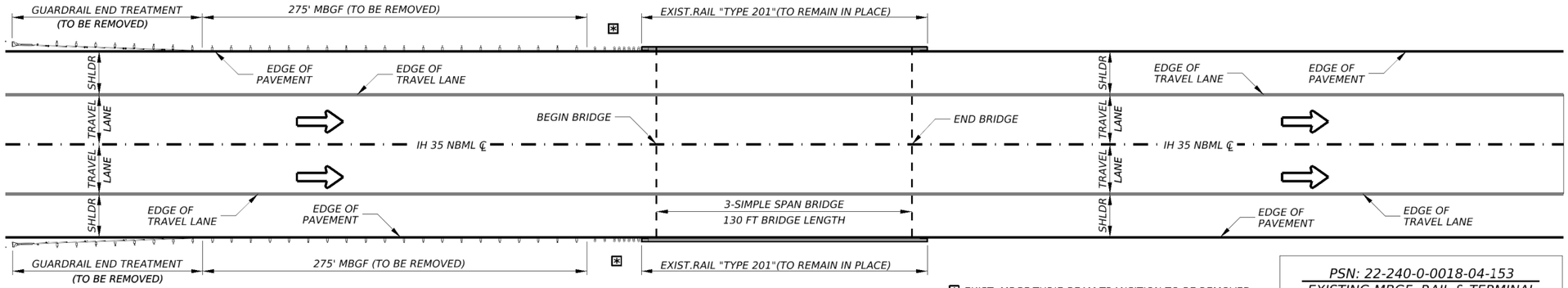
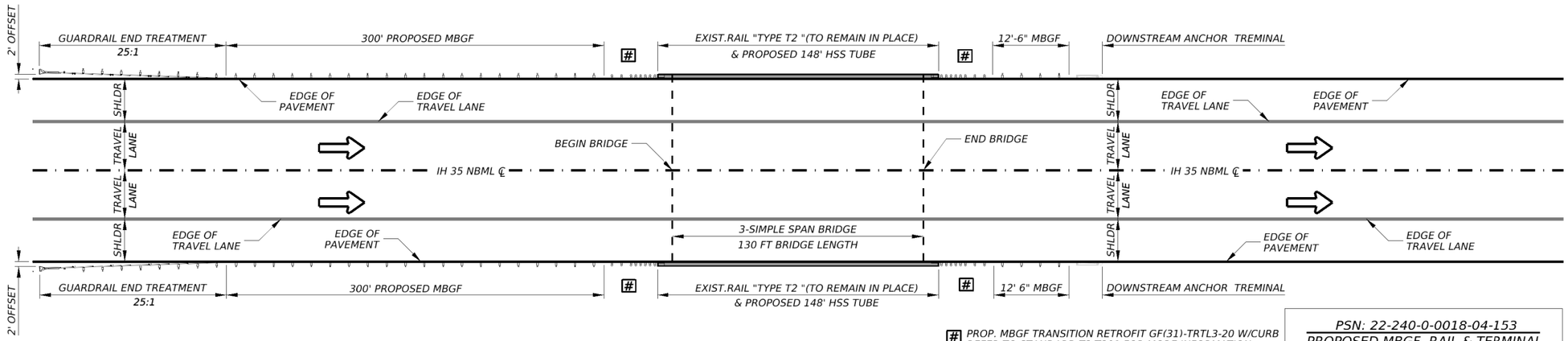


NOT TO SCALE

PSN: 22-240-0-0018-04-153
EXISTING MBGF, RAIL & TERMINAL



PROP. MBGF TRANSITION RETROFIT GF(31)-TRTL3-20 W/CURB REFER TO STANDARD T2/T201 FOR MORE INFORMATION.

PSN: 22-240-0-0018-04-153
PROPOSED MBGF, RAIL & TERMINAL

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.
2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.
3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.
4. ALSO REFER TO BRIDGE RAIL RETROFIT HSS TUBE DETAIL SHEET & T2/T201 TR(MOD) FOR THE PROPOSED INSTALLATION.

LOCATION #6 - IH 35 NBML

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 6 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		102

DATE: 1/30/2024 7:01:52 PM
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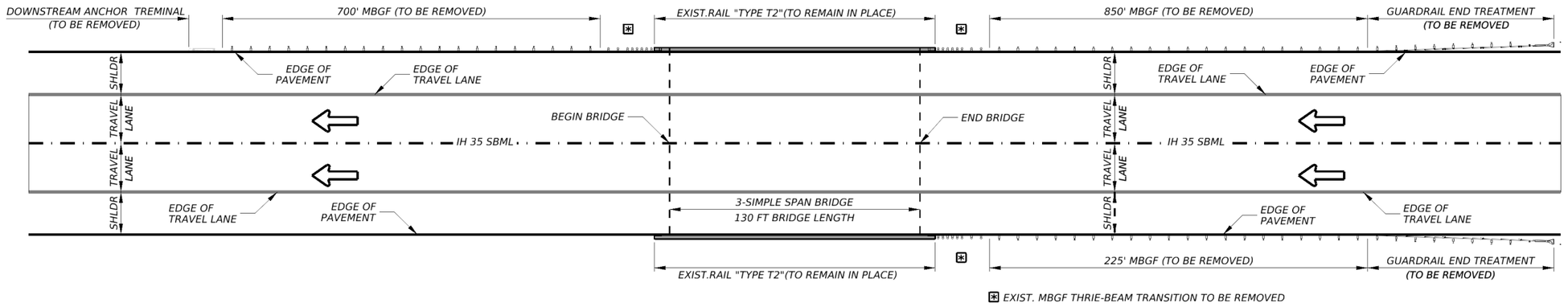
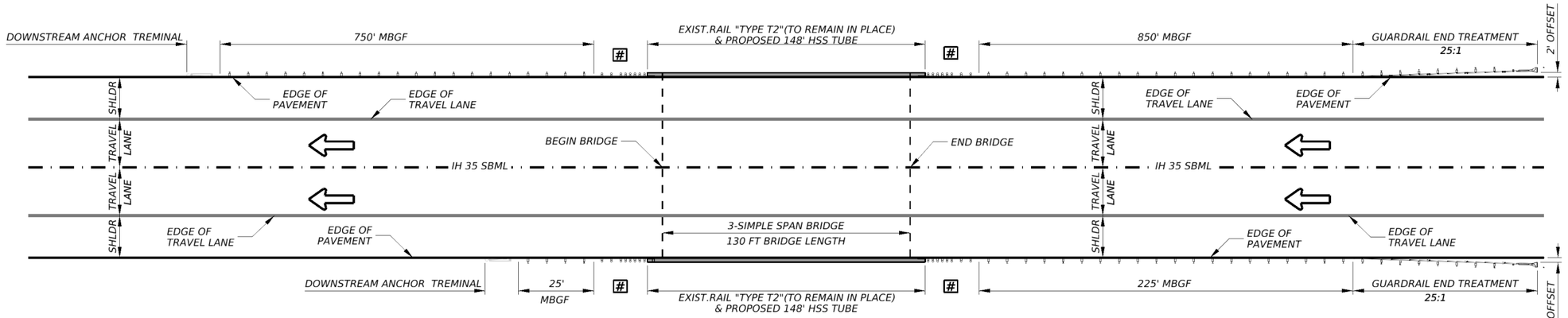


PSN: 22-240-0-0018-04-154
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-04-154
PROPOSED MBGF, RAIL & TERMINAL

NOT TO SCALE

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...

1/30/2024

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

4. ALSO REFER TO BRIDGE RAIL RETROFIT HSS TUBE DETAIL SHEET & T2/T201 TR(MOD) FOR THE PROPOSED INSTALLATION.

LOCATION #7 - IH35 SBML

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 7 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		103

DATE: 1/30/2024 7:02:08 PM
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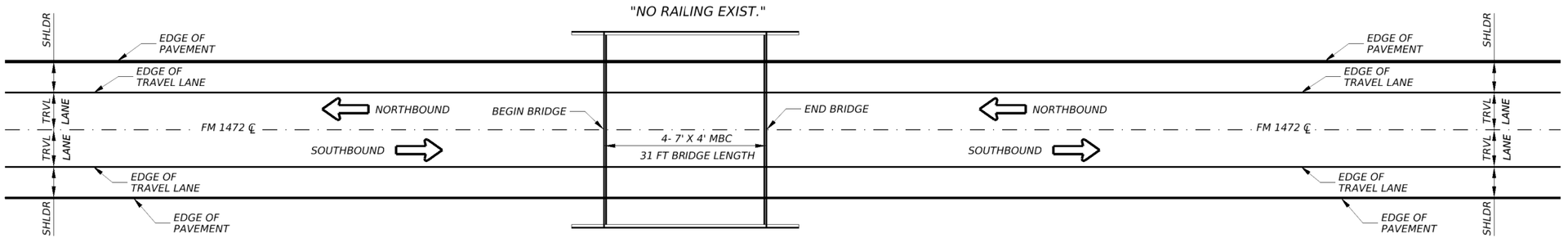
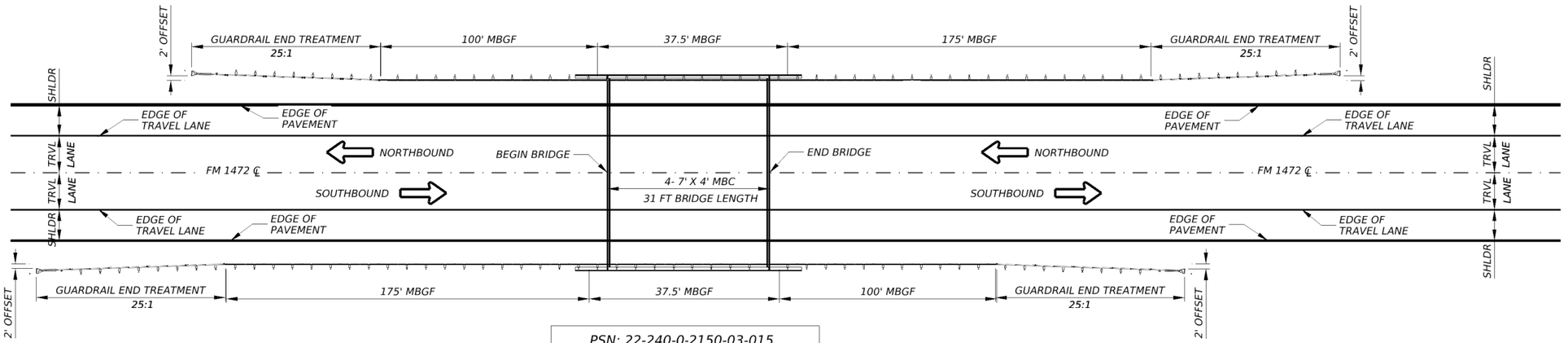


PSN: 22-240-0-2150-03-015
EXISTING MBGF, RAIL & TERMINAL

NOT TO SCALE



PSN: 22-240-0-2150-03-015
PROPOSED MBGF, RAIL & TERMINAL

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...

1/30/2024

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.
2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.
3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #8 - FM 1472

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 8 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		104

DATE: 1/30/2024 7:02:22 PM
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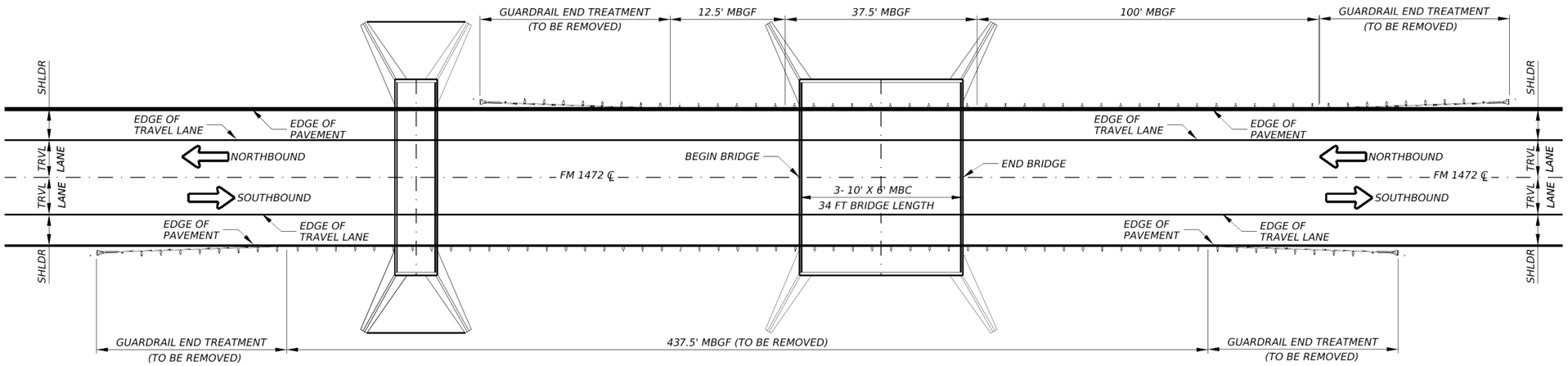
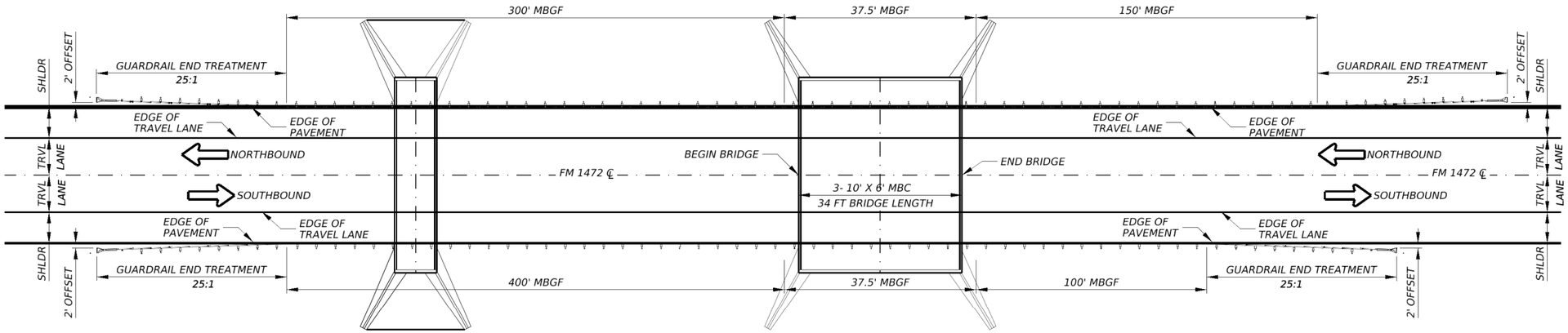


PSN: 22-240-0-2150-03-014
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-2150-03-014
PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.
2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.
3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

NOT TO SCALE

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...

