INDEX OF SHEETS

SEE SHEET NO. 2

FEDERAL-AID PROJECT NUMBER			
F 2B23(225)			
CONT	SECT	JOB	HIGHWAY
0650	03	031	SH 153
DIST	COUNTY		SHEET NO.
SJT	RUNNELS		1

CSJ 0650-03-031 : SH 153
FUNCTIONAL CLASS = MAJOR COLLECTOR
TERRAIN = LEVEL
DESIGN SPEED = 75 MPH
CURRENT ADT (2019) = 2,278
FUTURE ADT (2039) = 2,734

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT F 2B23(225)

SH 153
RUNNELS COUNTY

NET LENGTH OF PROJECT
- ROADWAY = 985 FT = 0.186 MI
- BRIDGE = 115 FT = 0.022 MI
- TOTAL = 1,100 FT = 0.208 MI

LIMITS: AT VALLEY CREEK

FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT
CONSISTING OF REPLACING BRIDGE AND APPROACHES

VOLUME II

CONTRACT CSJ: 0650-03-036

FINAL PLANS

Letting Date: ______________

Name of Contractor: ______________

Date Work Began: ______________

Date Work Completed: ______________

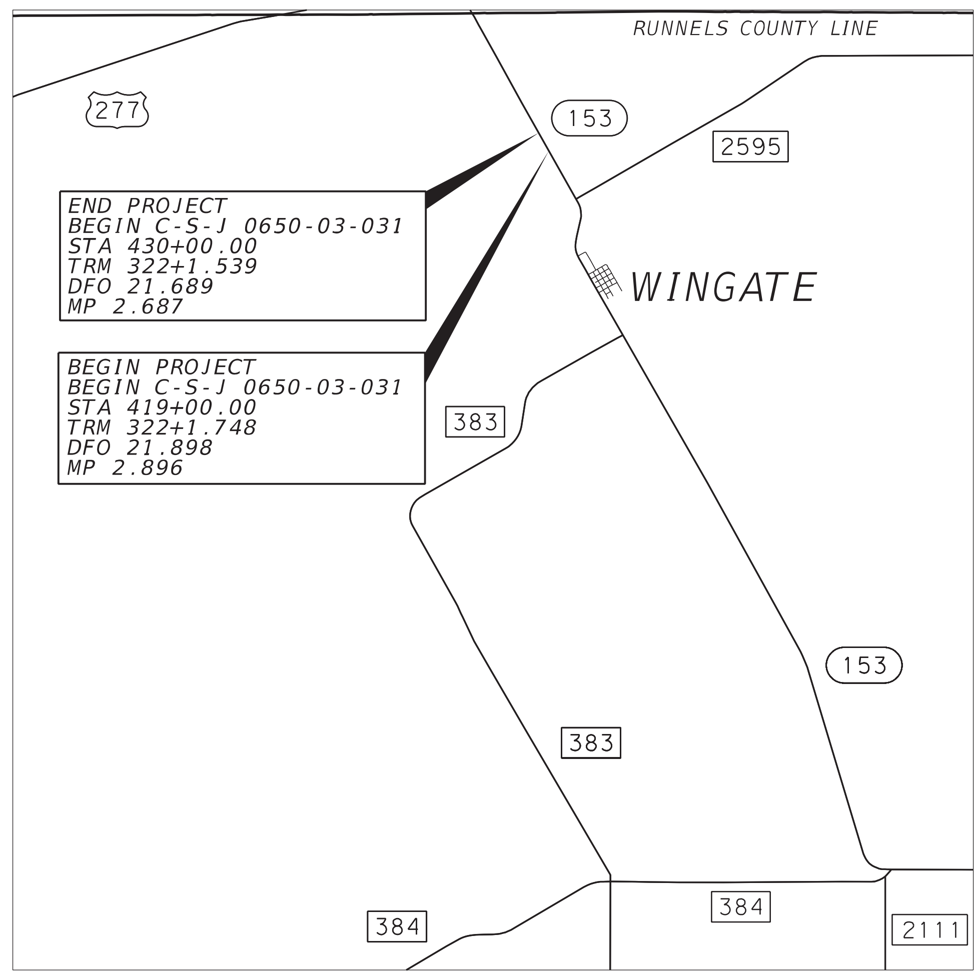
Date Work Accepted: ______________

Final Contract Cost: ______________

Project was built according to the Plans & Specifications. These final plans reflect the work done and the quantities shown thereon and on the Final Estimate are Final Quantities.

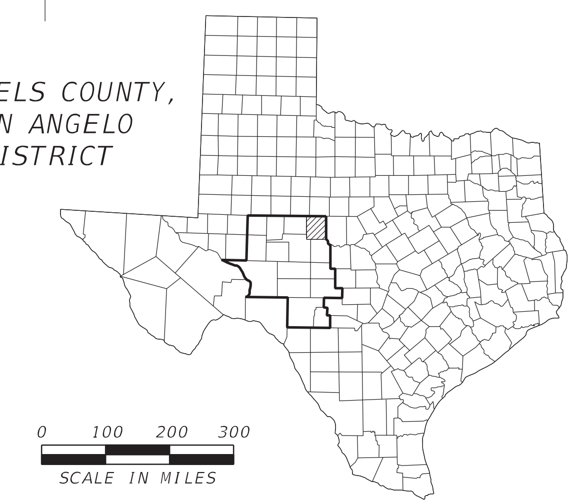
Area Engineer   Date

Summary of Change Orders:



SCALE: N.T.S.

RUNNELS COUNTY,
SAN ANGELO
DISTRICT



2023
Texas Department of Transportation

SUBMITTED FOR LETTING: 7/5/2023

DocuSigned by:
Nicholas Greenly
DDF89C6522AF49E...
District Design Engineer

RECOMMENDED FOR LETTING: 7/5/2023

DocuSigned by:
826185212F51427...
District Director of TP&D

APPROVED FOR LETTING: 7/5/2023

DocuSigned by:
BC10B17FA709437...
District Engineer

STATE OF TEXAS
DAVID A. ROCHA
92654
LICENSED
PROFESSIONAL ENGINEER
06.28.23

FIRM REG. NO. F-199

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

EXCEPTIONS
NONE

EQUATIONS
NONE

RAILROAD CROSSINGS
NONE

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JULY 5, 2022).

DATE: 6/28/2023 5:12:25 PM
FILE: S:\Transportation\20-157C TxDOT 88-91DP5026 WA1 US67, SH153, SH163\CAD\01-Sheets\SH 153\SH153-TSH.dgn

Plotted on: 10/27/2022

Design Filename: S:\Transportation\20-157C TxDOT 88-91DP5026 WA1 US67, SH153, SH163\CAD\01-Sheets\SH 153\SH153-Index01.dgn

STATE OF TEXAS
HEATHER McNEAL
114428
LICENSED PROFESSIONAL ENGINEER

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

HEATHER MCNEAL, PE — 11/2/2022 DATE

STATE OF TEXAS
CODY J. MOCZYGEMBA
133448
LICENSED PROFESSIONAL ENGINEER

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

CODY J. MOCZYGEMBA, PE — 11/02/2022 DATE

STATE OF TEXAS
DAVID A. ROCHA
92654
LICENSED PROFESSIONAL ENGINEER

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

DAVID A. ROCHA, PE — 11.01.22 DATE

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

INDEX OF SHEETS

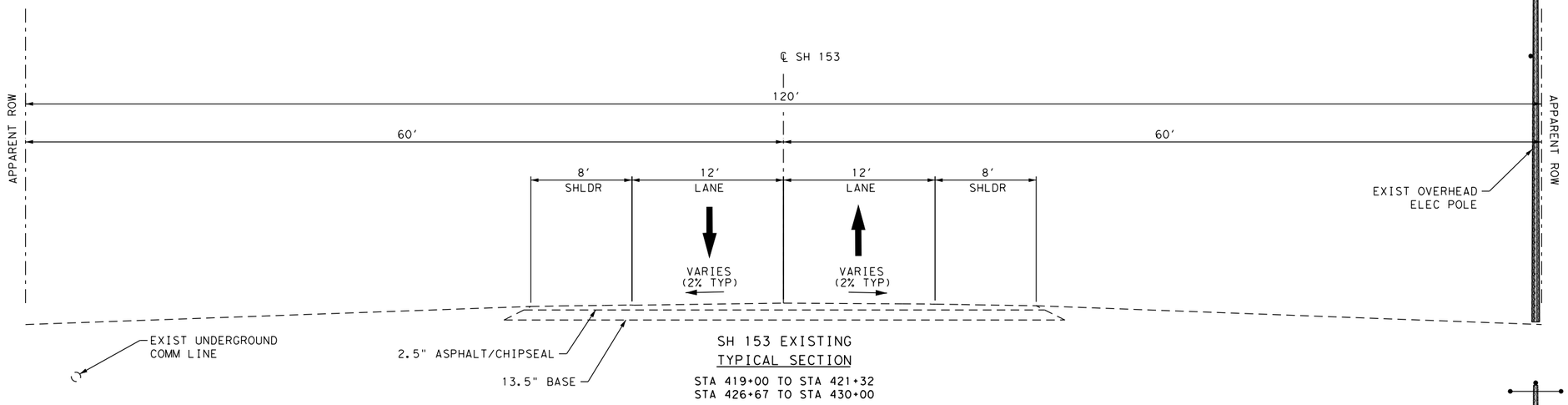
SH 153 AT VALLEY CREEK

SHEET 1 OF 1

DGN: DBR	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DR	6	TEXAS				SH 153
DWG: PX	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DBR	SJT	RUNNELS	0650	03	031	2