2/1/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION
INSTALLATION LAYOUT

LOCATION #9 - FM 1472

SHEET 9 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		105

DATE: 2/1/2024 2:49:06 PM
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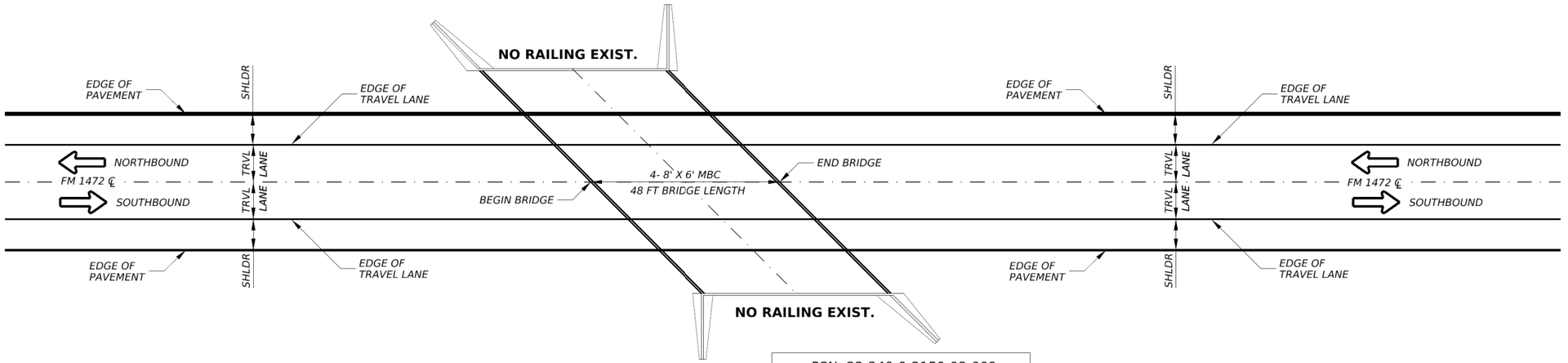
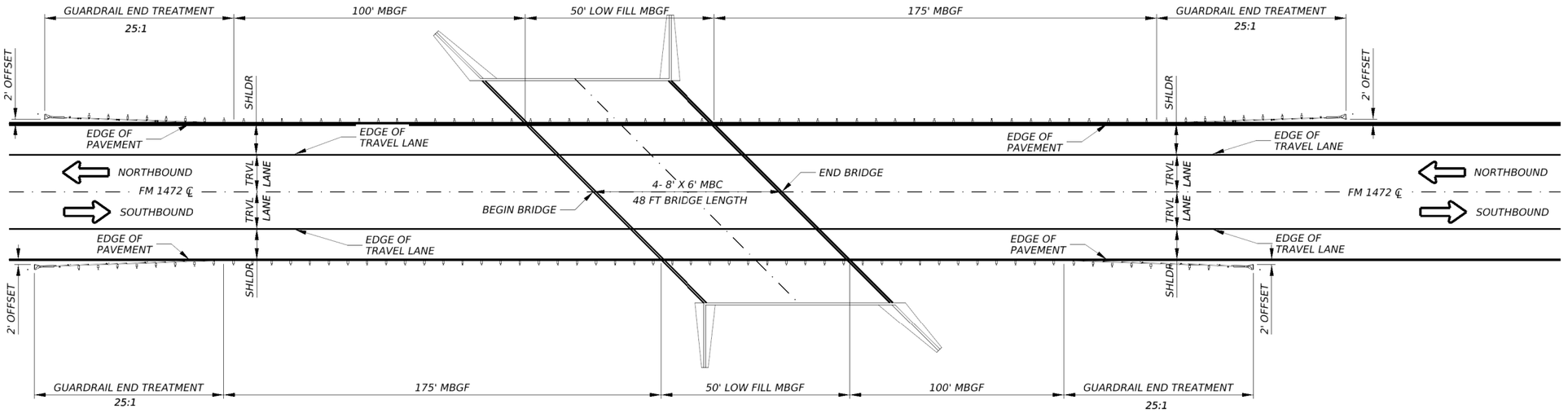


PSN: 22-240-0-2150-03-009
EXISTING MBGF, RAIL & TERMINAL

NOT TO SCALE



PSN: 22-240-0-2150-03-009
PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		106

LOCATION #10 - FM 1472

DATE: 1/30/2024 7:02:51 PM
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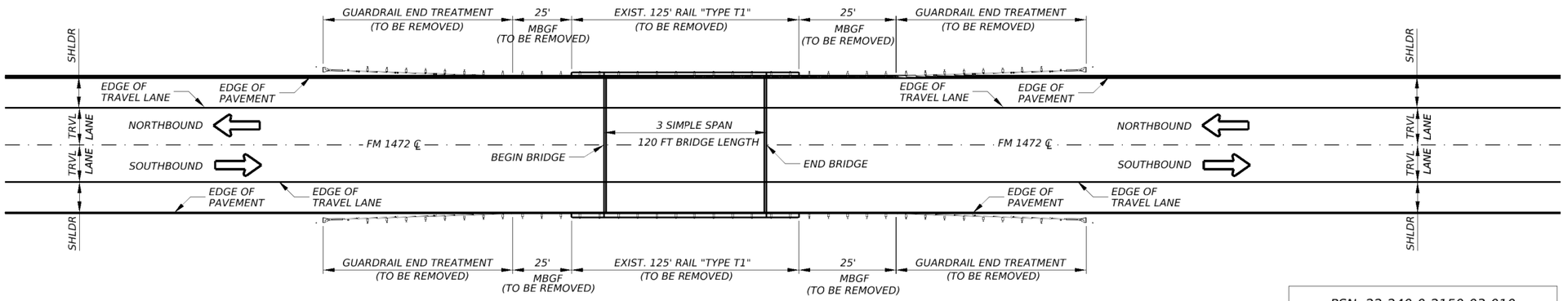
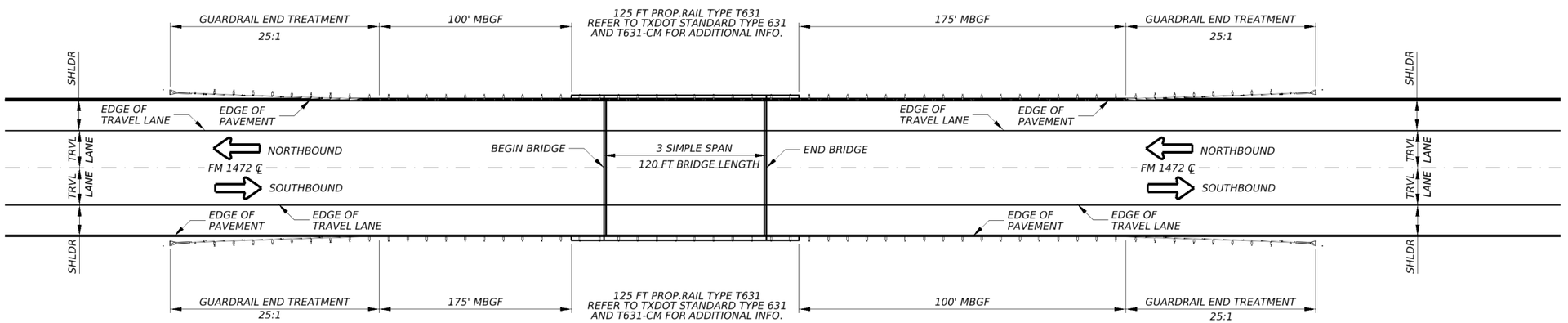


NOT TO SCALE

PSN: 22-240-0-2150-03-010
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-2150-03-010
PROPOSED MBGF, RAIL & TERMINAL

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
307945B8A8784F3...
1/30/2024

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.
2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.
3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #11 - FM 1472

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION
INSTALLATION LAYOUT

SHEET 11 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		107

DATE: 1/30/2024 7:03:08 PM
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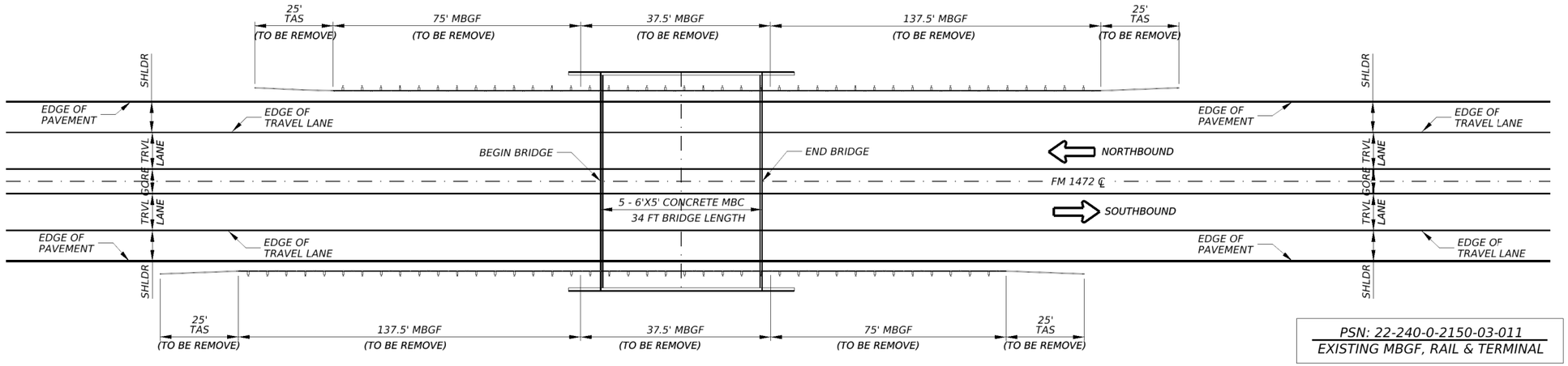
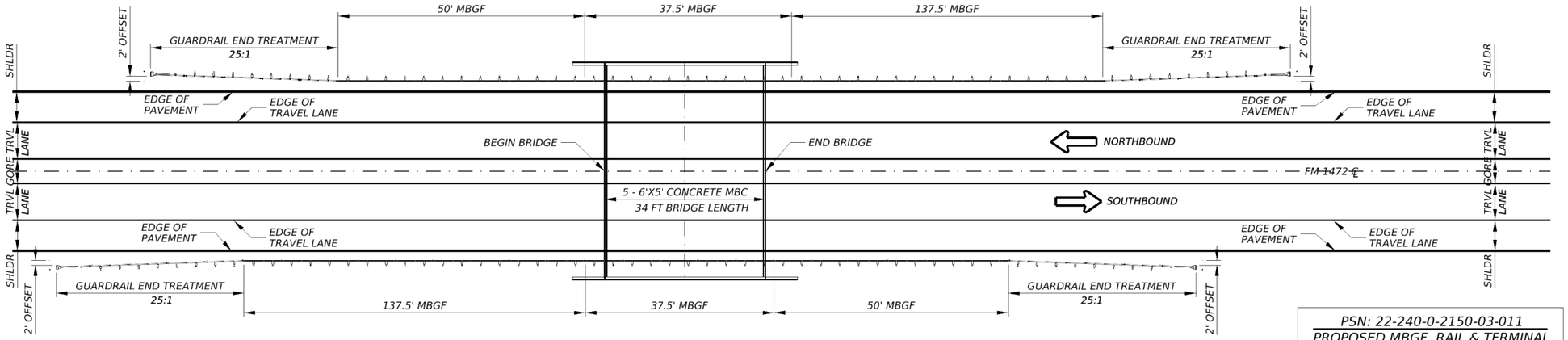
NOT TO SCALE



PSN: 22-240-0-2150-03-011
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-2150-03-011
PROPOSED MBGF, RAIL & TERMINAL

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #12 - FM 1472

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		108

DATE: 1/30/2024 7:03:22 PM
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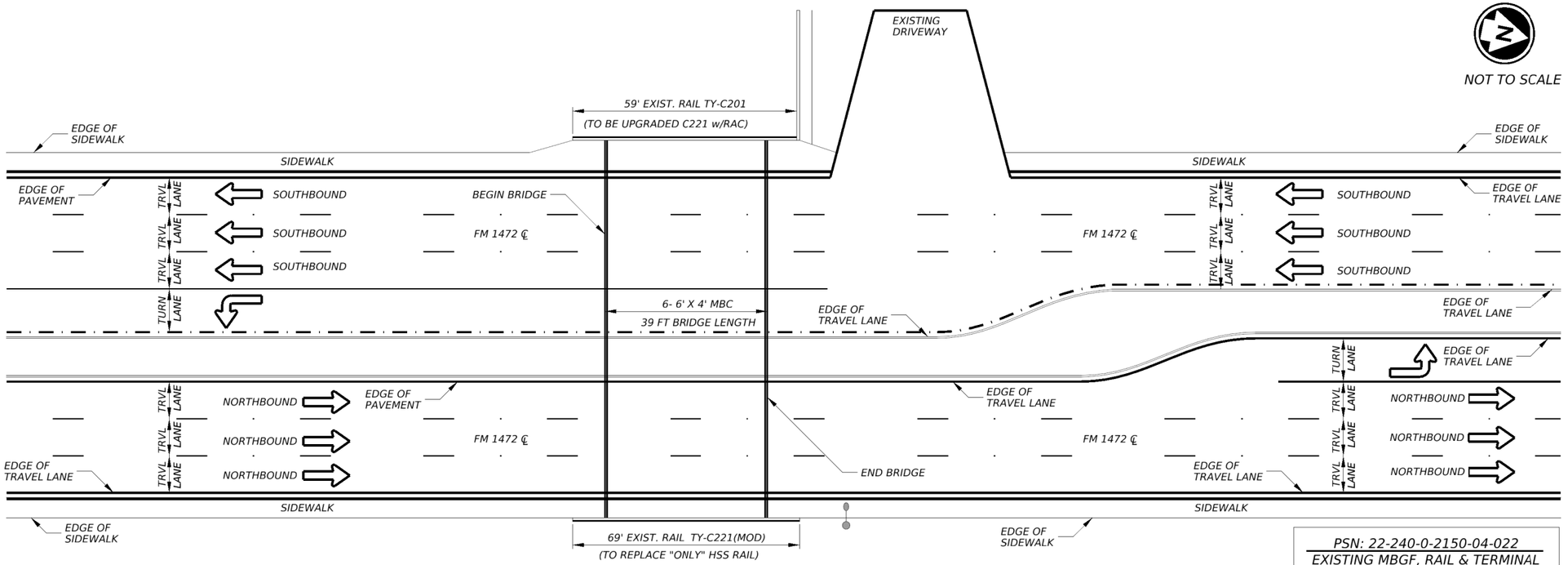
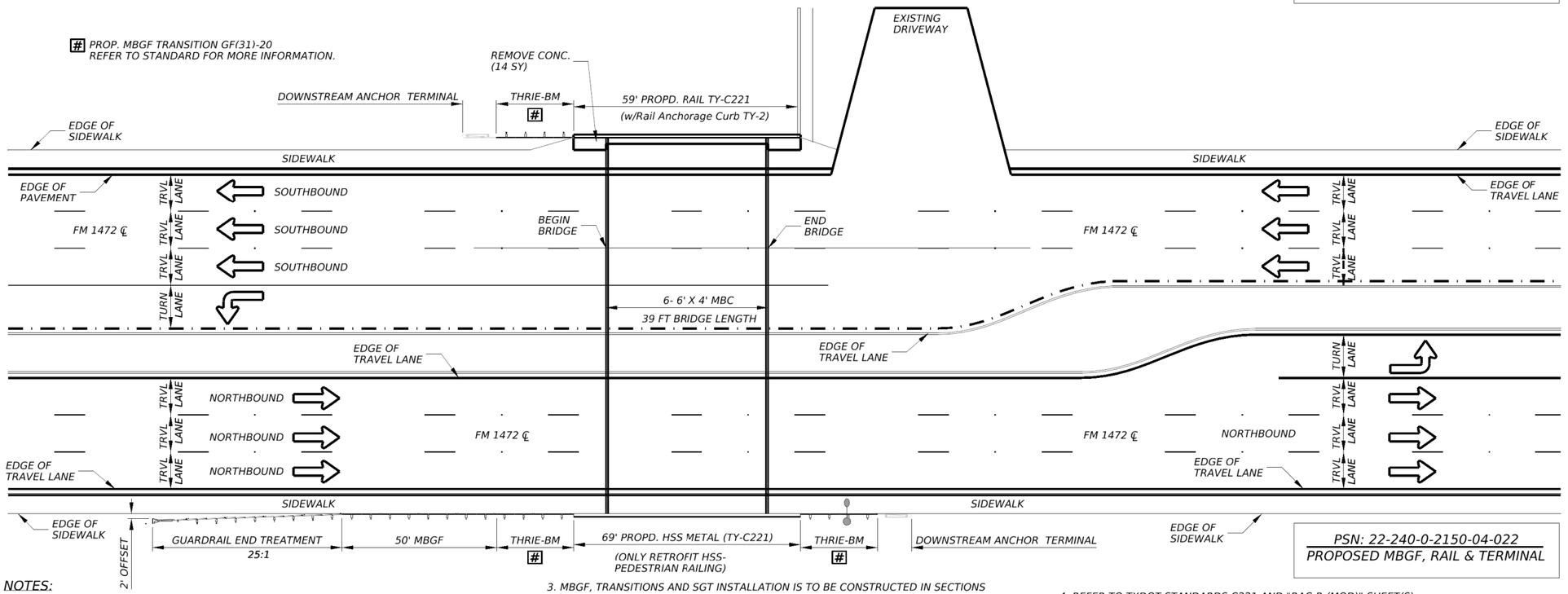


NOT TO SCALE

PSN: 22-240-0-2150-04-022
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-2150-04-022
PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.
2. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.
3. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.
4. REFER TO TXDOT STANDARDS C221 AND "RAC-R (MOD)" SHEET(S) FOR MORE BRIDGE RAIL INFORMATION.

LOCATION #13 - FM 1472

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 13 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		109

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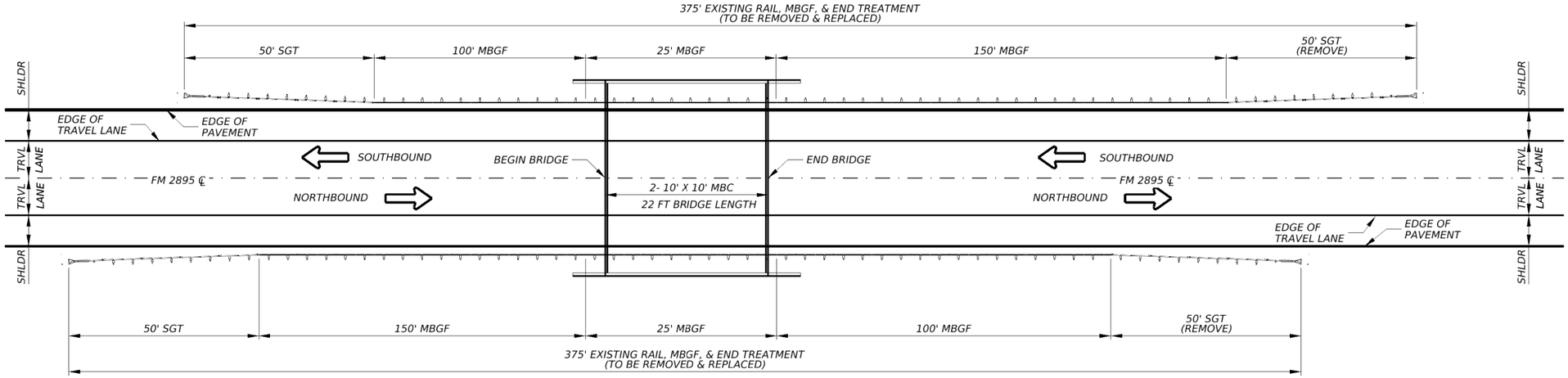
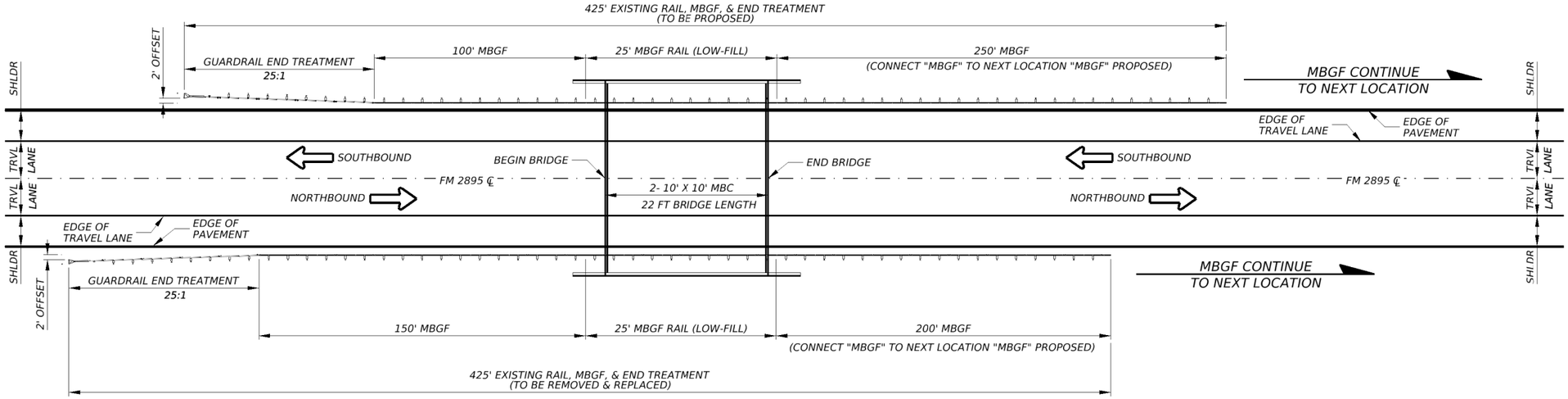


PSN: 22-240-0-2988-02-003
EXISTING MBGF, RAIL & TERMINAL

NOT TO SCALE



PSN: 22-240-0-2988-02-003
PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #14 - FM 2895

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
307945B8A8784F3...
1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION
INSTALLATION LAYOUT

SHEET 14 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		110

DATE: 1/30/2024 7:03:51 PM
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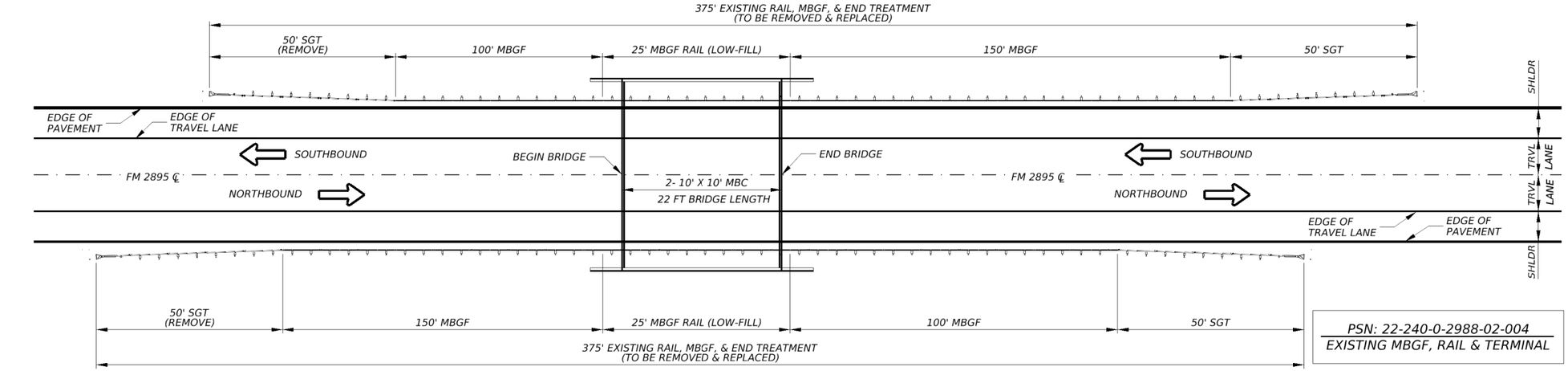
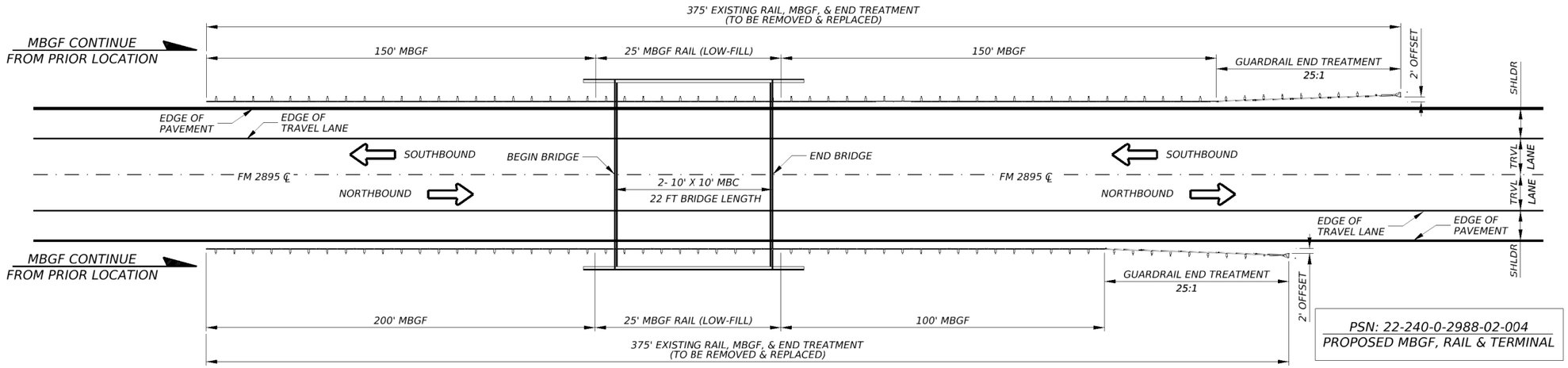


NOT TO SCALE

PSN: 22-240-0-2988-02-004
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-2988-02-004
PROPOSED MBGF, RAIL & TERMINAL

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.
2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.
3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #15 - FM 2895

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION
INSTALLATION LAYOUT

SHEET 15 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		111

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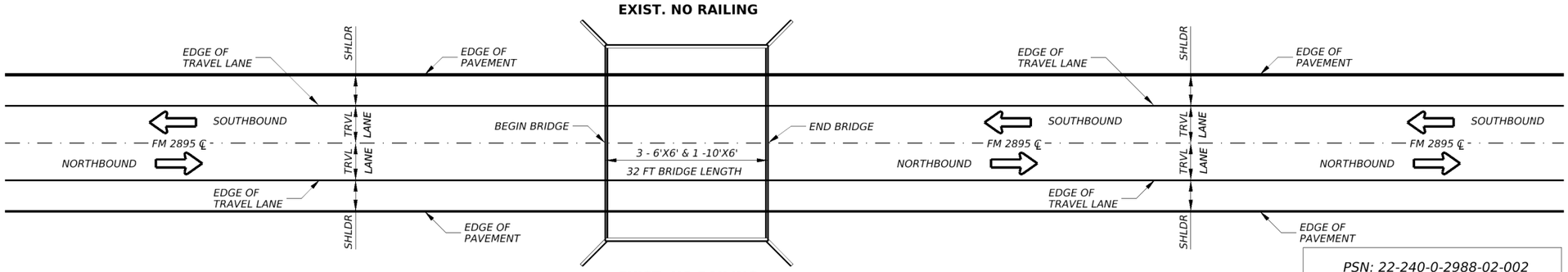
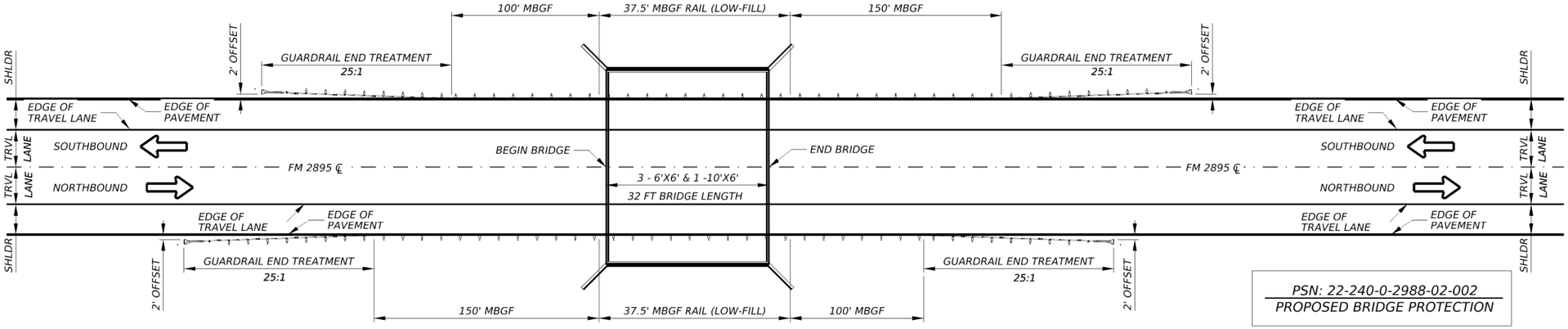


NOT TO SCALE

PSN: 22-240-0-2988-02-002
EXISTING BRIDGE PROTECTION



PSN: 22-240-0-2988-02-002
PROPOSED BRIDGE PROTECTION

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #16 - FM 2895

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 16 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		112

DATE: 1/30/2024 7:04:20 PM
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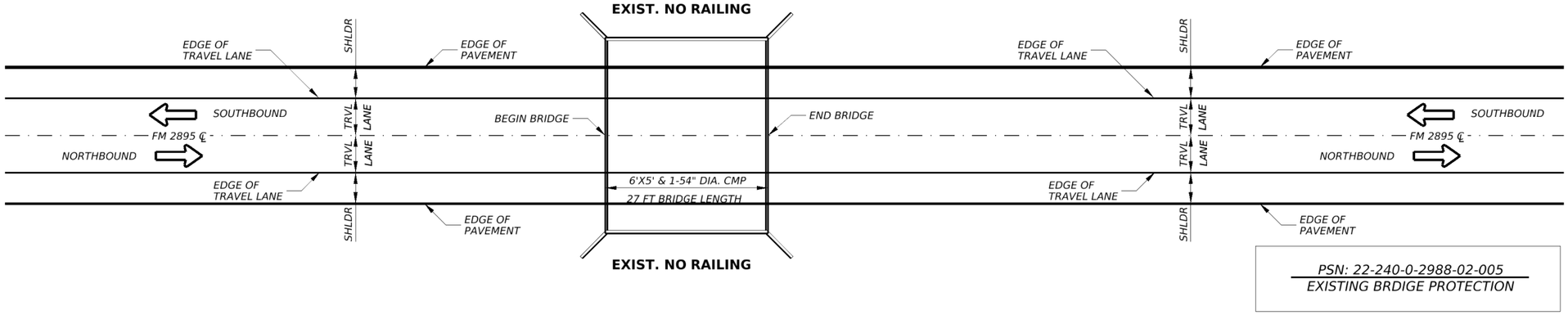
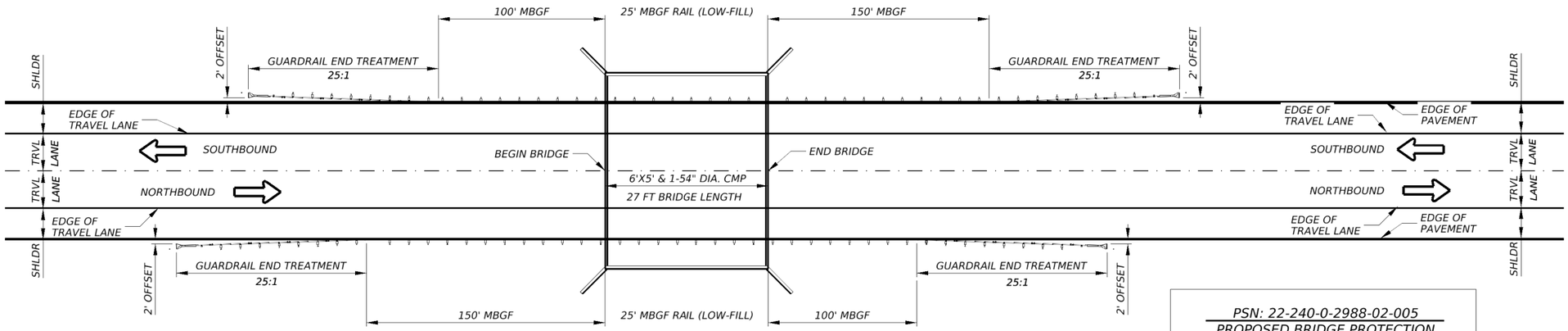


NOT TO SCALE

PSN: 22-240-0-2988-02-005
EXISTING BRDIGE PROTECTION



PSN: 22-240-0-2988-02-005
PROPOSED BRIDGE PROTECTION

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #17 - FM 2895

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 17 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		113

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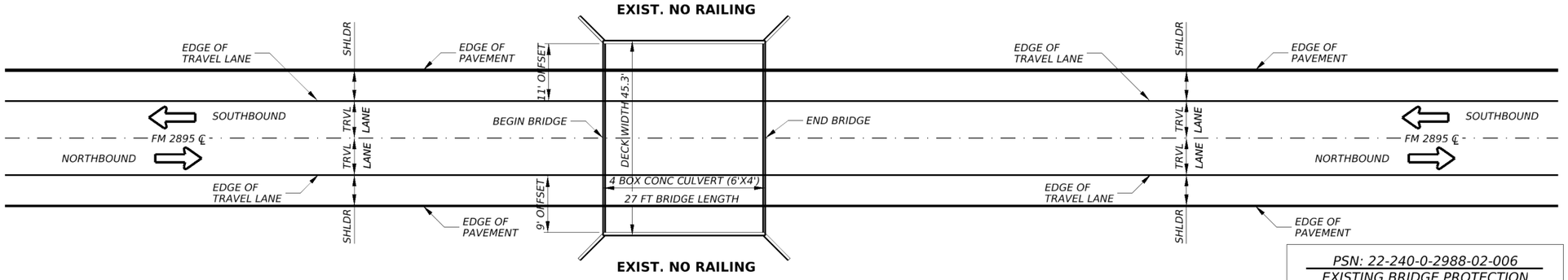
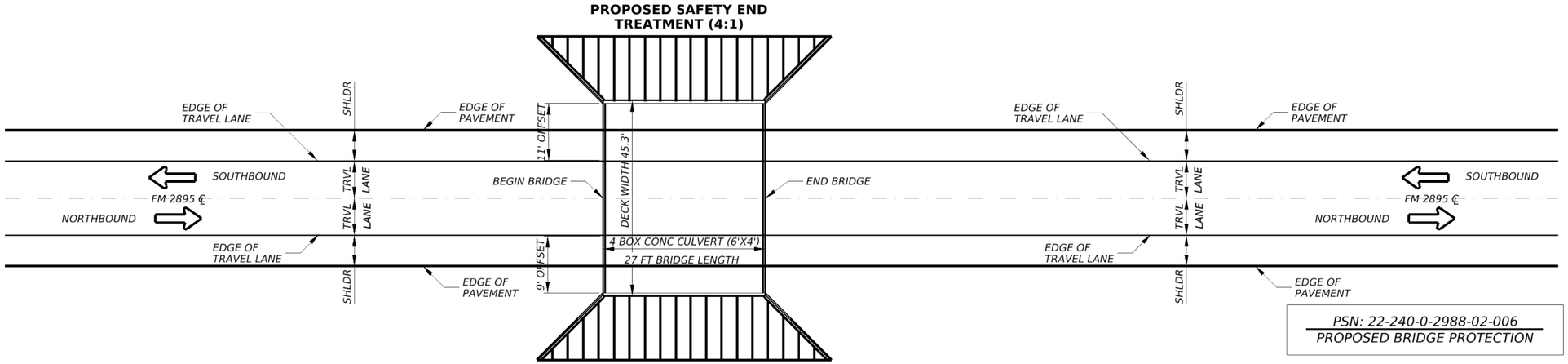


PSN: 22-240-0-2988-02-006
EXISTING BRIDGE PROTECTION

NOT TO SCALE



PSN: 22-240-0-2988-02-006
PROPOSED BRIDGE PROTECTION

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOTES:

1. ON EXISTING DRAINAGE STRUCTURES, THE HEADWALL AND WINGWALL ARE TO BE REMOVED & UPGRADED WITH A NEW SAFETY END TREATMENT (S.E.T.) WITH PIPE RUNNER ASSEMBLIES. PROVIDE A SMOOTH DRAINAGE TRANSITION IN ADJACENT AREAS TO THE EXISTING FLOW LINE AND IT WILL BE CONSIDERED SUBSIDIARY TO ITEM 467.
2. REFER TO APPLICABLE TXDOT STANDARDS "SETB-FW-0", SETB-FW-S", "SETB-CD", AND "SUMMARY OF DRAINAGE STRUCTURES" DETAIL SHEET(S) FOR MORE INFORMATION.
3. MAINTAIN A PROPER SIGHT DISTANCE CLEAR ZONE FOR DRIVEWAY & METAL BEAM GUARD FENCE INSTALLATION.