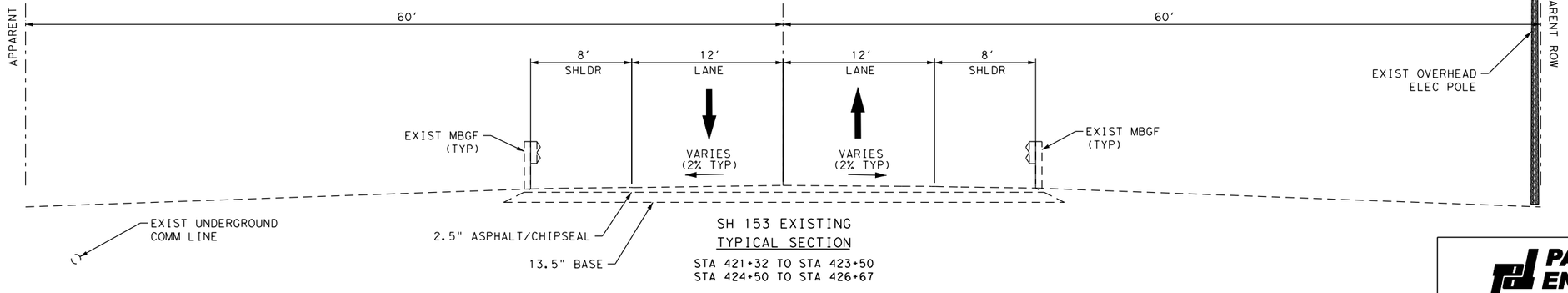
Plotted on: 10/3/2022

Design Filename: P:\118\79\01\Design\Civil\Roadway\SH153-ROWY-TYP-01.dgn



SH 153 EXISTING
TYPICAL SECTION

STA 419+00 TO STA 421+32
STA 426+67 TO STA 430+00



SH 153 EXISTING
TYPICAL SECTION

STA 421+32 TO STA 423+50
STA 424+50 TO STA 426+67

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

0 5 10

SCALE: 1"= 10′

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

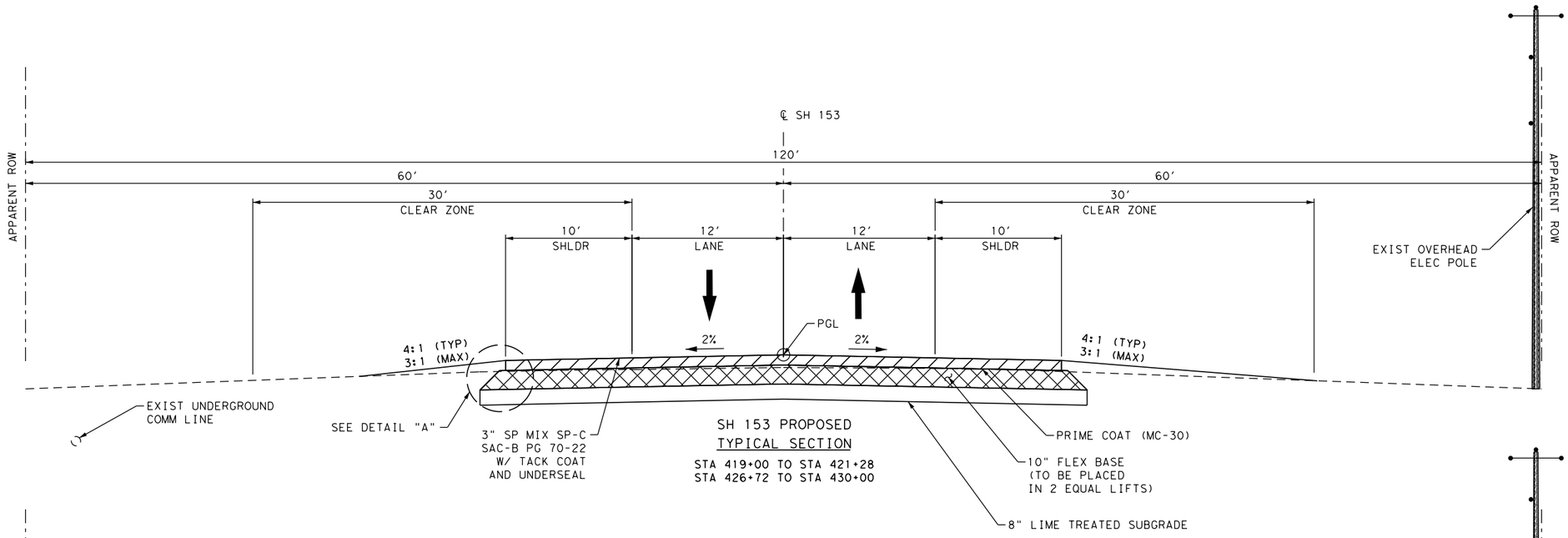
STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

TYPICAL SECTIONS

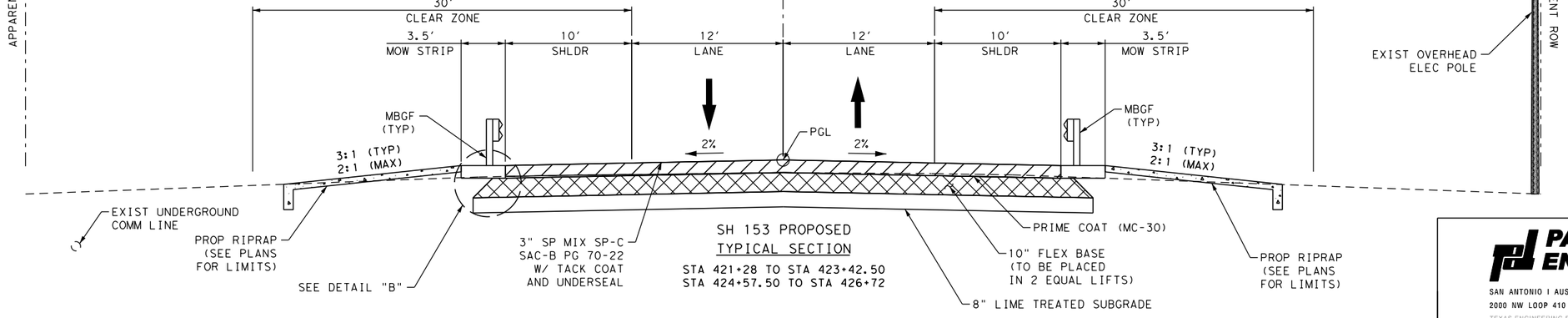
SH 153 AT VALLEY CREEK

SHEET 1 OF 2

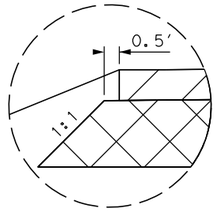
DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	3



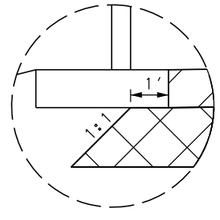
SH 153 PROPOSED
TYPICAL SECTION
STA 419+00 TO STA 421+28
STA 426+72 TO STA 430+00



SH 153 PROPOSED
TYPICAL SECTION
STA 421+28 TO STA 423+42.50
STA 424+57.50 TO STA 426+72



DETAIL "A"
N.T.S.



DETAIL "B"
N.T.S.

NOTES

1. SEE BRIDGE LAYOUT SHEETS FOR BRIDGE TYPICAL SECTIONS.
2. A CLEAR ZONE OF 30 FT WILL BE MAINTAINED.
3. SEE MOW STRIP STANDARD GF(31)MS-19 FOR CONSTRUCTION DETAILS.

DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

0 5 10

SCALE: 1"= 10′

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

TYPICAL SECTIONS

SH 153 AT VALLEY CREEK

SHEET 2 OF 2

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	4

Plotted on: 10/3/2022
Design Filename: P:\118\79\01\Design\Civil\Roadway\SH153-RDWY-TYP-02.dgn

Plotted on: 10/3/2022

Design Filename: P:\118\79\01\Design\Civil\Summaries\SH153-SUM_TCP.dgn

CSJ 0650-03-031: SH 153 AT VALLEY CREEK

ITEM	0110-6001	0132-6003	0247-6304	0310-6009	0330-6004	0423-6003	0508-6002
LOCATION	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY B)	FL BS (CMP IN PLACE) (TY D GR 1&2) (10")	PRIME COAT (MC-30)	LRA PAV TY-I GR-C	RETAINING WALL (TEMP WALL)	CONSTRUCTING DETOURS (EBSS)
	CY	CY	SY	GAL	TON	SF	SY
TCP PHASE I - SHEET 1 OF 3	119	13	678	136	105		636
TCP PHASE I - SHEET 2 OF 3	953	22	2,094	419	330	1,593	2,000
TCP PHASE I - SHEET 3 OF 3	150	1	573	115	88		536
TCP PHASE II - SHEET 1 OF 2							
TCP PHASE II - SHEET 2 OF 2							
TOTALS	1,222	36	3,345	670	523	1,593	3,172

ITEM	0510-6003	0512-6005	0512-6053	0545-6005	0545-6019	0662-6004	0662-6050
LOCATION	ONE-WAY TRAF CONT (PORT TRAF SIG)	PORT CTB (FUR & INST) (F-SHAPE) (TY 1)	PORT CTB (REMOVE) (F-SHAPE) (TY 1)	CRASH CUSH ATTEN (REMOVE)	CRASH CUSH ATTEN (INSTL) (S) (N) (TL3)	WK ZN PAV MRK NON-REMOV (W) 4" (SLD)	WK ZN PAV MRK REMOV (REFL) TY II-A-A
	MO	LF	LF	EA	EA	LF	EA
TCP PHASE I - SHEET 1 OF 3							
TCP PHASE I - SHEET 2 OF 3							
TCP PHASE I - SHEET 3 OF 3							
TCP PHASE II - SHEET 1 OF 2	7	2,685	2,685	2	2	2,618	48
TCP PHASE II - SHEET 2 OF 2		585	585	2	2	521	48
TOTALS	7	3,270	3,270	4	4	3,139	96

ITEM	0662-6063	0662-6075	0662-6095	0677-6001	6001-6001	6185-6002
LOCATION	WK ZN PAV MRK REMOV (W) 4" (SLD)	WK ZN PAV MRK REMOV (W) 24" (SLD)	WK ZN PAV MRK REMOV (Y) 4" (SLD)	ELIM EXT PAV MRK & MRKS (4")	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)
	LF	LF	LF	LF	DAY	DAY
TCP PHASE I - SHEET 1 OF 3					72	
TCP PHASE I - SHEET 2 OF 3						
TCP PHASE I - SHEET 3 OF 3					72	36
TCP PHASE II - SHEET 1 OF 2	982	12	1,920	2,194	200	
TCP PHASE II - SHEET 2 OF 2	978	12	1,920	2,245	200	
TOTALS	1,960	24	3,840	4,439	544	36

BASIS OF ESTIMATE

TEMPORARY PAVEMENT					
ITEM NUMBER	DESCRIPTION	USAGE	AMOUNT	RATE	ESTIMATED QUANTITIY
247	FL BS (CMP IN PLACE) (TY D GR 1&2)	10"	3,345 SY	SY	3,345 SY
310	PRIME COAT (MC-30)	FLEX BASE	3,345 SY	0.2 GAL/SY	670 GAL
330	LRA PAV TY-I GR-C	3"	3,172 SY	110 LBS/SY	523 TON

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2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SH 153 AT VALLEY CREEK

SUMMARY OF QUANTITIES TCP

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	7

Plotted on: 10/4/2022

CSJ 0650-03-031: SH 153 AT VALLEY CREEK

ITEM	0100-6002	0110-6001	0132-6003	0247-6231	0260-6012	0260-6073
LOCATION	PREPARING ROW	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (ORD COMP) (TY B)	FL BS (CMP IN PLACE) (TY A GR 1&2) (10")	LIME (HYD, COM OR QK) (SLRY) OR QK (DRY)	LIME TRT (SUBGRADE) (8")
	STA	CY	CY	SY	TON	SY
BEGIN PROJECT TO STA 422+00	3.0	578	332	1,523	32	1,523
STA 422+00 TO END PROJECT	8.0	477	1,736	3,256	68	3,256
TOTALS	11.0	1,055	2,068	4,779	100	4,779

ITEM	0310-6027	0316-6224	0316-6400	0432-6008	0432-6045	0540-6002
LOCATION	PRIME COAT (MC-30 OR AE-P)	AGGR (TY-PB GR-4 SAC-B)	ASPH (AC-15P OR AC-10-2TR OR CRS-2P)	RIPRAP (CONC) (CL B) (RR8&RR9)	RIPRAP (MOW STRIP) (4 IN)	MTL W-BEAM GD FEN (STEEL POST)
	GAL	CY	GAL	CY	CY	LF
BEGIN PROJECT TO STA 422+00	289	13	534		8	11
STA 422+00 TO END PROJECT	622	28	1,151	77	36	289
TOTALS	911	41	1,685	77	44	300

ITEM	0540-6006	0542-6001	0544-6001	0544-6003	3077-6023	3077-6075
LOCATION	MTL BEAM GD FEN TRANS (THRIE-BEAM)	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)	SP MIXES SP-C SAC-B PG70-22	TACK COAT
	EA	LF	EA	EA	TON	GAL
BEGIN PROJECT TO STA 422+00		18	1	1	238	130
STA 422+00 TO END PROJECT	4	432	3	3	513	280
TOTALS	4	450	4	4	751	410

BASIS OF ESTIMATE

PERMANENT PAVEMENT					
ITEM NUMBER	DESCRIPTION	USAGE	AMOUNT	RATE	ESTIMATED QUANTITIY
247	FL BS (CMP IN PLACE) (TY A GR 1&2)	10"	4,779 SY	SY	4,779 SY
260	LIME (HYD, COM OR QK) (SLRY) OR QK (DRY)	SUBGRADE	4,779 SY	140 LBS/CF AND 5% LIME	100 TON
260	LIME TRT (SUBGRADE)	8"	4,779 SY	SY	4,779 SY
310	PRIME COAT (MC-30 OR AE-P)	FLEX BASE	4,553 SY	0.2 GAL/SY	911 GAL
316	AGGR (TY-PB GR-4 SAC-B)	UNDERSEAL	4,553 SY	113 SY/CY	41 CY
316	ASPH (AC-15P OR AC-10-2TR OR CRS-2P)	UNDERSEAL	4,553 SY	0.37 GAL/SY	1,685 GAL
3077	SP MIXES SP-C SAC-B PG70-22	3"	4,553 SY	110 LBS/SY	751 TON
3077	TACK COAT	SP MIXES	4,553 SY	0.09 GAL/SY	410 GAL

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SH 153 AT VALLEY CREEK

SUMMARY OF QUANTITIES
ROADWAY

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	8

Design Filename: P:\118\79\01\Design\Civil\Summaries\SH153-SUM_RDWY.dgn

Plotted on: 10/3/2022

Design Filename: P:\118\79\01\Design\Civil\Summaries\SH153-SUM_SPM.dgn

CSJ 0650-03-031: SH 153 AT VALLEY CREEK

ITEM	0644-6001	0644-6004	0644-6031	0658-6062	0666-6170	0666-6207	0666-6303
LOCATION	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	IN SM RD SN SUP&AM TYS80(1)SA(T-2EXT)	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	REFL PAV MRK TY II (W) 4" (SLD)	REFL PAV MRK TY II (Y) 4" (SLD)	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)
	EA	EA	EA	EA	LF	LF	LF
BEGIN WORK TO STA 430+00	3	1	1	22	3,727	7,452	3,727
STA 430+00 TO END WORK		1			1,434	718	1,434
TOTALS	3	2	1	22	5,161	8,170	5,161

ITEM	0666-6315	0672-6009	0678-6001
LOCATION	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	REFL PAV MRKR TY II-A-A	PAV SURF PREP FOR MRK (4")
	LF	EA	LF
BEGIN WORK TO STA 430+00	7,452	94	7,452
STA 430+00 TO END WORK	718	18	1,434
TOTALS	8,170	112	8,886

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SH 153 AT VALLEY CREEK

SUMMARY OF QUANTITIES SIGNING AND PAVEMENT MARKINGS

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	9

Plotted on: 10/5/2022

SUMMARY OF DRAINAGE ITEMS SH 153 AT VALLEY CREEK 0650-03-031		
LOCATION	462 6016	496 6008
	CONC BOX CULV (7 FT X 5 FT)	REMOV STR (BOX CULVERT)
	LF	LF
TEMP CULVERT B	66	66
PROJECT TOTALS	66	66

SUMMARY OF EROSION CONTROL ITEMS SH 153 AT VALLEY CREEK 0650-03-031																
LOCATION	160 6003	164 6003	164 6009	164 6011	168 6001	169 6001	169 6005	506 6002	506 6003	506 6011	506 6020	506 6024	506 6038	506 6039	*** 506 6041	*** 506 6043
	FURNISHING AND PLACING TOPSOIL (4")	BROADCAST SEED (PERM) (RURAL) (CLAY)	BROADCAST SEED (TEMP) (WARM)	BROADCAST SEED (TEMP) (COOL)	VEGETATIVE WATERING	SOIL RETENTION BLANKETS (CL 1) (TY A)	SOIL RETENTION BLANKETS (CL 2) (TY E)	ROCK FILTER DAMS (INSTALL) (TY 2)	ROCK FILTER DAMS (INSTALL) (TY 3)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 1)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
	SY	SY	SY	SY	MG	SY	SY	LF	LF	LF	SY	SY	LF	LF	LF	LF
PHASE 1																
BEGIN TO STA 420+00	1516		758	758	15	1516		20		20	112	112				
STA 420+00 TO STA 430+00	3117		1559	1559	31	3117		160	32	192			1139	1139		
STA 430+00 TO END	1473		737	737	15	1473		20		20	112	112	129	129		
POST CONSTRUCTION																
BEGIN TO STA 420+00	3429	3429			69	3429										
STA 420+00 TO STA 430+00	7987	7947			159	6862	545									
STA 430+00 TO END	2930	2930			59	2930										
PROJECT TOTALS	20452	14306	3054	3054	347	19327	545	200	32	232	224	224	1268	1268	200	200

NOTE:
*** BIODEGRADABLE EROSION CONTROL LOGS SHALL BE USED AS DIRECTED BY THE ENGINEER AS NEEDED.

LJA Engineering, Inc.
FRN - F-1386

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SH 153 AT VALLEY CREEK

SUMMARY OF QUANTITIES

DRAINAGE AND EROSION CONTROL

DGN: CM	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DG	6	TEXAS				SH 153
DWG: CM	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DG	SJT	RUNNELS	0650	03	031	10

Design Filename: ...\01-General\SH153_QTY-01.dgn

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
1 OF 2	1-1	R2-1	SPEED LIMIT 75	30"X36"	X		10 BWG	1	SA	P		
1 OF 2	1-2	R2-1	SPEED LIMIT 60	30"X36"	X		10 BWG	1	SA	P		
1 OF 2	1-3	D2-1	Sweetwater 36	102"X18"	X		S80	1	SA	T	2EXT	
1 OF 2	1-4	M2-1	JCT FARM 2595 ROAD	21"X15"	X		10 BWG	1	SA	P		
		M1-6F		24"X24"	X							
1 OF 2	1-5	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36"X36"	X		10 BWG	1	SA	T		
2 OF 2	2-1	W8-13aT	BRIDGE MAY ICE IN COLD WEATHER	36"X36"	X		10 BWG	1	SA	T		

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

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

http://www.txdot.gov/

NOTE:

1. Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.
2. For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS)Standard Sheet.
3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

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Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
4-16 8-16	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		11

18

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.

LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION								
															MOVE / RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC.#	N	W	N	W	N	W
1	PHASE II	1 OF 2	SH 153 DETOUR	STA 603+90	TL3	BI			PCTB	24"	32"		1	1							1	
2	PHASE II	1 OF 2	SH 153 DETOUR	STA 605+24	TL3	BI			PCTB	24"	32"		1	1							1	
3	PHASE II	2 OF 2	SH 153 DETOUR	STA 620+25	TL3	BI			PCTB	24"	32"		1	1							1	
4	PHASE II	2 OF 2	SH 153 DETOUR	STA 621+59	TL3	BI			PCTB	24"	32"		1	1							1	
												TOTALS	4	4								

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/rdwylse.htm

DESIGN
STATE OF TEXAS HEATHER McNEAL 114428 LICENSED PROFESSIONAL ENGINEER
HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL
STATE OF TEXAS JAMES A. LUTZ 84728 LICENSED PROFESSIONAL ENGINEER
JAMES A. LUTZ, P.E. — 10/3/2022 DATE

CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:		CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		
	SJT	RUNNELS		
	FEDERAL AID PROJECT			SHEET NO.
				12

GENERAL NOTES

1. When a contractor force account "Safety Contingency" has been established for the project, it is for work zone enhancements that were unforeseen in the project planning and design stage, but would improve the effectiveness of the traffic control plan. 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 doing so does not slow implementation of work zone enhancements.
2. Shadow, lead, trail, and ramp control vehicles shown on the plans are required.
3. Use high level warning flags on advance warning signs during daytime operations.
4. Provide flaggers at such times and locations as directed to ensure the safe passage of traffic through construction areas. When flaggers are used to control traffic, furnish and install signs CW20-7 "FLAGGER SYMBOL", CW20-7aD "FLAGGER AHEAD", and CW3-4 "BE PREPARED TO STOP". Flaggers shall use 24 in. STOP/SLOW paddles.
5. Temporarily relocate existing mailbox assemblies on portable mailbox stands as shown on the plans, or as directed. Use materials conforming to the Compliant Work Zone Traffic Control Device List (CWZTCDL).
6. Prior to each work day, make provisions to exclude vehicles from parking within work areas.
7. Temporarily relocate existing permanent sign assemblies to temporary supports as shown on the plans, or as directed.
8. Omit advance warning signs and furnish and install reduced size signs CW20-1 "ROAD WORK AHEAD" mounted back to back with reduced size signs G20-2 "END ROAD WORK" signs at intersecting city streets and county roads.
9. Furnish and install signs CW20-1D "ROAD WORK AHEAD", G20-1aT "ROAD WORK ←NEXT X MILES, NEXT X MILES→", and G20-2 "END ROAD WORK" at intersecting state highways.
10. Sign and buffer spacing may be altered to fit field conditions, as directed.
11. In addition to providing a Contractor's Responsible Person and a phone number for emergency contact, have employee(s) available to respond on the project for emergencies and for taking corrective measures within 30 minutes.
12. Cones may be used as the typical channelizing device for freeway surfacing projects.
13. 28 in. tall 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 in. tall two-piece cones.
14. All construction signs and barricades placed during any phase of work shall remain in place until removal is approved by the Engineer.
15. The Engineer may direct the Contractor to furnish additional signs and barricades as required to maintain traffic flow, detours and motorist safety during construction.
16. Warning signs for long term stationary work should be mounted at 7 ft. to the bottom of the sign.
17. For long 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.
18. All motor vehicle equipment having an obstructed view to the rear shall have a reverse signal alarm audible above the surrounding noise level.
19. Traffic control devices denoted with the triangle symbol on the plans may be omitted.
20. When sheet WZ(RS) is included in the plans, furnish and install temporary rumble strips for daytime lane closures. Do not use temporary rumble strips on freeways or expressways.
21. When sheet WZ(BRK) is included in the plans, furnish and install signs CW21-1T "GIVE US A BRAKE".
22. Flags attached to signs shown in the plans are required.
23. Signs END ROAD WORK (G20-2) may be omitted when conflicting with G20-2 signs already in place on the project.
24. The Engineer will determine advisory speeds to be shown on plaques CW13-1P.
25. Temporary work zone devices (including portable barriers) manufactured after December 31, 2019 must have been successfully tested to the 2016 edition of Manual for Assessing Safety Hardware (MASH). Such devices manufactured on or before this date, and successfully tested to either National Cooperative Highway Research Program (NCHRP) Report 350 or the 2009 edition of MASH, may continue to be used.

TRUCK MOUNTED ATTENUATOR REQUIREMENTS

Provide the number of vehicles with truck mounted attenuators listed in the table below. The Contractor shall determine if multiple operations will occur at the same time, to determine the total number of truck mounted attenuators needed for the project.

WZ(BTS-1)	0	TCP(2-3)	0	TCP(6-1)	0
TCP(1-1)	0	TCP(2-4)	0	TCP(6-2)	0
TCP(1-2)	0	TCP(2-5)	0	TCP(6-3)	0
TCP(1-3)	0	TCP(2-6)	0	TCP(6-4)	0
TCP(1-4)	0	TCP(3-1)	0	TCP(6-5)	0
TCP(1-5)	0	TCP(3-2)	0	TCP(6-6)	0
TCP(1-6)	0	TCP(3-3)	0	TCP(6-7)	0
TCP(2-1)	1	TCP(3-4)	0	TCP(6-8)	0
TCP(2-2)	0	TCP(5-1)	0	TCP(6-9)	0
TRAFFIC CONTROL PLAN PILOT VEHICLE OPERATION					0
TRAFFIC CONTROL PLAN TWO LANE CLOSURES ON FOUR LANE UNDIVIDED HIGHWAYS					0
TRAFFIC CONTROL PLAN LANE CLOSURES WITH BARRIER					0
TRAFFIC CONTROL PLAN SHOULDER CLOSURES WITH BARRIER					0
TRAFFIC CONTROL PLAN WORK SPACE NEAR SHOULDER					0
TRAFFIC CONTROL PLAN CROSSOVER CLOSURE					0
TRAFFIC CONTROL PLAN TURNAROUND CLOSURE					0
TRAFFIC CONTROL PLAN LANE CLOSURES WITH TRAFFIC SIGNAL AND BARRIER					0
TRAFFIC CONTROL PLAN LANE CLOSURES WITH TRAFFIC SIGNAL					0
TRAFFIC CONTROL PLAN FREEWAY CLOSURE					0

PORTABLE CHANGEABLE MESSAGE SIGN REQUIREMENTS

Provide the portable changeable message signs listed in the table below. The Contractor shall determine if multiple operations will occur at the same time, to determine the total number of portable changeable message signs needed for the project.

TCP(6-1)	0	TCP(6-4)	0	TCP(6-8)	0
TCP(6-2)	0	TCP(6-6)	0	TCP(6-9)	0
TCP(6-3)	0	TCP(6-7)	0		
TRAFFIC CONTROL PLAN LANE CLOSURES WITH BARRIER					0
TRAFFIC CONTROL PLAN SHOULDER CLOSURES WITH BARRIER					0
TRAFFIC CONTROL PLAN LANE CLOSURES WITH TRAFFIC SIGNAL AND BARRIER					2
TRAFFIC CONTROL PLAN LANE CLOSURES WITH TRAFFIC SIGNAL					0
TRAFFIC CONTROL PLAN FREEWAY CLOSURE					0

TYPICAL USAGE

MOBILE
Work that moves continuously or intermittently (stopping for up to approximately 15 minutes).

SHORT DURATION
Work that occupies a location up to 1 hour.

SHORT TERM STATIONARY
Daytime work that occupies a location for more than 1 hour in a single daylight period.

INTERMEDIATE TERM STATIONARY
Work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than 1 hour.

LONG TERM STATIONARY
Work that occupies a location more than 3 days.

DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

Texas Department of Transportation — San Angelo District

TRAFFIC CONTROL PLAN GENERAL REQUIREMENTS

SHEET 1 OF 1 — NOT TO SCALE

SHEET ISSUED OR LAST REVISED	CONT	SECT	JOB	HIGHWAY
11-19	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		13

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PROPOSED SEQUENCE OF CONSTRUCTION

CSJ 0650-03-031: SH 153 AT VALLEY CREEK

PHASE I

1. INSTALL ADVANCED WARNING SIGNS PER BC(2)-21. INSTALL TEMPORARY EROSION CONTROL MEASURES.
2. INSTALL TRAFFIC CONTROL DEVICES PER TCP(2-1)-18 AND PER PLANS.
3. CONSTRUCT TEMPORARY DRAINAGE AND TEMPORARY PAVEMENT ON SH 153.
4. COMPLETE ALL PHASE I CONSTRUCTION PRIOR TO STARTING PHASE II CONSTRUCTION.

PHASE II

1. INSTALL TEMPORARY EROSION CONTROL MEASURES.
2. INSTALL TRAFFIC CONTROL DEVICES AND PAVEMENT MARKINGS PER SJT STANDARD "TRAFFIC CONTROL PLAN LANE CLOSURES WITH TRAFFIC SIGNAL AND BARRIER" AND PER PLANS. SHIFT TRAFFIC PER PLANS.
3. CONSTRUCT SH 153 BRIDGE REPLACEMENT.
4. COMPLETE ALL PHASE II CONSTRUCTION PRIOR TO STARTING PHASE III CONSTRUCTION.