LOCATION #18 - FM 2895

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		114

DATE: 1/30/2024 7:04:47 PM
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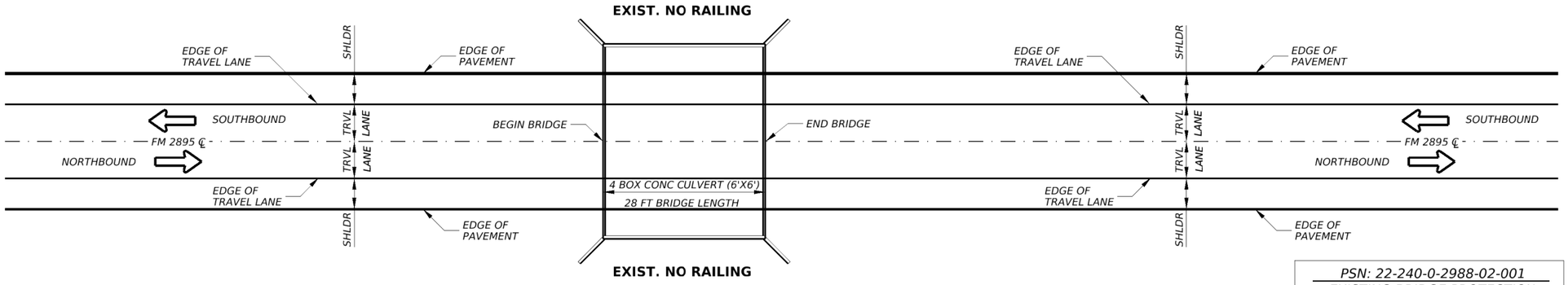
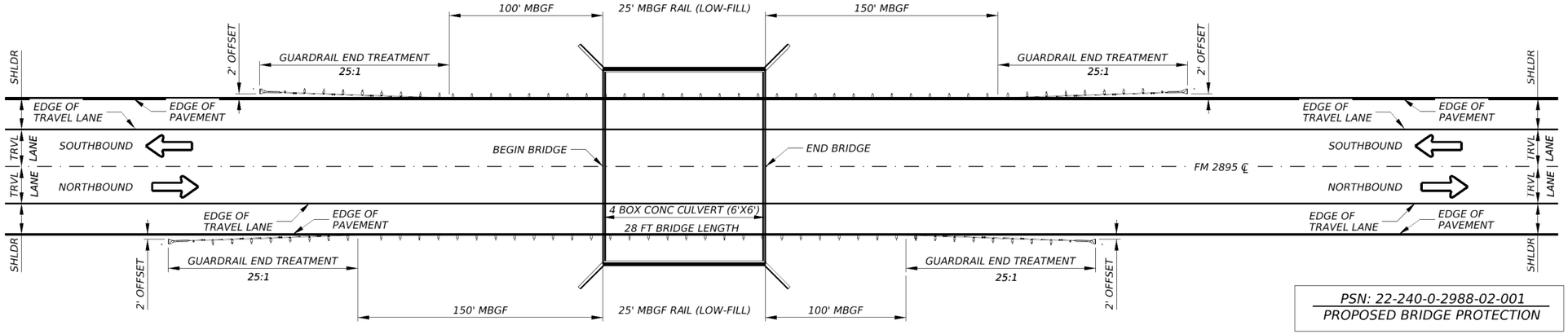
DW
CK
DW



NOT TO SCALE

PSN: 22-240-0-2988-02-001
EXISTING BRIDGE PROTECTION



PSN: 22-240-0-2988-02-001
PROPOSED BRIDGE PROTECTION

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #19 - FM 2895

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 19 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		115

DATE: 1/30/2024 7:05:02 PM
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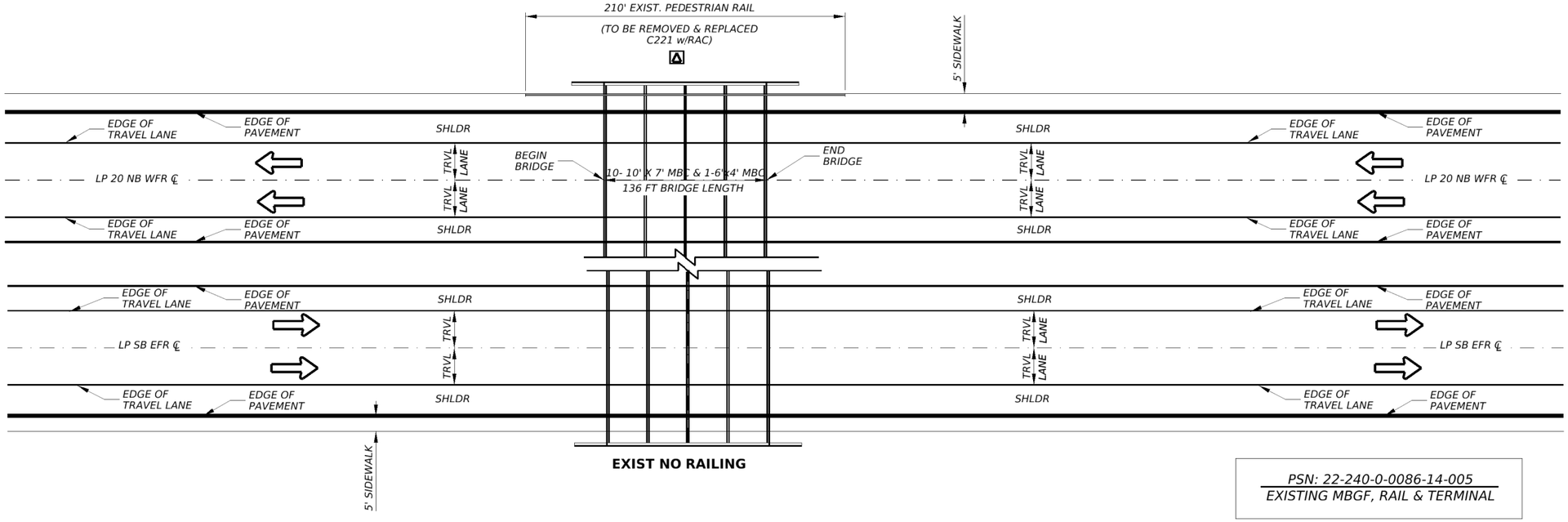
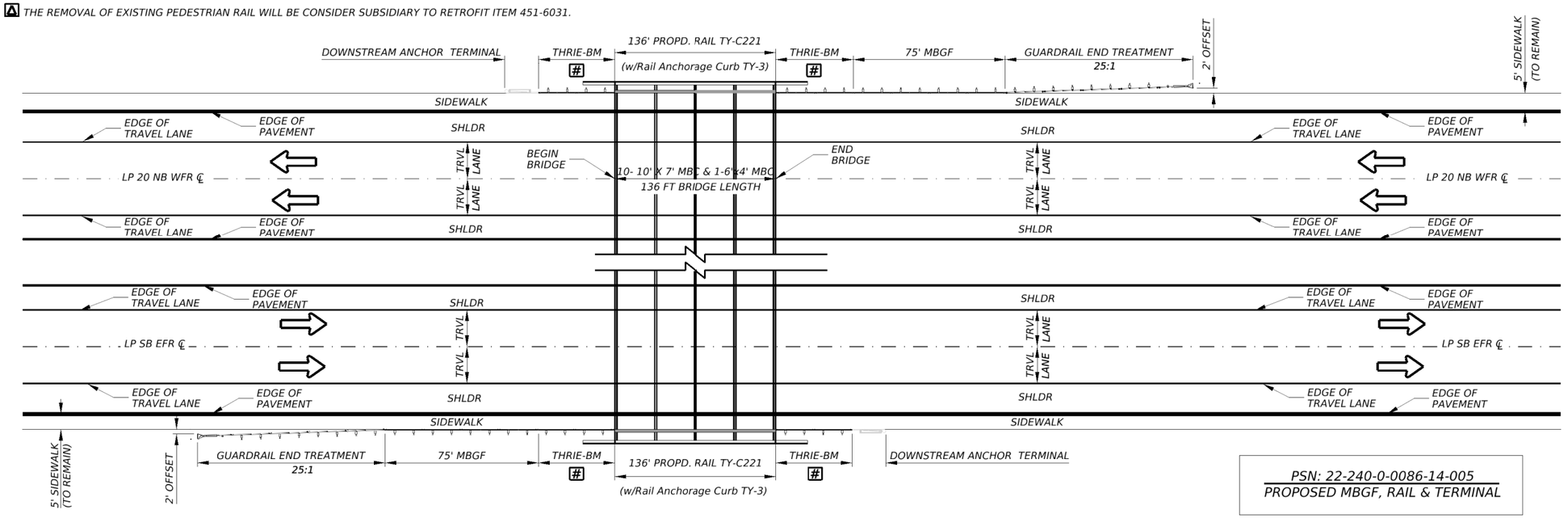


NOT TO SCALE

PSN: 22-240-0-0086-14-005
EXISTING MBGF, RAIL & TERMINAL

PROP. MBGF TRANSITION GF(31)-20
REFER TO STANDARD FOR MORE INFORMATION.

THE REMOVAL OF EXISTING PEDESTRIAN RAIL WILL BE CONSIDER SUBSIDIARY TO RETROFIT ITEM 451-6031.



PSN: 22-240-0-0086-14-005
PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.
2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.
3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.
4. REFER TO TXDOT STANDARDS C221 AND "RAC (MOD)" SHEET(S) FOR MORE BRIDGE RAIL INFORMATION.

LOCATION #20 - LP 20 EFR & WFR

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
307945B8A8784F3...
1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 20 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		116

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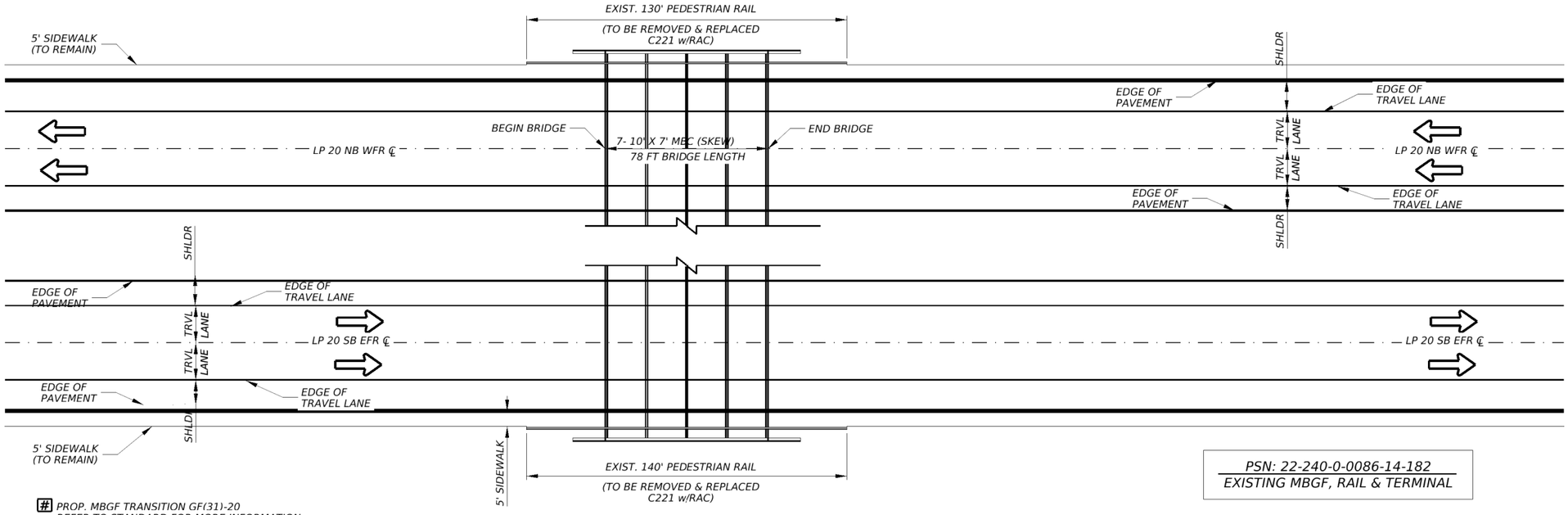
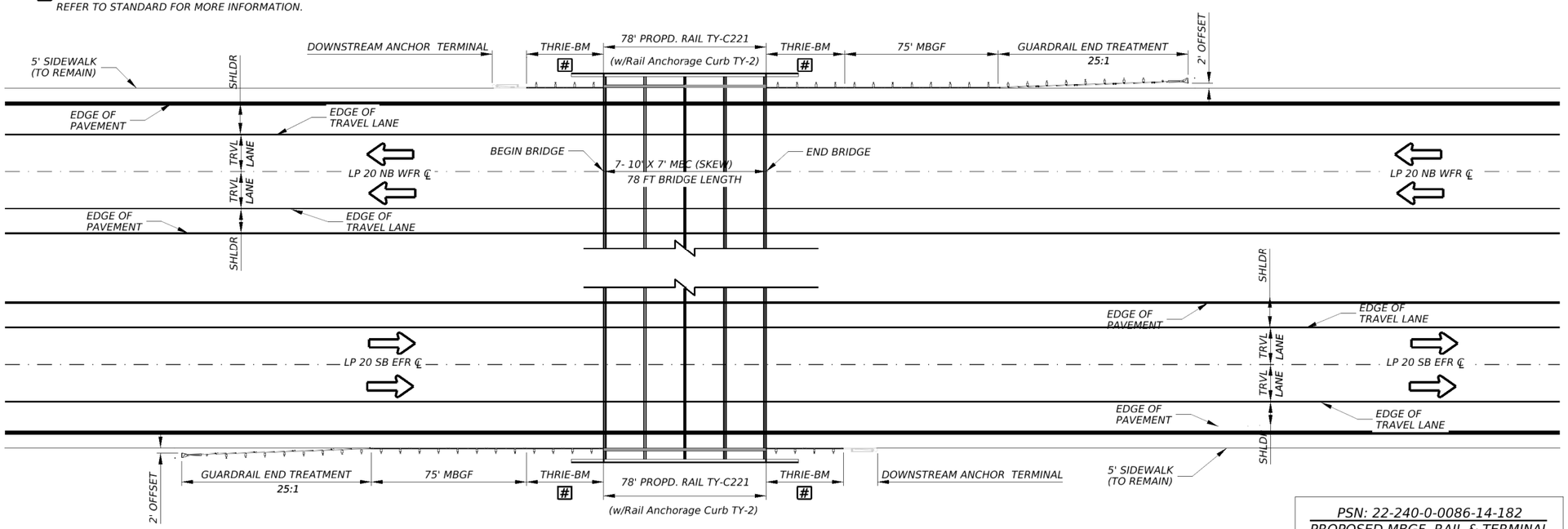


PSN: 22-240-0-0086-14-182
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0086-14-182
PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.
2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.
3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.
4. REFER TO TXDOT STANDARDS C221 AND "RAC (MOD)" SHEET(S) FOR MORE BRIDGE RAIL INFORMATION.
5. THE REMOVAL OF EXISTING PEDESTRIAN RAIL WILL BE CONSIDER SUBSIDIARY TO RETROFIT ITEM 451-6031.