PHASE III

1. INSTALL TEMPORARY EROSION CONTROL MEASURES.
2. FINAL STRIPING.
3. SHIFT TRAFFIC TO SH 153 MAINLANES.
4. REMOVE ALL TEMPORARY PAVEMENT. PLACE TOPSOIL AND PERMANENT SEEDING WHERE DETOUR WAS LOCATED.
5. COMPLETE FINAL CLEAN UP.

DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

PAPE-DAWSON ENGINEERS
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2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SH 153 AT VALLEY CREEK

TRAFFIC CONTROL PLAN NARRATIVE

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	14

Plotted on: 10/3/2022

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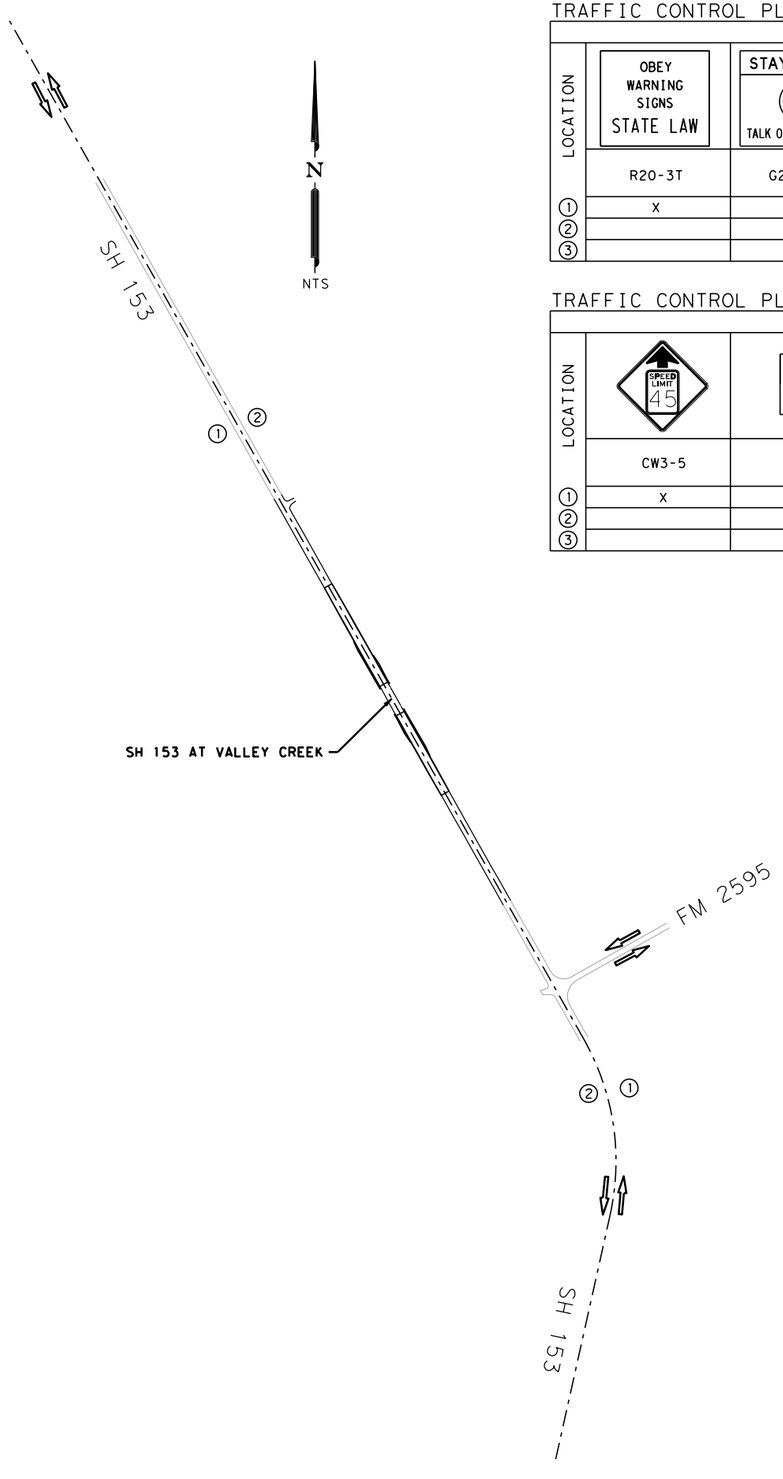

TRAFFIC CONTROL PLAN ITEMS

LOCATION	SIGNING AND DEVICES										
	OBEY WARNING SIGNS STATE LAW	STAY ALERT TALK OR TEXT LATER	BEGIN WORK ZONE	TRAFFIC FINES DOUBLE	WHEN WORKERS ARE PRESENT	ROAD WORK AHEAD	DO NOT PASS	PASS WITH CARE	END ROAD WORK	SPEED LIMIT 75	SPEED LIMIT 60
	R20-3T	G20-10T	G20-9TP	R20-5T	R20-5aTP	CW20-1D	R4-1	R4-2	G20-2	R2-1	R2-1
①	X	X	X	X	X	X	X			X	X
②								X	X	X	X
③						X	X				

TRAFFIC CONTROL PLAN ITEMS (CONTINUED)

LOCATION	SIGNING AND DEVICES								
	SPEED LIMIT 45	SPEED LIMIT 45	WORK ZONE	BEGIN ROAD WORK NEXT 1 MILE	NAME ADDRESS CITY STATE CONTRACTOR				M
	CW3-5	R2-1	G20-5aP	G20-5T	G20-6T	TY III BARRICADE	BARRELS	PCTB	P.C.M.S.
①	X	X		X	X				X
②									
③			X			X	X	X	

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

GENERAL NOTES:

LOCATION NO. 1 TO BE USED AT BEGINNING OF THE PROJECT.

LOCATION NO. 2 TO BE USED AT THE END OF THE PROJECT.

LOCATION NO. 3 (NOT SHOWN ON LEFT) TO BE USED THROUGHOUT THE COURSE OF THE PROJECT AS DIRECTED BY THE ENGINEER.

NOTE:

1. REFER TO TXDOT STANDARDS FOR PROPER SIGN SPACING.
2. REFER TO TCP PHASING SHEETS FOR ADDITIONAL SIGNAGE.
3. CERTAIN SIGNS MUST BE USED IN CONJUNCTION WITH OTHER SIGNS. EXAMPLE: "FLAGGER AHEAD" MUST HAVE A "BE PREPARED TO STOP". REFER TO TCP STANDARDS FOR FURTHER DETAILS.
4. BARRICADES AND WARNING SIGNS ON THIS SHEET ARE THE MINIMUM CONSTRUCTION ZONE, SIGNING. ADDITIONAL BARRICADES, WARNING SIGNS, ARROW PANELS, CONES, ETC. REQUIRED IN ACCORDANCE WITH CURRENT BC STANDARDS AND THE TEXAS MUTCD MAY BE REQUIRED IN AREAS OF ACTUAL CONSTRUCTION.
5. A DISTANCE PLAQUE IN FEET OR MILES MAY BE REQUIRED FOR USE IN CONJUNCTION WITH WARNING SIGNS.

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STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SCHEDULE OF BARRICADES AND ADVANCE WARNING DEVICES

SH 153 AT VALLEY CREEK

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	15

Plotted on: 10/3/2022

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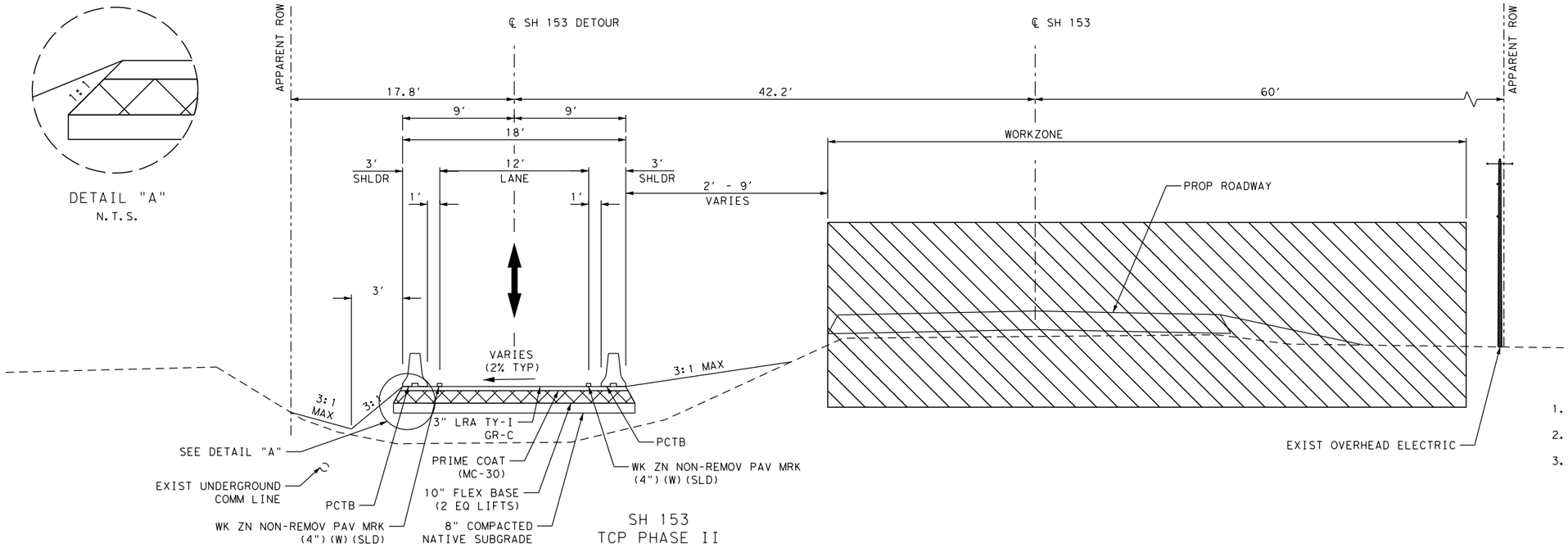
DETAIL "A"
N.T.S.