LOCATION #21 - LP 20 EFR & WFR

NOT TO SCALE

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 21 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		117

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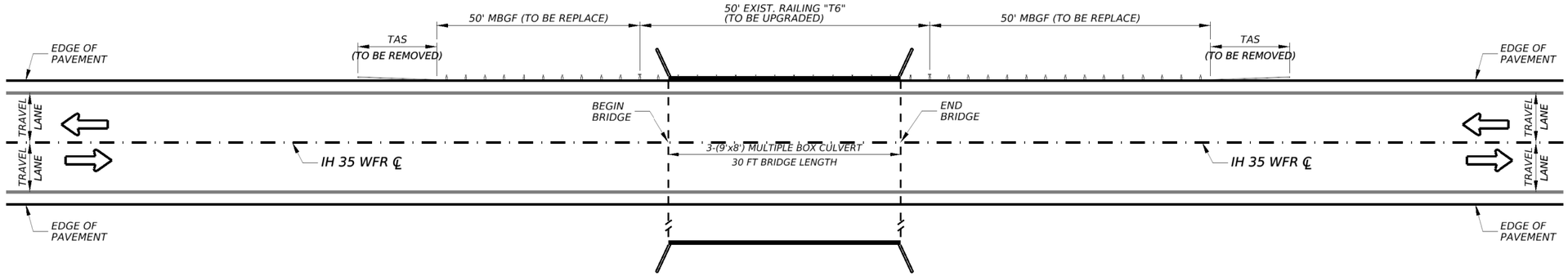
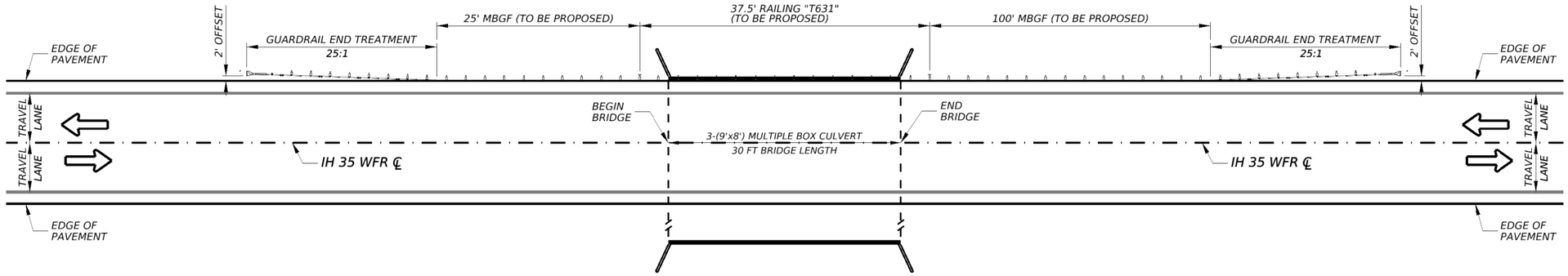


PSN: 22-240-0-0018-04-065

EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-04-065

PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #22 - IH35 WFR

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		118

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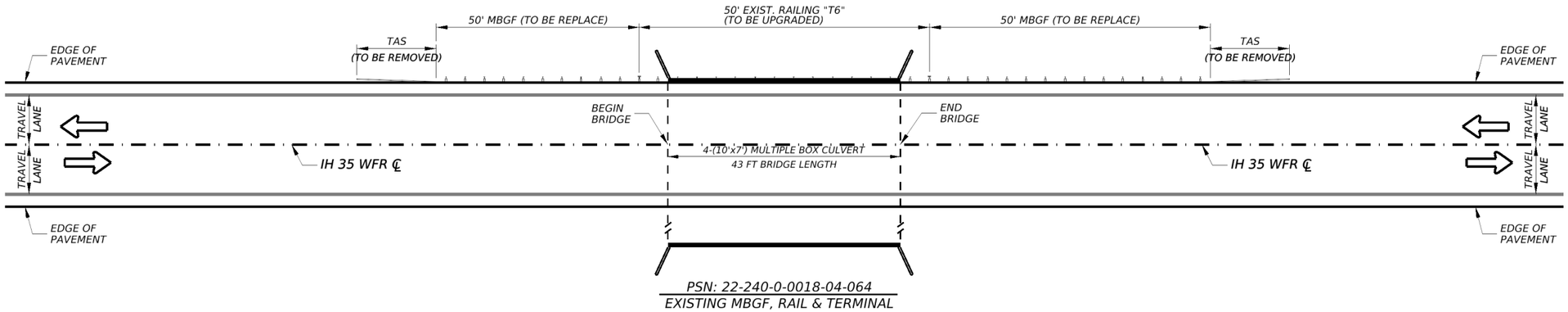
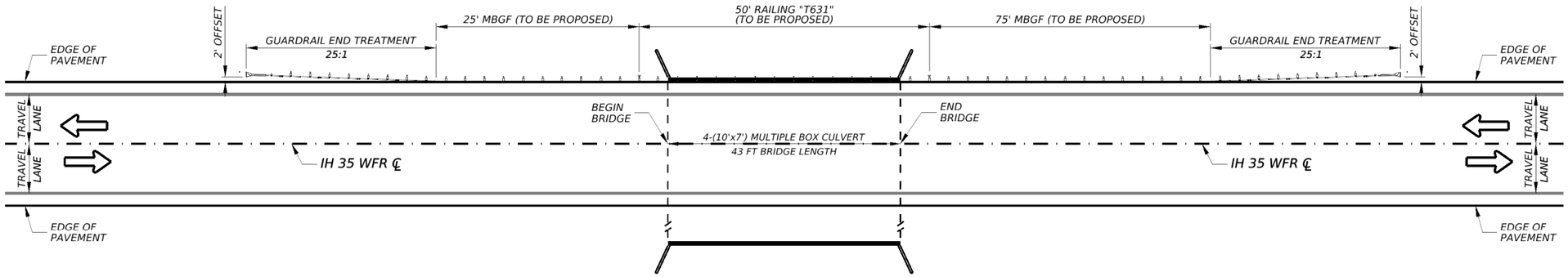


PSN: 22-240-0-0018-04-064
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-04-064
PROPOSED MBGF, RAIL & TERMINAL

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
307945B8A8784F3...
1/30/2024

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #23 - IH35 WFR

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 23 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		119

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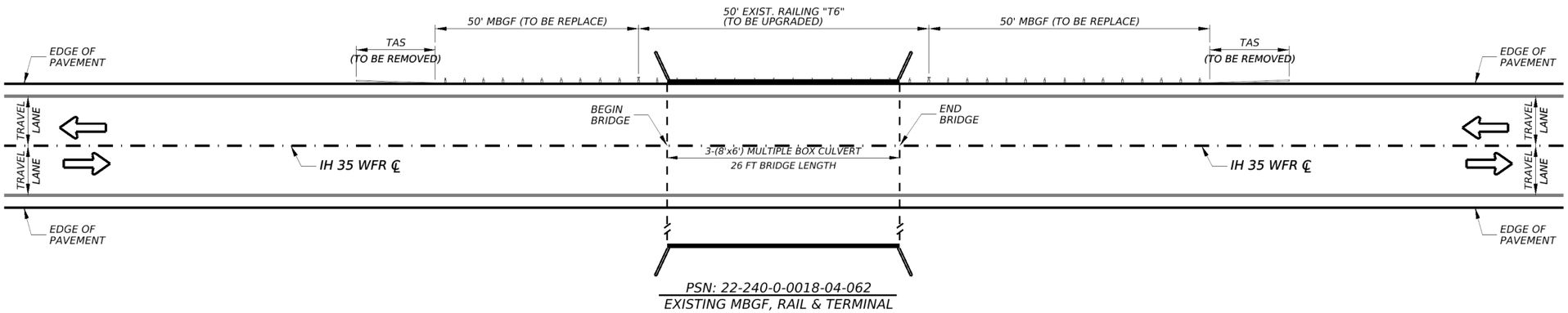
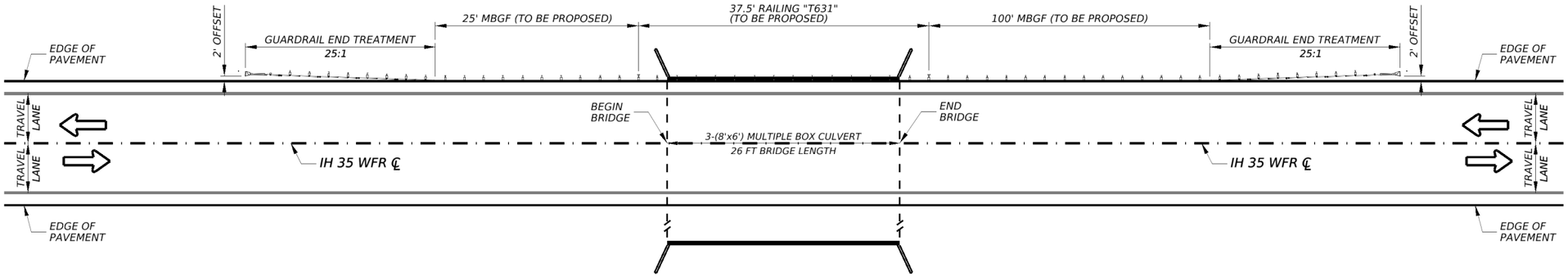


PSN: 22-240-0-0018-04-062
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-04-062
PROPOSED MBGF, RAIL & TERMINAL

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
307945B8A8784F3...
1/30/2024

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #24 - IH35 WFR

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 24 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		120

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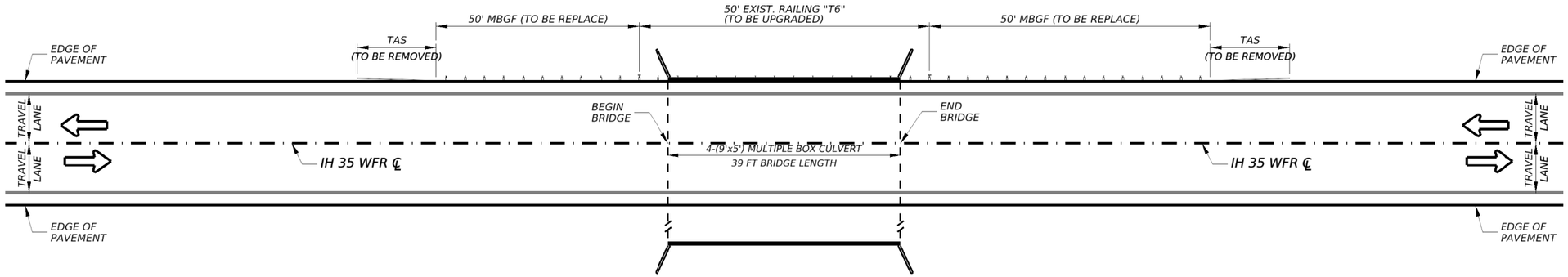
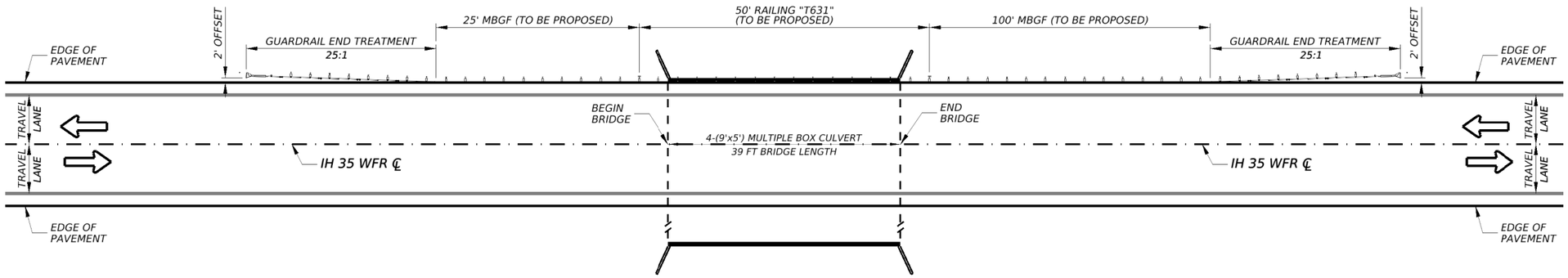


PSN: 22-240-0-0018-04-061
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-04-061
PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #25 - IH35 WFR

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER
DocuSigned by:
307945B8A8784F3...
1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION
INSTALLATION LAYOUT

SHEET 25 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		121

DATE: 1/30/2024 7:06:31 PM
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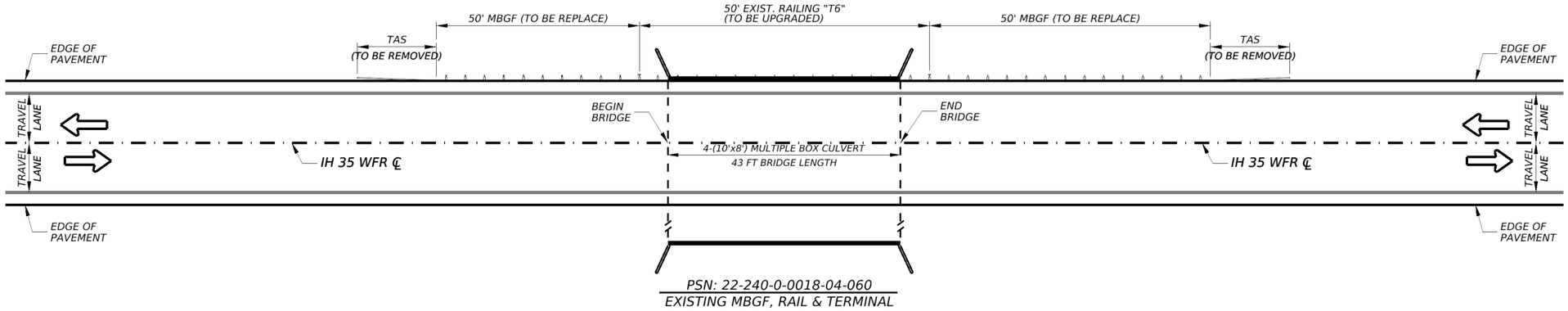
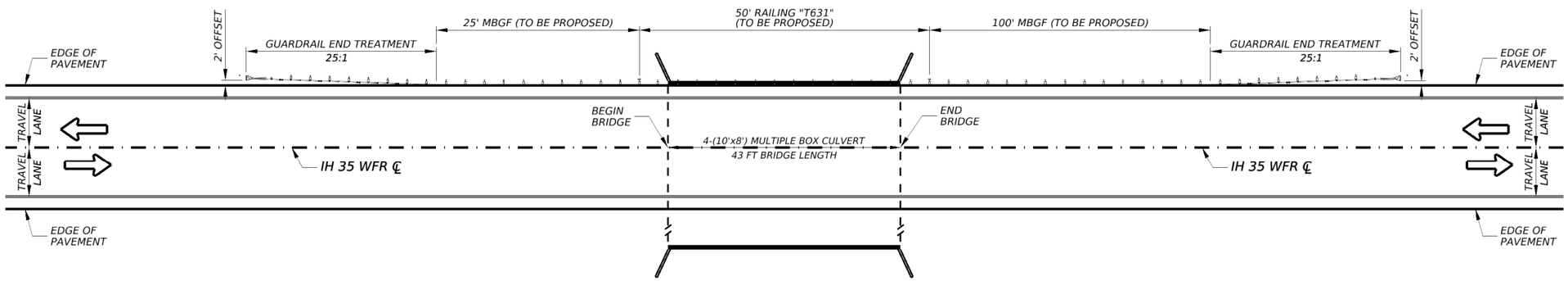


PSN: 22-240-0-0018-04-060

EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-04-060

PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #26 - IH35 WFR

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 26 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		122

DATE: 1/30/2024 7:06:46 PM
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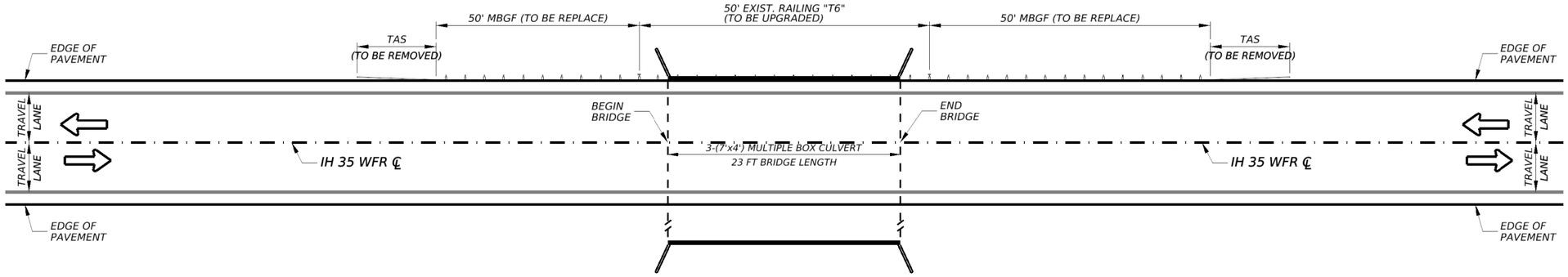
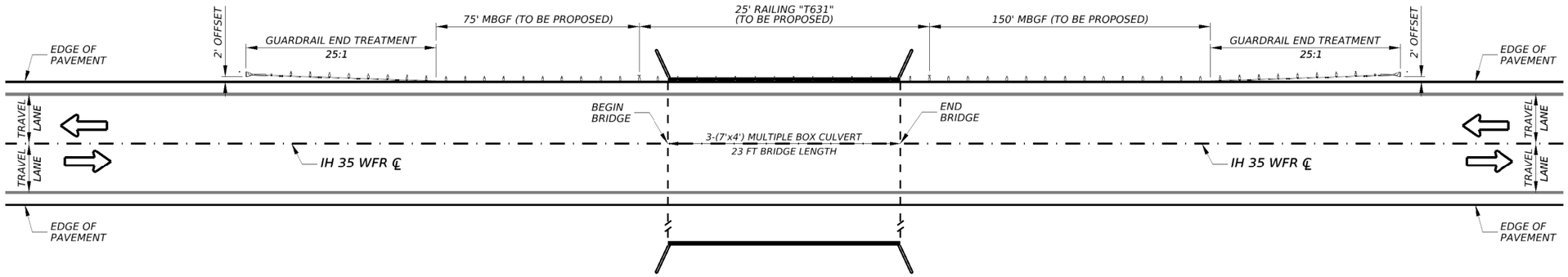