SH 153
TCP PHASE II
TYPICAL SECTION

STA 606+30.62 TO STA 611+31(LT), STA 611+41(RT)
STA 612+53(LT), STA 612+20(RT) TO STA 619+23.87

NOTES:

1. PCTB SHALL BE PINNED TO TEMPORARY PAVEMENT PER CSB(7)-10.
2. SEE RETAINING WALL SHEETS FOR LIMITS OF TEMP WALL.
3. TEMP DETOUR PAID USING ITEM 508 WITH PAVEMENT ITEMS TO BE PAID SEPARATELY PER TXDOT SPEC.

DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

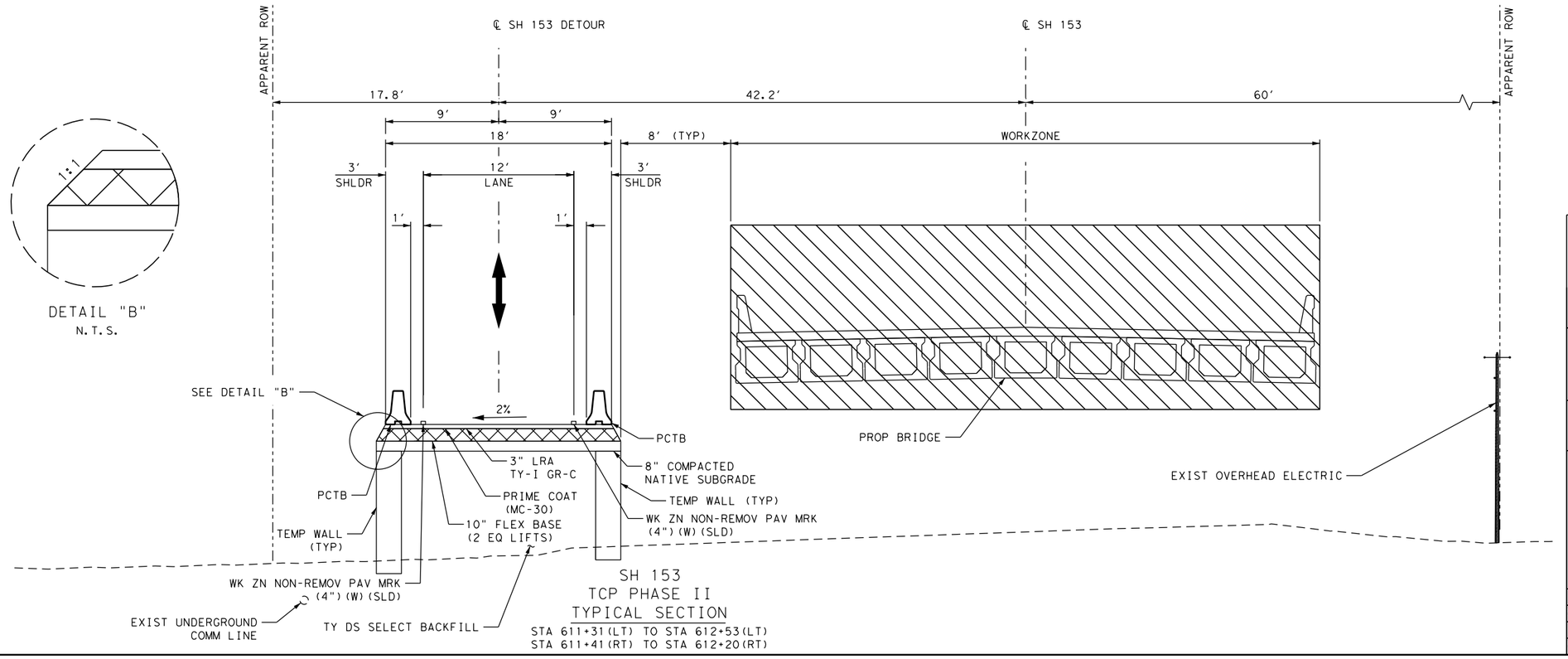
APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

0 5 10
SCALE: 1"= 10′

DETAIL "B"
N.T.S.



SH 153
TCP PHASE II
TYPICAL SECTION

STA 611+31(LT) TO STA 612+53(LT)
STA 611+41(RT) TO STA 612+20(RT)

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STRUCTURAL ENGINEERING ASSOCIATES, INC.
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TRAFFIC CONTROL PLAN TYPICAL SECTIONS

SH 153 AT VALLEY CREEK

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	16

Plotted on: 10/3/2022

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℄ SH 153 DETOUR

Beginning chain SH153TEMPCL description

				Curve Data			
Curve SH153TEMPCUR01							
P.I. Station			601+99.10	N	10,712,600.95	E	2,364,605.98
Delta	=	4° 00′ 03.43"	(LT)				
Degree	=	1° 00′ 18.68"					
Tangent	=		199.10				
Length	=		398.03				
Radius	=		5,700.00				
External	=		3.48				
Long Chord	=		397.95				
Mid. Ord.	=		3.47				
P.C. Station			600+00.00	N	10,712,427.54	E	2,364,703.80
P.T. Station			603+98.03	N	10,712,767.11	E	2,364,496.30
C.C.				N	10,709,627.09	E	2,359,739.17
Back	= N	29° 25′ 35.44"	W				
Ahead	= N	33° 25′ 38.87"	W				
Chord Bear	= N	31° 25′ 37.15"	W				

Course from PT SH153TEMPCUR01 to PC SH153TEMPCUR02 N 33° 25′ 38.87" W Dist 130.95

				Curve Data			
Curve SH153TEMPCUR02							
P.I. Station			608+03.87	N	10,713,105.82	E	2,364,272.73
Delta	=	4° 00′ 03.43"	(RT)				
Degree	=	0° 43′ 40.90"					
Tangent	=		274.89				
Length	=		549.56				
Radius	=		7,870.00				
External	=		4.80				
Long Chord	=		549.45				
Mid. Ord.	=		4.80				
P.C. Station			605+28.98	N	10,712,876.40	E	2,364,424.16
P.T. Station			610+78.54	N	10,713,345.25	E	2,364,137.68
C.C.				N	10,717,211.83	E	2,370,992.34
Back	= N	33° 25′ 38.87"	W				
Ahead	= N	29° 25′ 35.44"	W				
Chord Bear	= N	31° 25′ 37.15"	W				

Course from PT SH153TEMPCUR02 to PC SH153TEMPCUR03 N 29° 25′ 35.44" W Dist 391.92

				Curve Data			
Curve SH153TEMPCUR03							
P.I. Station			617+45.35	N	10,713,926.03	E	2,363,810.07
Delta	=	4° 00′ 03.43"	(RT)				
Degree	=	0° 43′ 40.90"					
Tangent	=		274.89				
Length	=		549.56				
Radius	=		7,870.00				
External	=		4.80				
Long Chord	=		549.45				
Mid. Ord.	=		4.80				
P.C. Station			614+70.46	N	10,713,686.60	E	2,363,945.12
P.T. Station			620+20.02	N	10,714,174.30	E	2,363,692.05
C.C.				N	10,717,553.19	E	2,370,799.79
Back	= N	29° 25′ 35.44"	W				
Ahead	= N	25° 25′ 32.01"	W				
Chord Bear	= N	27° 25′ 33.72"	W				

Course from PT SH153TEMPCUR03 to PC SH153TEMPCUR04 N 25° 25′ 32.01" W Dist 130.95

				Curve Data			
Curve SH153TEMPCUR04							
P.I. Station			623+50.06	N	10,714,472.38	E	2,363,550.34
Delta	=	4° 00′ 03.43"	(LT)				
Degree	=	1° 00′ 18.68"					
Tangent	=		199.10				
Length	=		398.03				
Radius	=		5,700.00				
External	=		3.48				
Long Chord	=		397.95				
Mid. Ord.	=		3.47				
P.C. Station			621+50.97	N	10,714,292.57	E	2,363,635.82
P.T. Station			625+49.00	N	10,714,645.79	E	2,363,452.53
C.C.				N	10,711,845.34	E	2,358,487.90
Back	= N	25° 25′ 32.01"	W				
Ahead	= N	29° 25′ 35.44"	W				
Chord Bear	= N	27° 25′ 33.72"	W				