PSN: 22-240-0-0018-04-059
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-04-059
PROPOSED MBGF, RAIL & TERMINAL

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #27 - IH35 WFR

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION
INSTALLATION LAYOUT

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		123

DATE: 1/30/2024 7:07:02 PM
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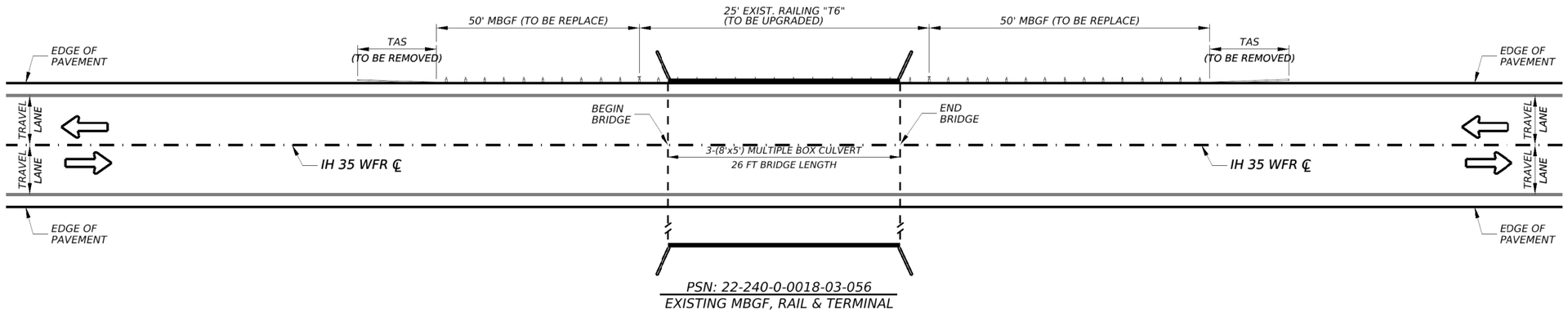
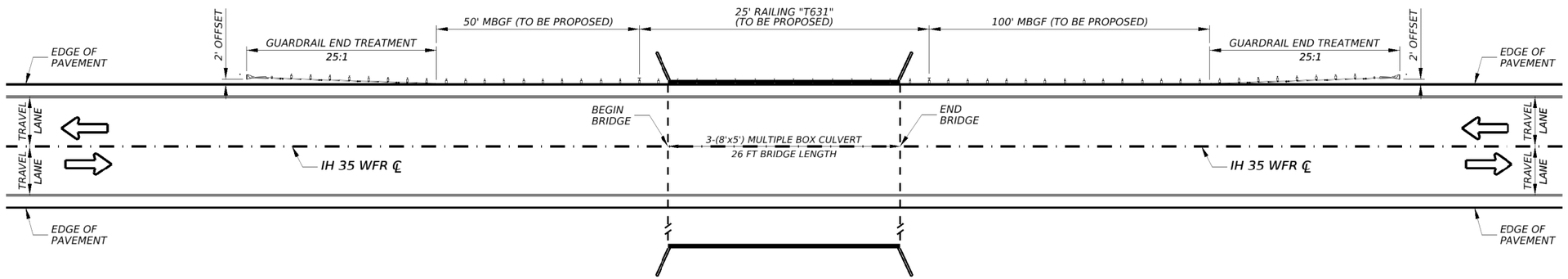


PSN: 22-240-0-0018-03-056
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-03-056
PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #28 - IH35 WFR

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 28 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		124

DATE: 1/30/2024 7:07:19 PM
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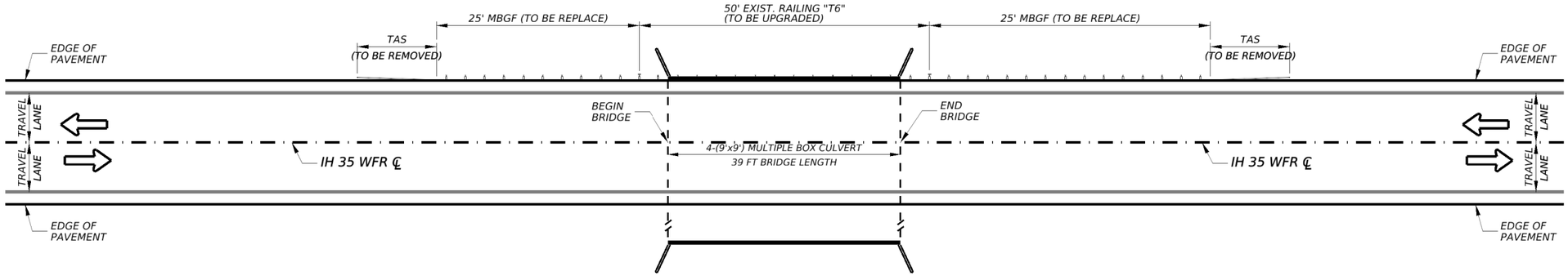
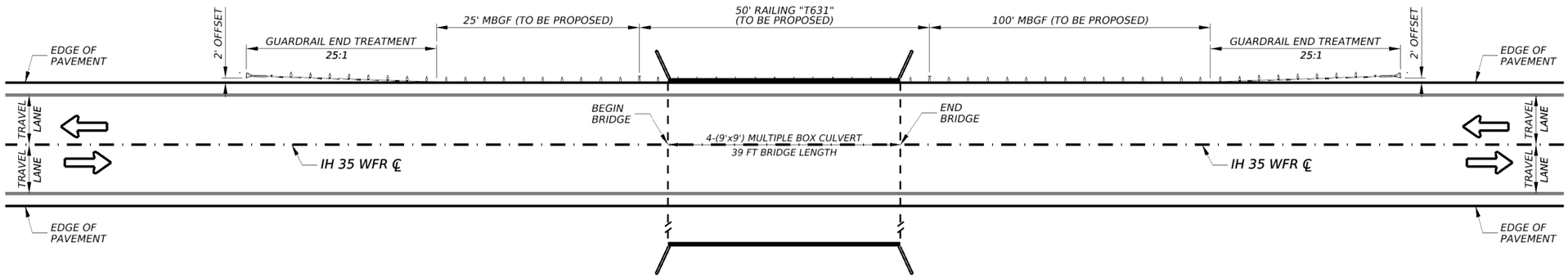


PSN: 22-240-0-0018-03-055
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-03-055
PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #29 - IH35 WFR

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
307945B8A8784F3...
1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		125

DATE: 1/30/2024 7:07:34 PM
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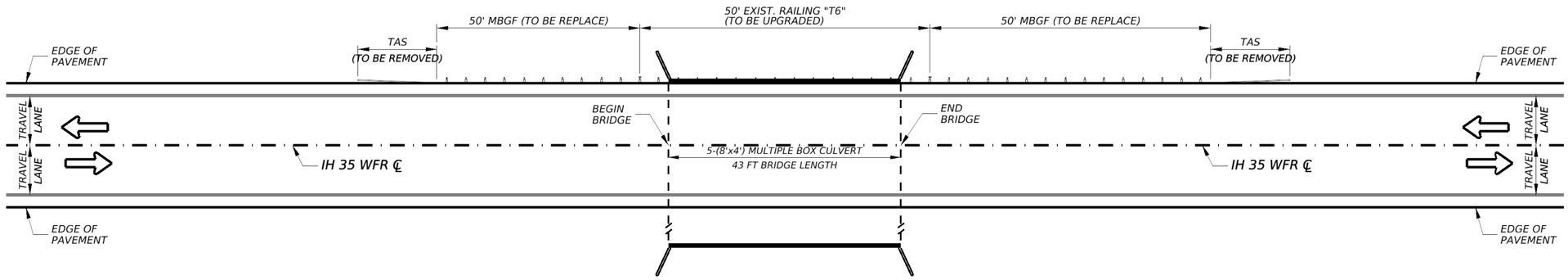
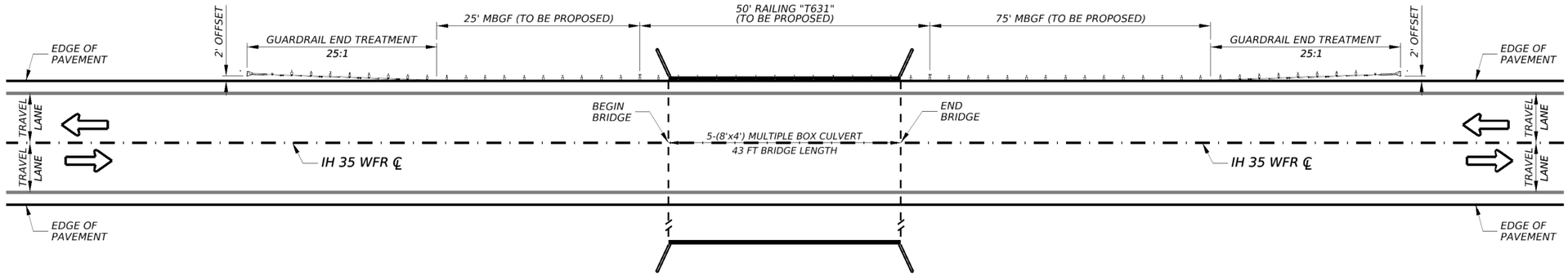


PSN: 22-240-0-0018-03-054
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-03-054
PROPOSED MBGF, RAIL & TERMINAL

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #30 - IH35 WFR

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 30 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		126

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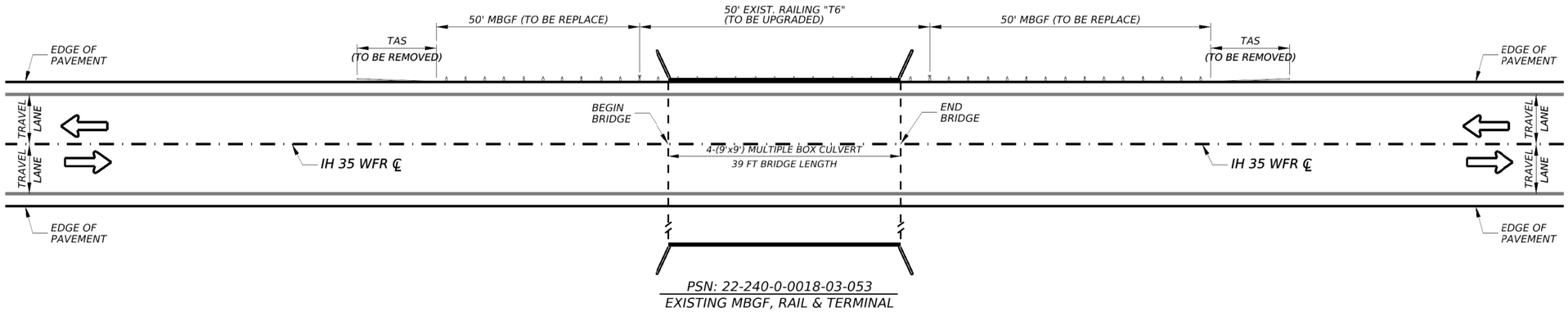
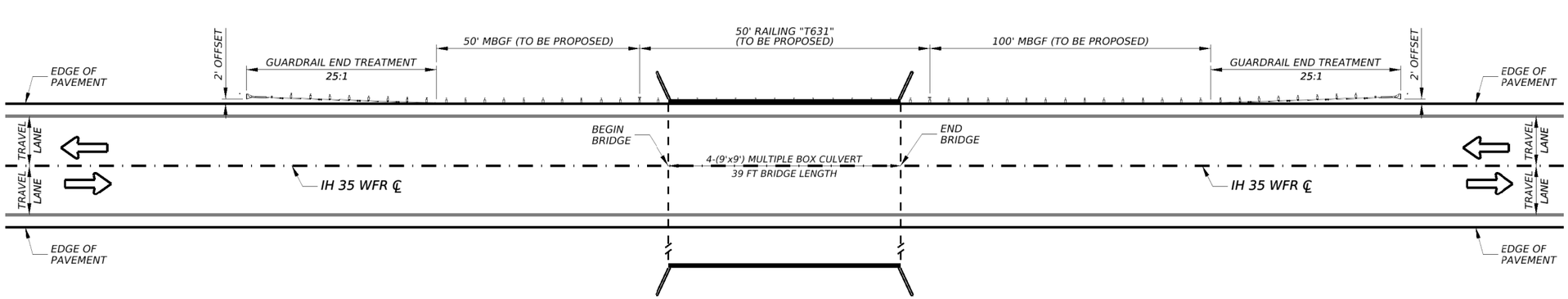


PSN: 22-240-0-0018-03-053

EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-03-053

PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #31 - IH35 WFR

ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...

1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 31 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		127

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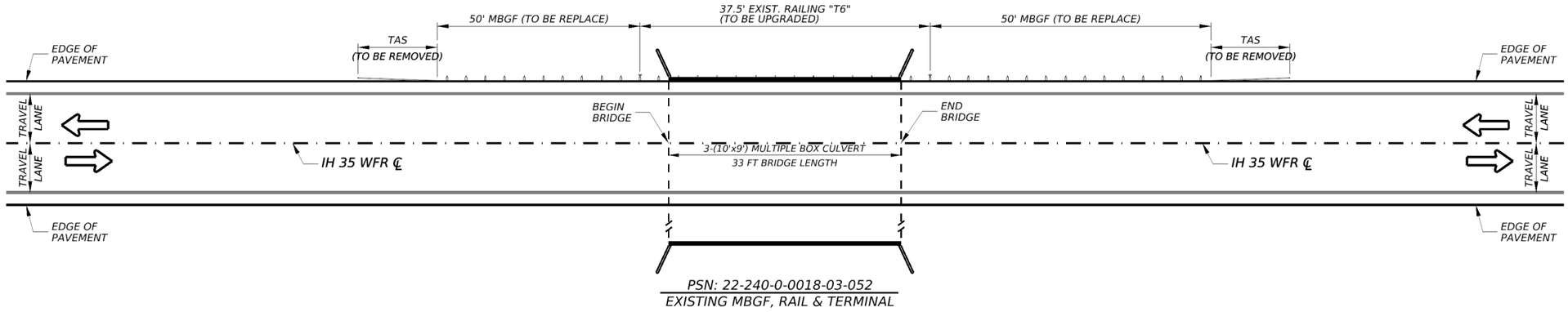
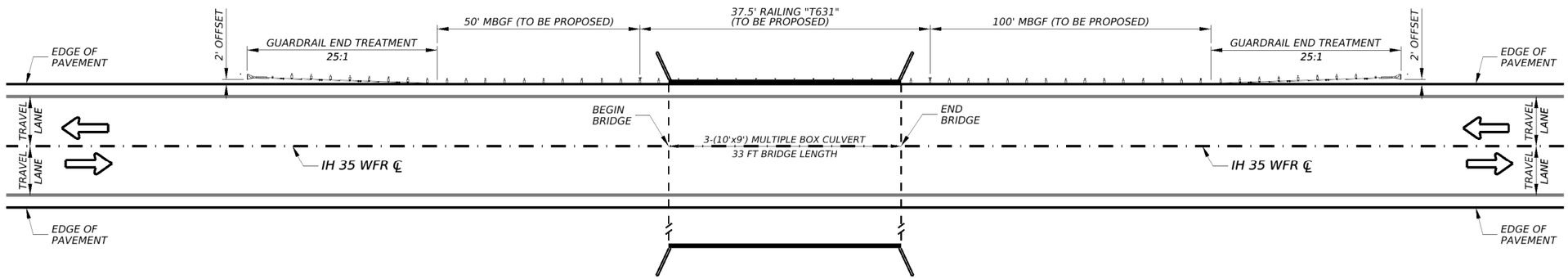


PSN: 22-240-0-0018-03-052
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-03-052
PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

2. MBGF, TRANSITIONS AND SGT INSTALLATION IS TO BE CONSTRUCTED IN SECTIONS (APPROACH UPSTREAM TRAFFIC, DEPARTURE DOWNSTREAM TRAFFIC). EACH SECTION WILL BE COMPLETED BEFORE THE END OF THE WORKING DAY ON WHICH IT WAS INITIATED. CONSTRUCTION OF A SECOND APPROACH/DEPARTURE SECTION MAY NOT COMMENCE UNTIL CONSTRUCTION OF A COMPLETE SECTION (THRIE-BEAM TRANSITION, MBGF, AND TERMINAL) IS COMPLETE. IF UNDER EXTREME CIRCUMSTANCES, A SECTION CAN NOT BE COMPLETED BEFORE THE END OF THE WORKING DAY, THE BLUNT, EXPOSED END WILL BE TIED DOWN AND/OR TIED TO THE REMAINING EXISTING MBGF APPURTENANCES (IF THEY ARE STILL IN PLACE) AT THE END OF THE WORKING DAY.

3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #32 - IH35 WFR

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER
DocuSigned by:
307945B8A8784F3...
1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
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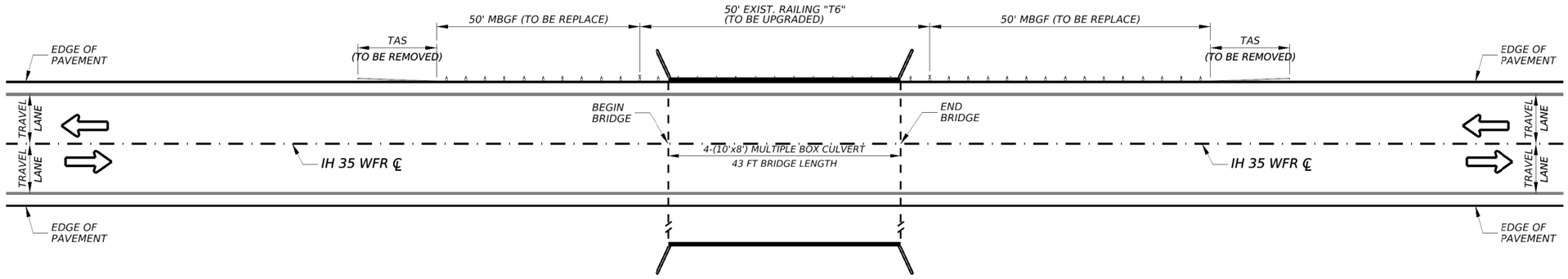
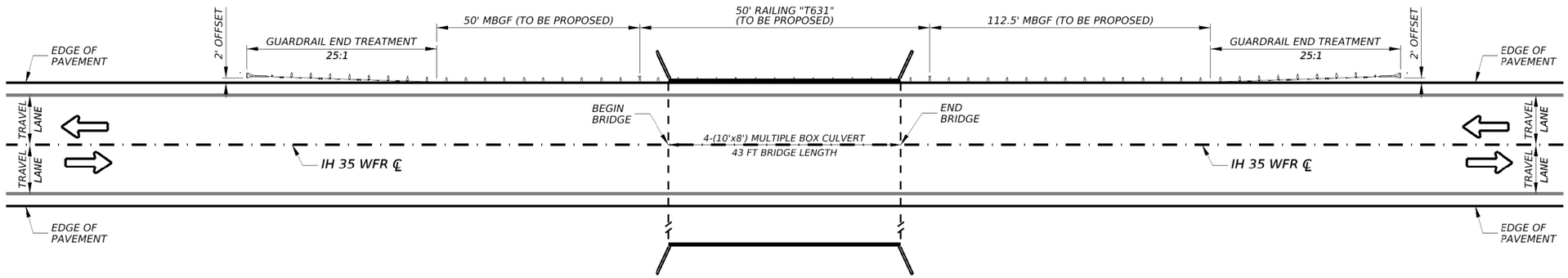


PSN: 22-240-0-0018-03-051
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-03-051
PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

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3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #33 - IH35 WFR

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

SHEET 33 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		129

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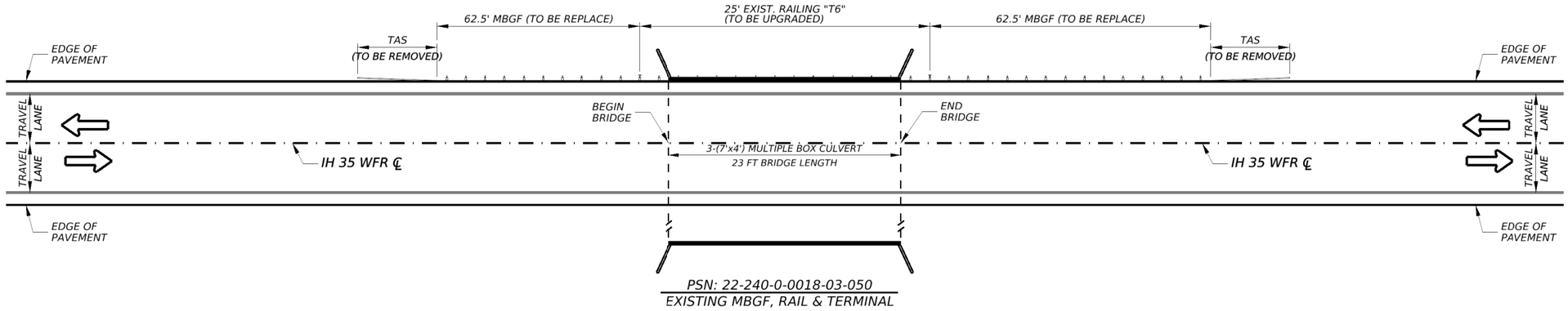
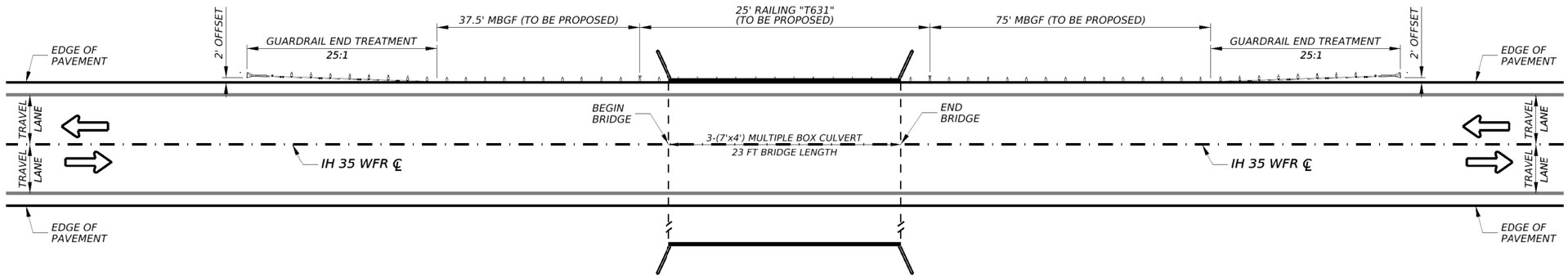


PSN: 22-240-0-0018-03-050
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-03-050
PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

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3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #34 - IH35 WFR

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION
INSTALLATION LAYOUT

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
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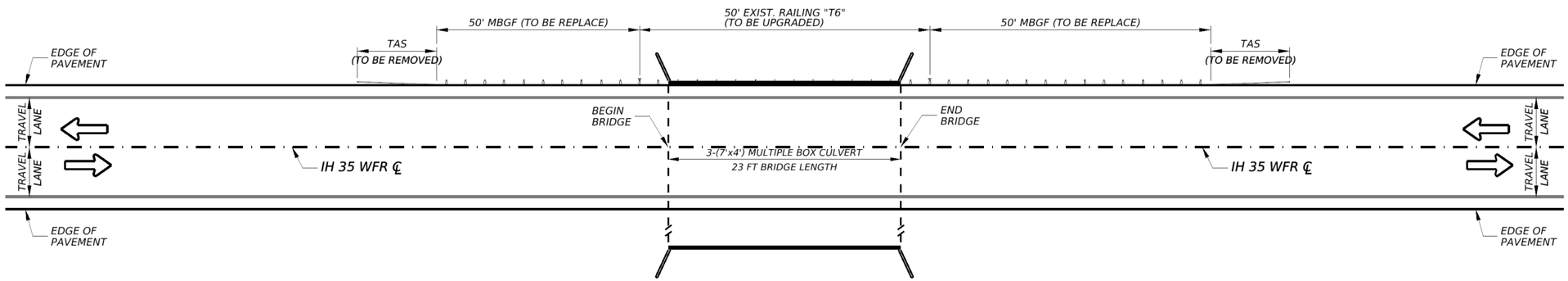
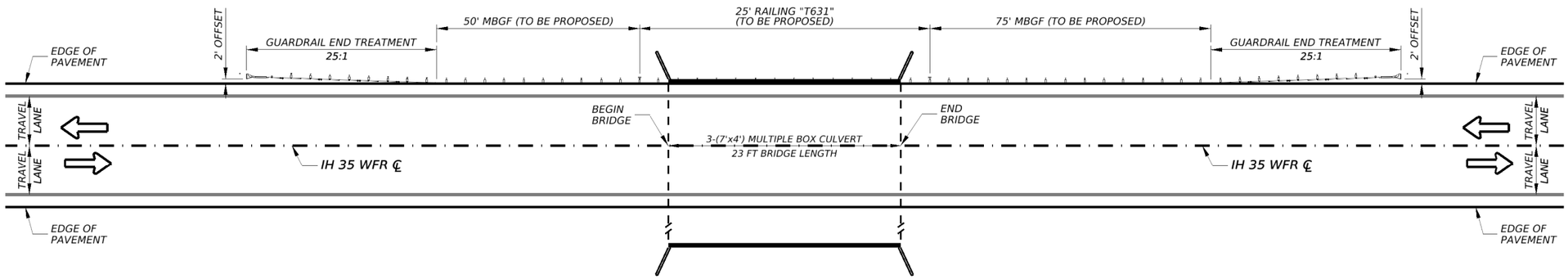


PSN: 22-240-0-0018-03-049
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-03-049
PROPOSED MBGF, RAIL & TERMINAL

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

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3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #35 - IH35 WFR

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

BRIDGE PROTECTION INSTALLATION LAYOUT

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		131

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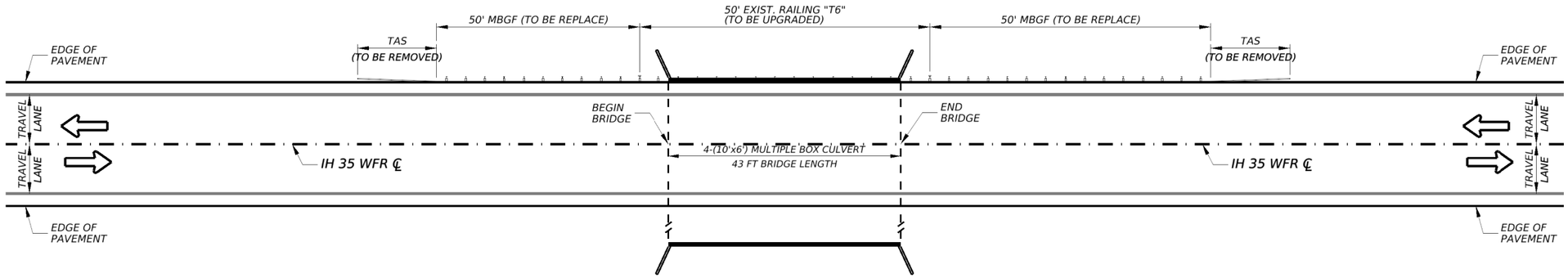
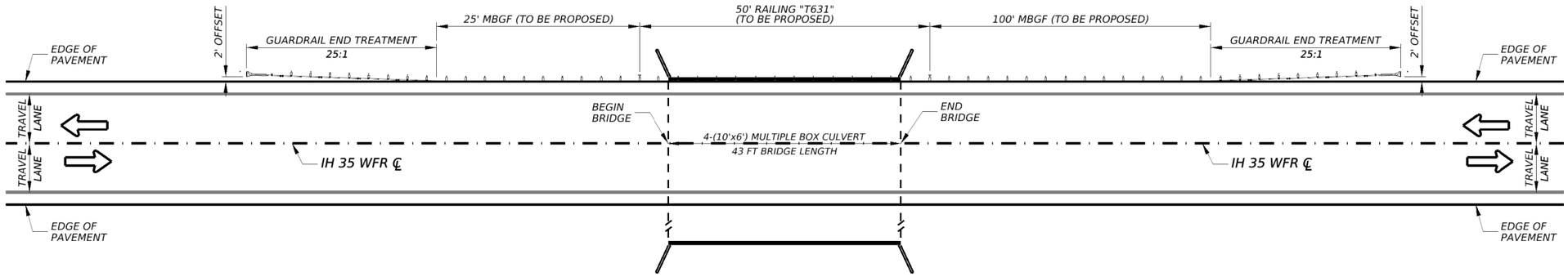


PSN: 22-240-0-0018-03-047
EXISTING MBGF, RAIL & TERMINAL



PSN: 22-240-0-0018-03-047
PROPOSED MBGF, RAIL & TERMINAL

NOTES:

1. THE PROPOSED WORK FOR THIS LOCATION CONSIST ON THE INSTALLATION OF BRIDGE RAILING, MBGF, GUARDRAIL END TREATMENTS AND DOWNSTREAM ANCHOR TERMINAL. INSTALLATION OF MOWSTRIP WILL BE PROPOSED FOR THE ENTIRE LENGTH ON BOTH APPROACHES.

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3. REFER TO APPLICABLE TXDOT STANDARDS GF(31), GF(31)DAT, GF(31)LS, GF(31)TRTL3, GF(31)TRTL2, GF(31)T101, GF(31)T6, GF(31)MS, SRG(TL-2), SRG(TL-3), BED-14, SGT(10S)31, SGT(11S)31, SGT(12S)31, SGT(15S)31 AND "ROADWAY MISCELLANEOUS SHEET(S)" FOR MORE INFORMATION.

LOCATION #36 - IH35 WFR

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
307945B8A8784F3...
1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC.

BRIDGE PROTECTION
INSTALLATION LAYOUT

SHEET 36 OF 36

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		132

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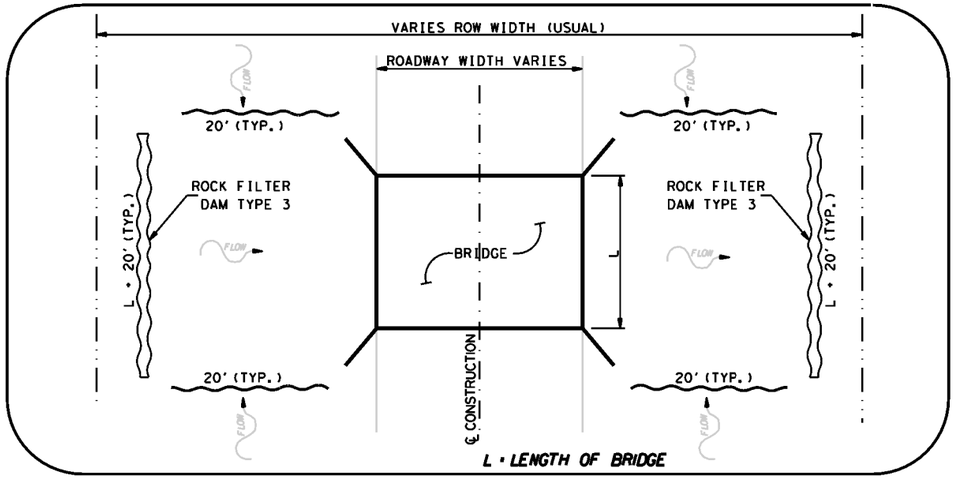
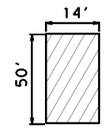
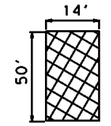


SILT FENCE DETAIL FOR BRIDGE ROADWAY

LEGEND



* CONSTRUCTION EXITS



WORK AREA

Silt Fence

Rock Filter Dam Type 3

NOTES:

* – LOCATION OF CONSTRUCTION EXITS TO BE DETERMINED BY THE ENGINEER.

– THE ROCK BERM AND CONSTRUCTION EXIT AGGREGATE MATERIAL WILL REMAIN THE PROPERTY OF THE STATE UPON THE COMPLETION OF THE PROPOSED CONSTRUCTION. THESE MATERIALS WILL BE PLACED AT AREAS WITHIN THE VICINITY OF THE BRIDGE SITE AS DIRECTED BY THE ENGINEER UPON REMOVAL. ALL EQUIPMENT, LABOR, AND INCIDENTALS REQUIRED FOR THE RELOCATION OF THESE MATERIALS WILL NOT BE PAID FOR BUT WILL BE SUBSIDIARY TO ITEM 506 REMOVAL ITEMS.

SUMMARY OF EROSION CONTROL ITEMS

LOCATION - PSN	506 6003 ROCK FILTER DAMS (INSTALL) (TY 3)	506 6011 ROCK FILTER DAMS (REMOVE)	506 6020 CONSTRUCTION EXITS (INSTALL) (TY 1)	506 6024 CONSTRUCTION EXITS (REMOVE)	506 6030 BACKHOE WORK (EROSION & SEDMT CONT)	506 6038 TEMP SEDMT CONT FENCE (INSTALL)	506 6039 TEMP SEDMT CONT FENCE (REMOVE)
	LF	LF	SY	SY	HR	LF	LF
4	48	48	77	77	1	80	80
13	59	59	79	79	1	40	40
18	94	94	84	84	2	40	40
20	312	312	86	86	2	40	40
21	196	196	87	87	2	40	40
PROJECT TOTALS	709	709	413	413	8	240	240

STATE OF TEXAS
ROGELIO CHAPA JR.
148468
LICENSED
PROFESSIONAL ENGINEER

DocuSigned by:
Rogelio Chapa
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1/30/2024

NOT TO SCALE

Texas Department of Transportation

IH 35, ETC

SW3P DETAILS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
0922	00	075	VARIOUS
DIST	COUNTY		SHEET NO.
22	WEBB		133

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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. City of Laredo

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. Texas Horned Lizard - The Contractor will avoid harvester ant mound in the selection of PSLs where feasible.
2. Texas Tortoise - The Contractor should cover utility trenches overnight and should visually inspect all trenches before filling.
3. Reticulated Collared Lizard - This lizard may potentially occur in the project area. The Contractor shall avoid harming or handeling the species.
4. Texas Indigo Snake - This snake may potentially occur in the project area. The Contractor shall avoid harming or handeling the species.