Ending chain SH153TEMPCL description

DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

TCP HORIZONTAL ALIGNMENT DATA

SH 153 AT VALLEY CREEK

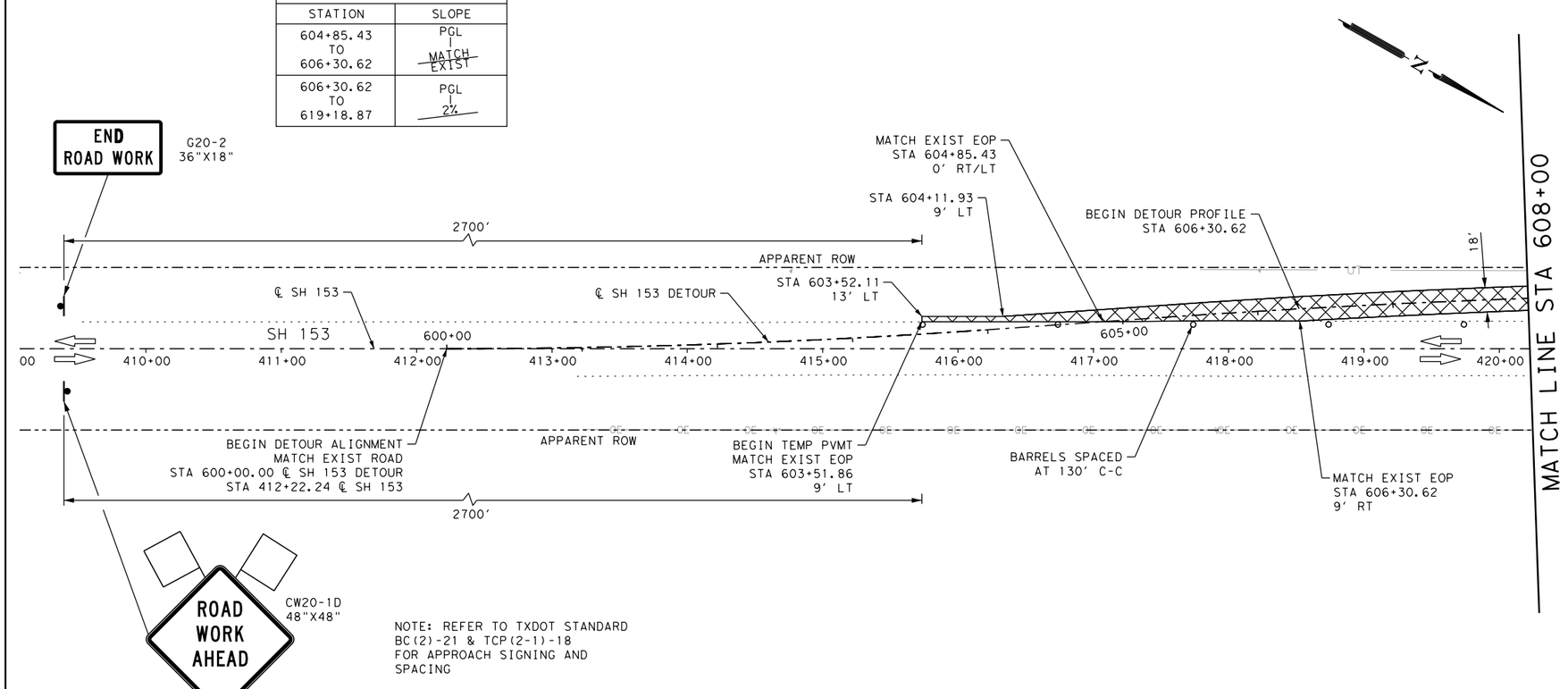
DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	17

Plotted on: 10/3/2022

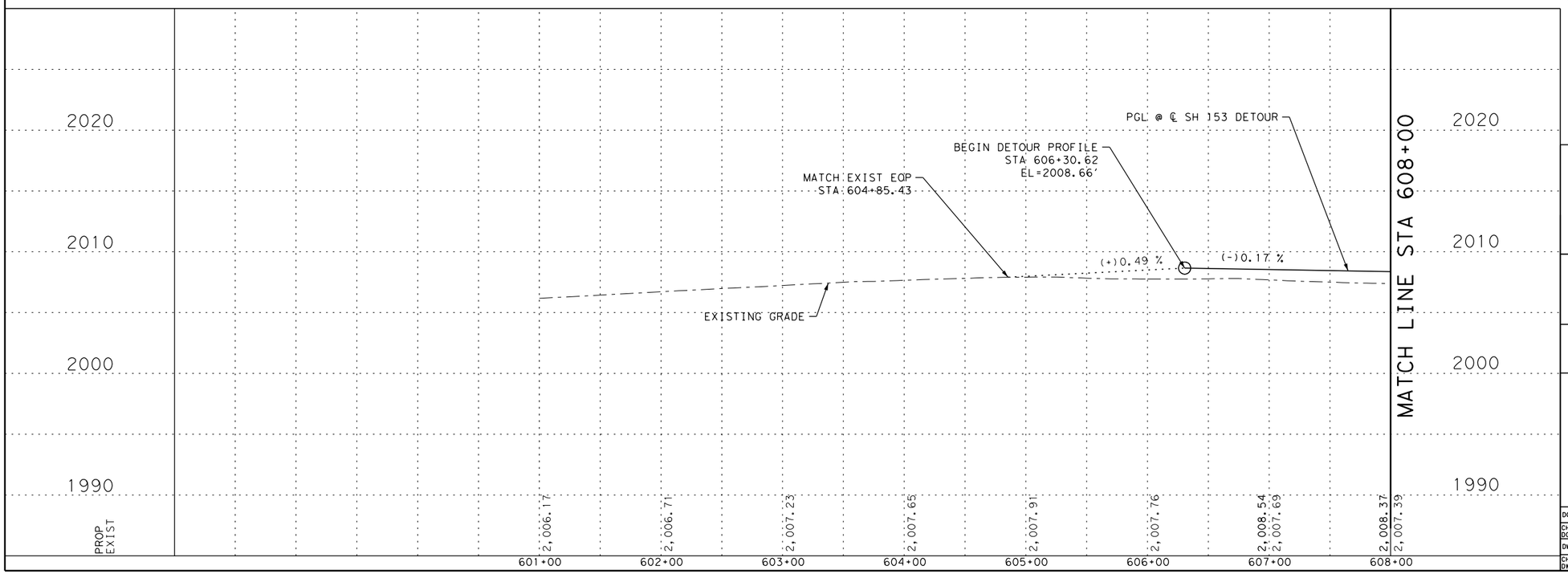
Design Filename: P:\118\79\01\Design\Civil\TCP\SH153-TCP-HALN-01.dgn

DETOUR SUPERELEVATION DATA	
STATION	SLOPE
604+85.43 TO 606+30.62	PGL | MATCH EXIST
606+30.62 TO 619+18.87	PGL | 2%

ITEM	DESCRIPTION	UNIT	QTY
0110-6001	EXCAVATION (ROADWAY)	CY	119
0132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	13
0247-6304	FL BS (CMP IN PLACE) (TY D GR 1&2)(10")	SY	678
0310-6009	PRIME COAT (MC-30)	GAL	136
0330-6004	LRA PAV TY-I GR-C	TON	105
0508-6002	CONSTRUCTING DETOURS (EBSS)	SY	636
6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	72



NOTE: REFER TO TXDOT STANDARD BC(2)-21 & TCP(2-1)-18 FOR APPROACH SIGNING AND SPACING



LEGEND

TEMPORARY PAVEMENT — SIGN

PLASTIC DRUMS — TRAFFIC FLOW ARROWS

NOTES

1. SEE HORIZONTAL ALIGNMENT DATA SHEETS FOR HORIZONTAL ALIGNMENT DATA.
2. EXISTING FEATURES ARE SHOWN SCREENED BACK; i.e. DOTTED.
3. EXISTING PAVEMENT MARKINGS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS SHALL BE REMOVED.
4. CONTRACTOR TO AVOID CONTACT WITH EXISTING OH LINES DURING ANY LIFTING OR MISCELLANEOUS CONSTRUCTION ACTIVITIES.

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

0 50 100

SCALE: PLAN 1" = 100' PROFILE: 1" = 10'