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.

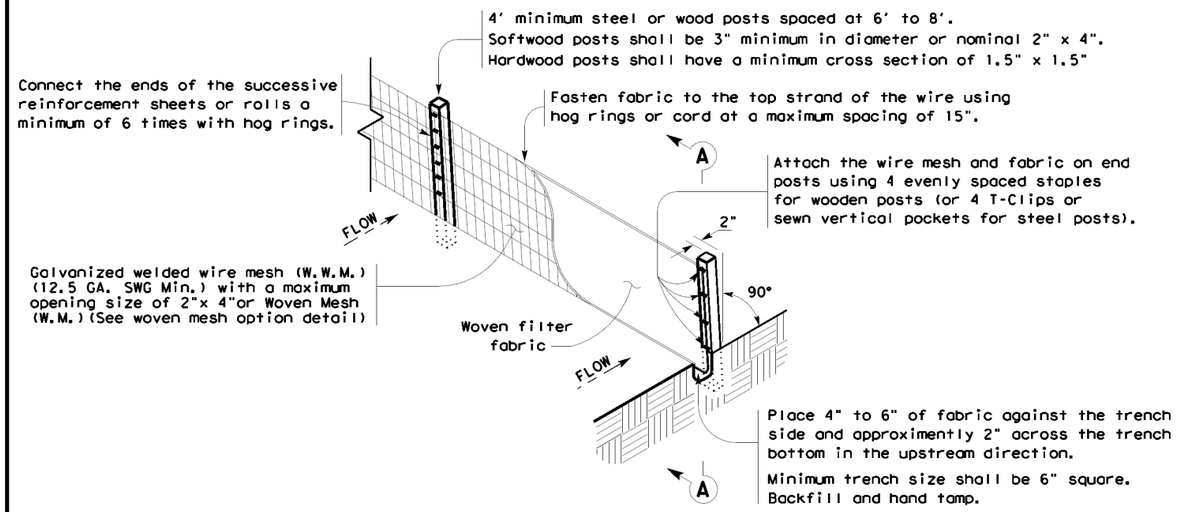
3.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

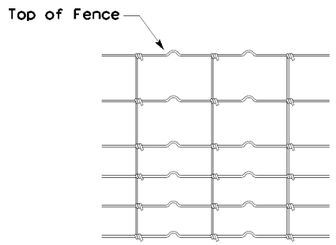
EPIC

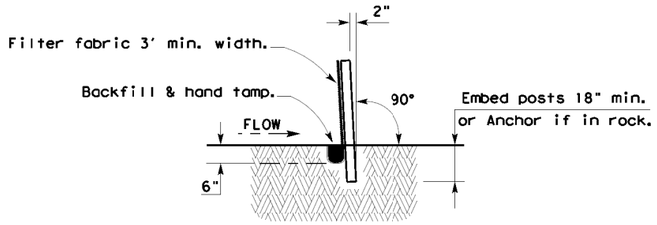
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS)	0922	00	075	VARIOUS
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY		SHEET NO.
01-23-2015 SECTION 1 (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	22	WEBB		134



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

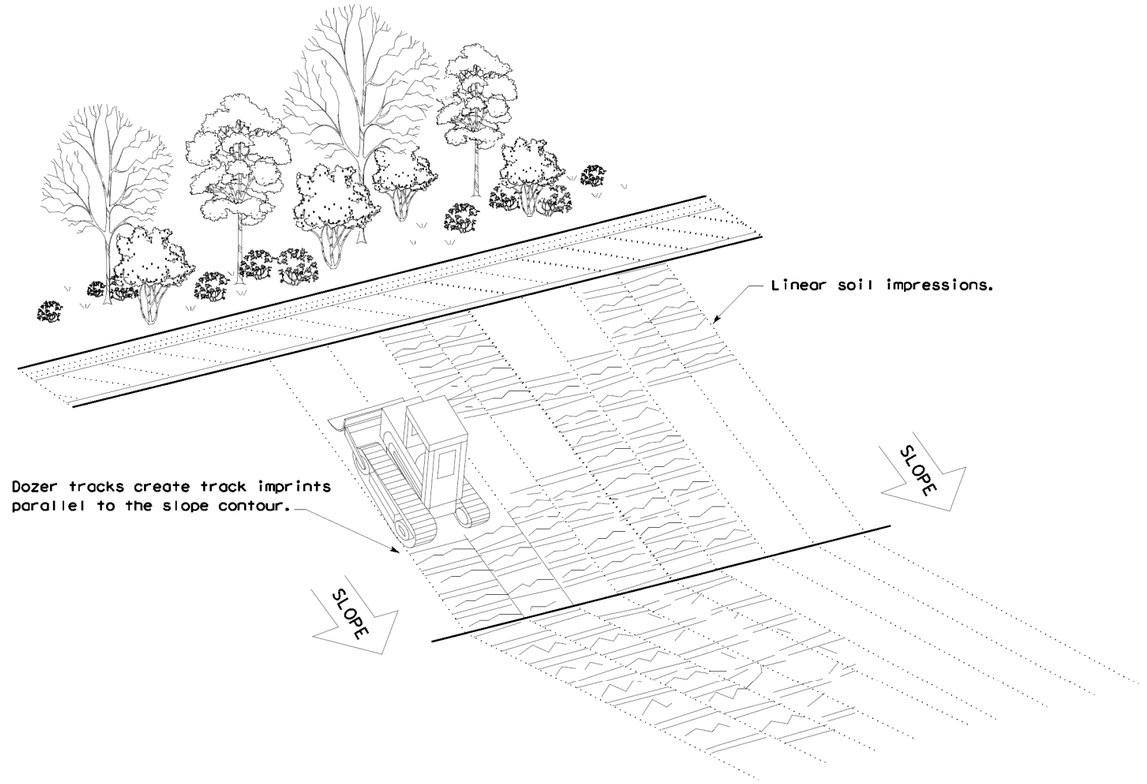
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
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DATE: 1/30/2024
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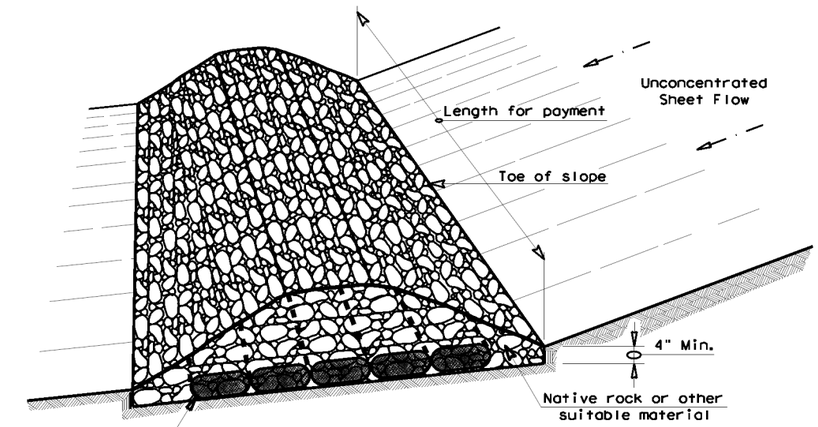
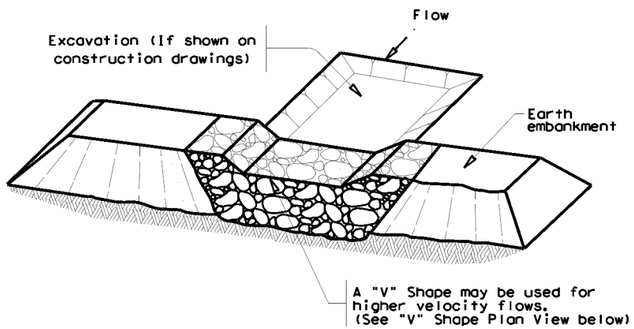


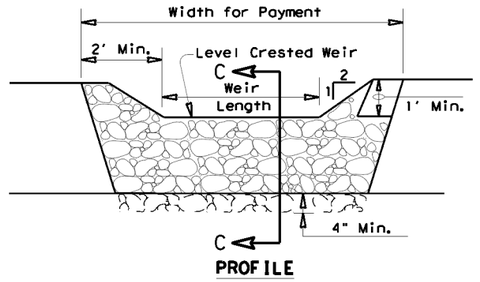
FILTER DAM AT TOE OF SLOPE

RFD1



FILTER DAM AT SEDIMENT TRAP

RFD1 — OR — RFD2



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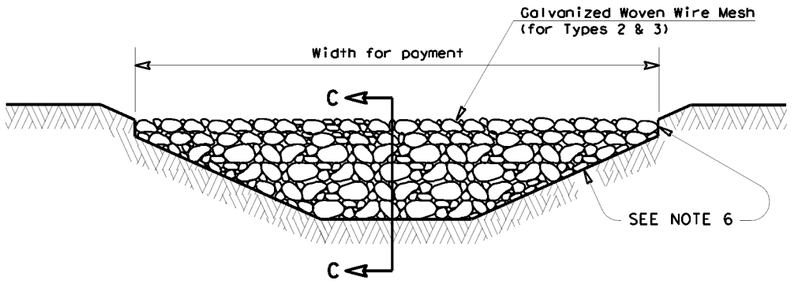
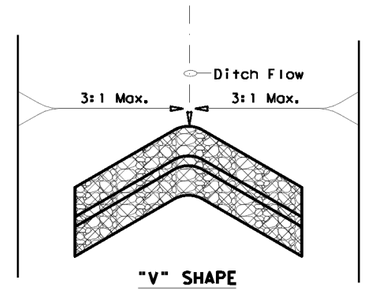
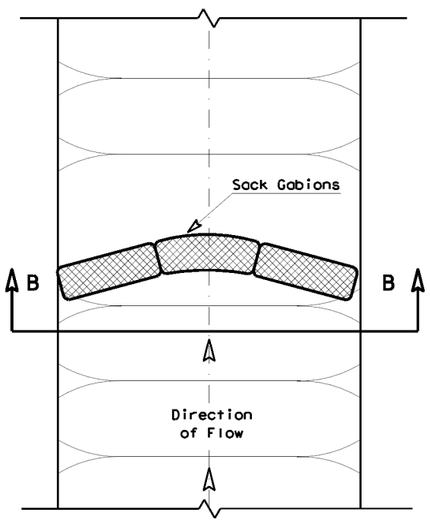


FILTER DAM AT CHANNEL SECTIONS

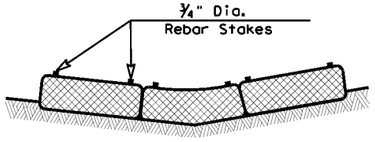
RFD1 — OR — RFD2 — OR — RFD3



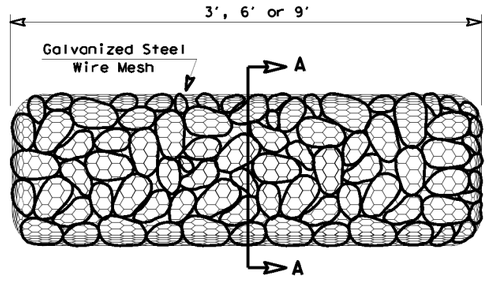
"V" SHAPE
PLAN VIEW



PLAN VIEW

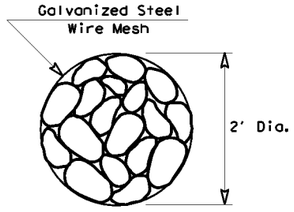


SECTION B-B

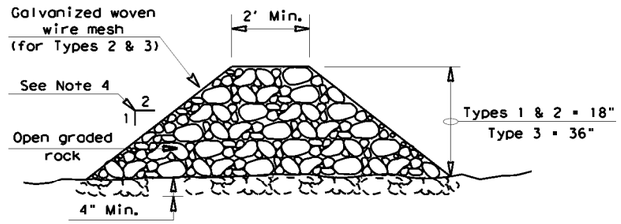


TYPE 4 (SACK GABIONS)

RFD4



SECTION A-A



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam — RFD1
Type 2 Rock Filter Dam — RFD2
Type 3 Rock Filter Dam — RFD3
Type 4 Rock Filter Dam — RFD4

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
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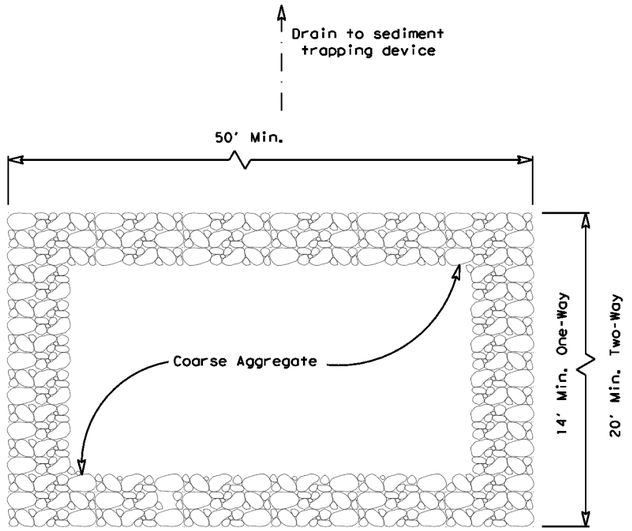
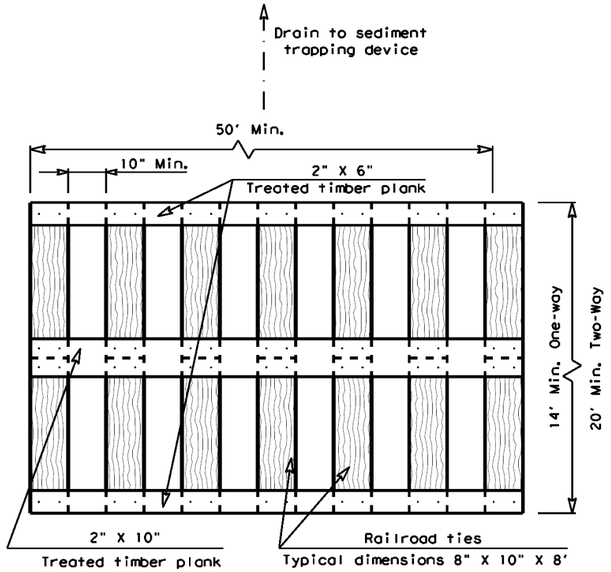


PLAN VIEW



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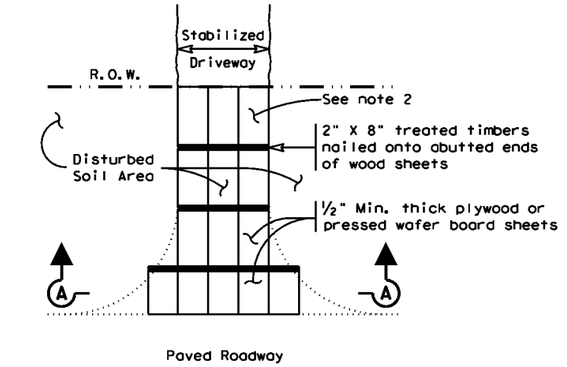

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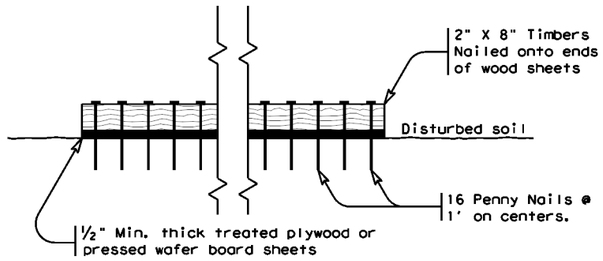
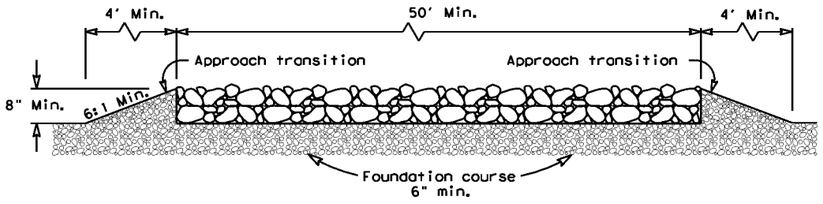


SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

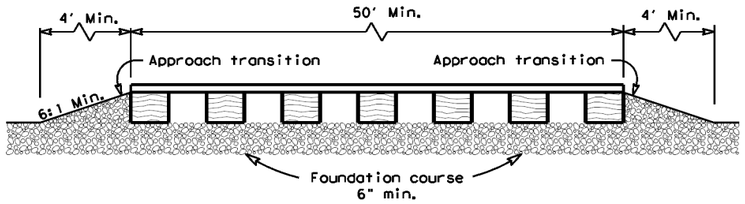
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
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