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TCP
PLAN AND PROFILE

PHASE I

SH 153 AT VALLEY CREEK

SHEET 1 OF 3

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	18

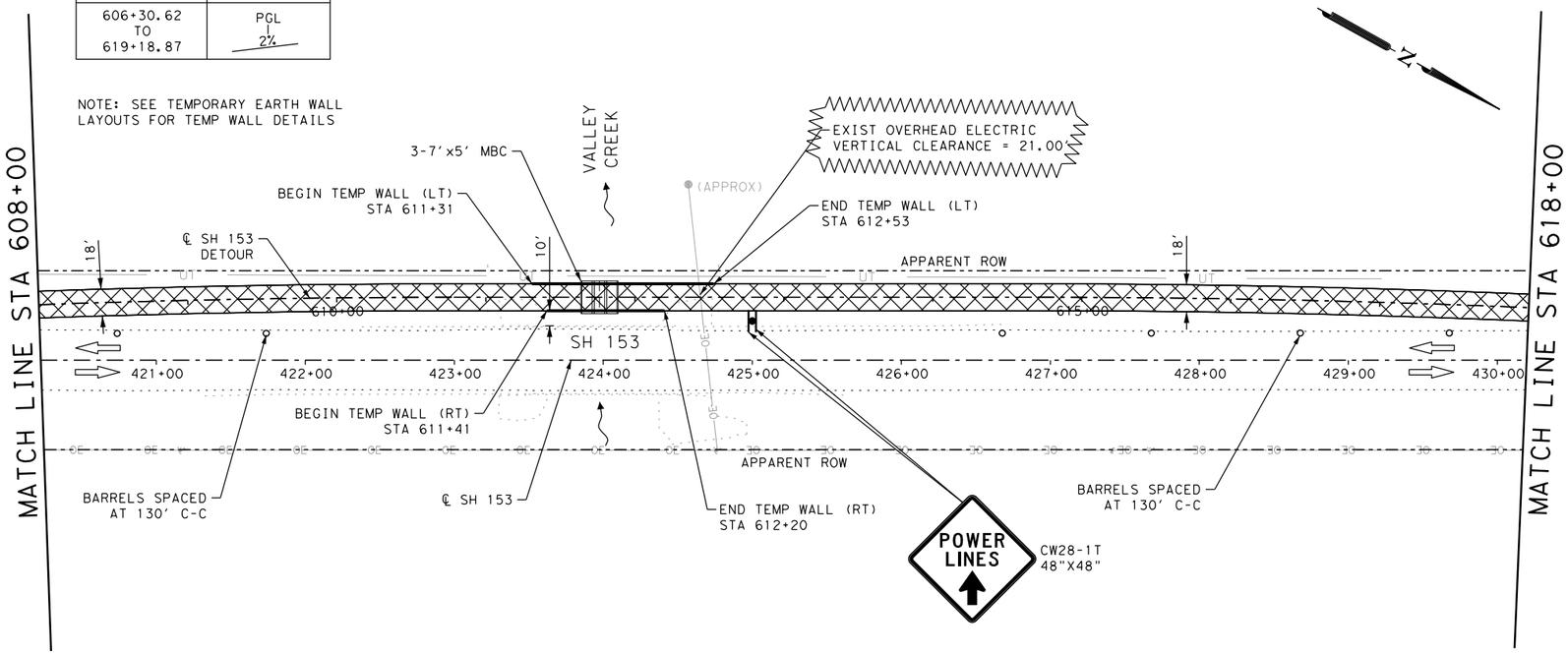
Plotted on: 10/3/2022

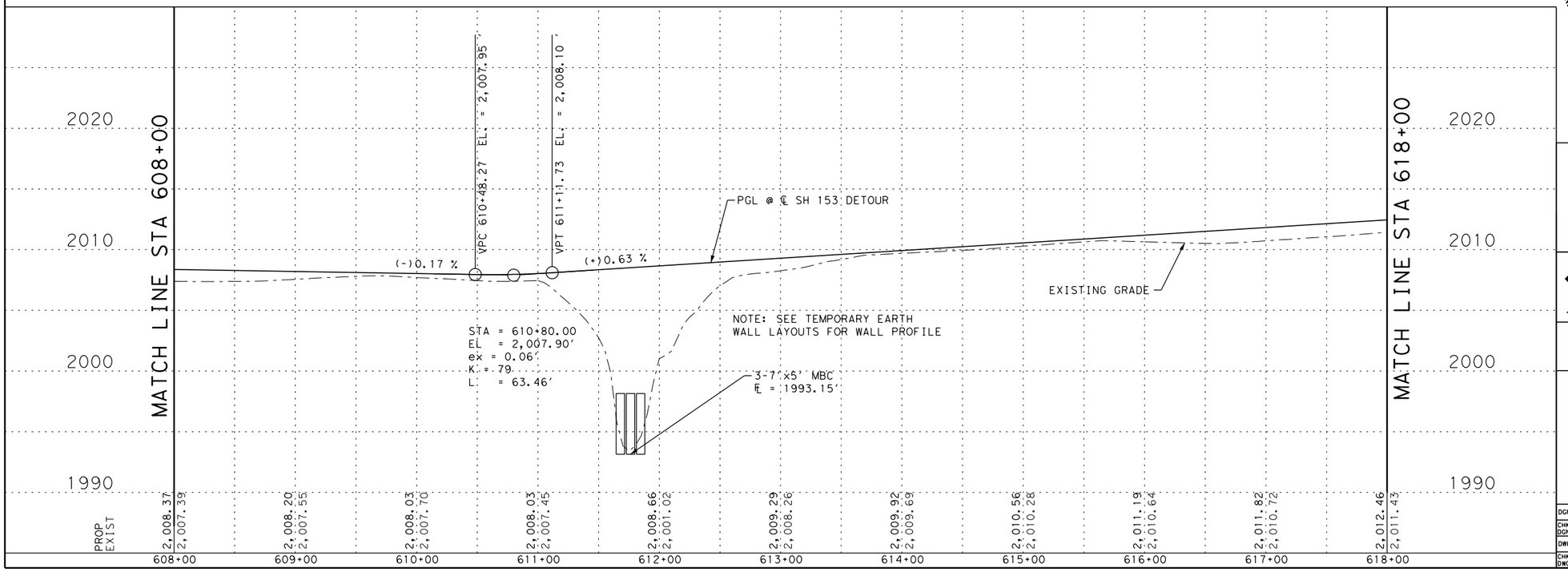
Design Filename: P:\118\79\01\Design\Civil\TCP\SH153-Phase I\SH153-TCP-P1-01.dgn

Plotted on: 10/3/2022

Design Filename: P:\118\79\01\Design\Civil\TCP\SH153-Phase I\SH153-TCP-P1-02.dgn

DETOUR SUPERELEVATION DATA	
STATION	SLOPE
606+30.62 TO 619+18.87	PGL 2%





ITEM	DESCRIPTION	UNIT	QTY
0110-6001	EXCAVATION (ROADWAY)	CY	953
0132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	22
0247-6304	FL BS (CMP IN PLACE) (TY D GR 1&2)(10")	SY	2,094
0310-6009	PRIME COAT (MC-30)	GAL	419
0330-6004	LRA PAV TY-I GR-C	TON	330
0423-6003	RETAINING WALL (TEMP WALL)	SF	1,593
0508-6002	CONSTRUCTING DETOURS (EBSS)	SY	2,000

LEGEND

TEMPORARY PAVEMENT

SIGN

PLASTIC DRUMS

TRAFFIC FLOW ARROWS

NOTES

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DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

0 50 100

SCALE: PLAN 1" = 100' PROFILE: 1" = 10'

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STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

TCP
PLAN AND PROFILE

PHASE I

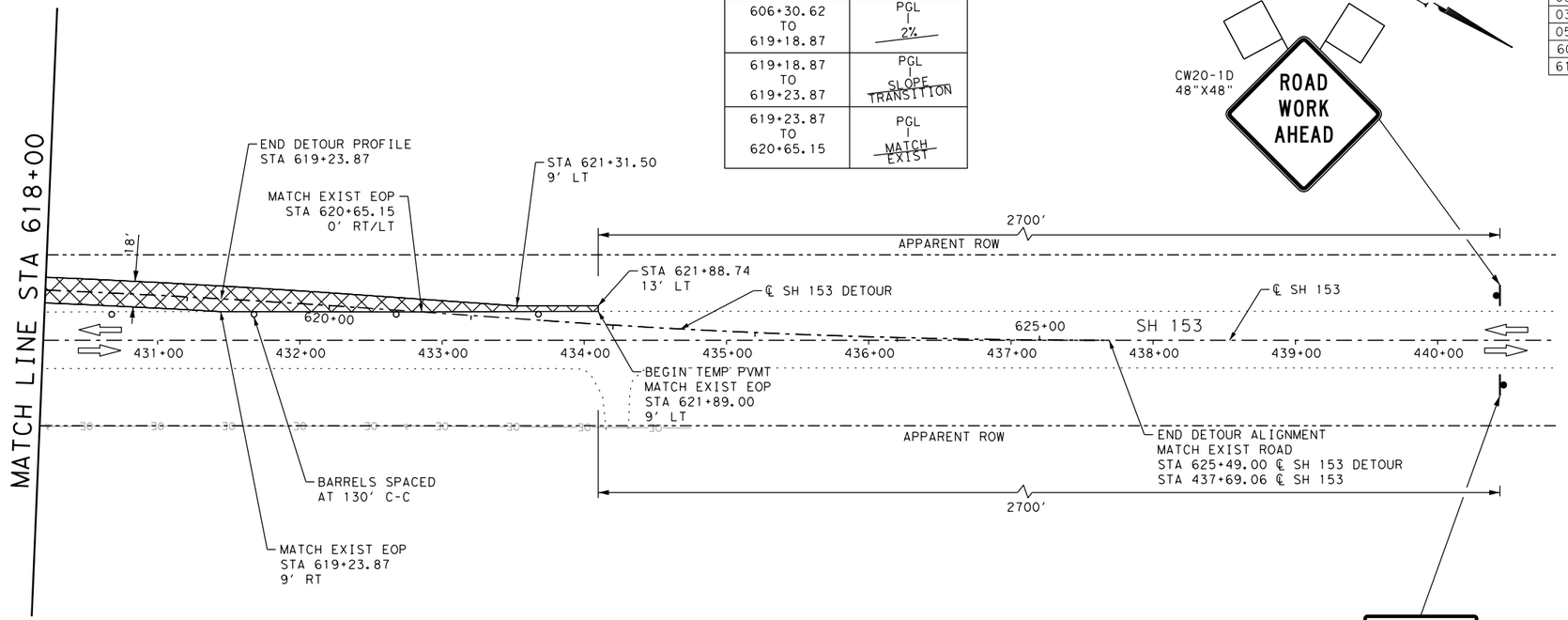
SH 153 AT VALLEY CREEK

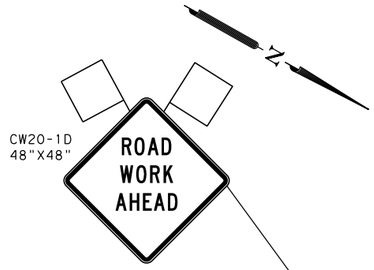
DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	19

Plotted on: 10/3/2022

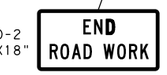
DETOUR SUPERELEVATION DATA	
STATION	SLOPE
606+30.62 TO 619+18.87	PGL | 2%
619+18.87 TO 619+23.87	PGL | SLOPE TRANSITION
619+23.87 TO 620+65.15	PGL | MATCH EXIST

ITEM	DESCRIPTION	UNIT	QTY
0110-6001	EXCAVATION (ROADWAY)	CY	150
0132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	1
0247-6304	FL BS (CMP IN PLACE) (TY D GR 1&2)(10")	SY	573
0310-6009	PRIME COAT (MC-30)	GAL	115
0330-6004	LRA PAV TY-I GR-C	TON	88
0508-6002	CONSTRUCTING DETOURS (EBSS)	SY	536
6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	72
6185-6002	TMA (STATIONARY)	DAY	36





NOTE: REFER TO TXDOT STANDARD BC(2)-21 & TCP(2-1)-18 FOR APPROACH SIGNING AND SPACING



LEGEND

TEMPORARY PAVEMENT — SIGN

PLASTIC DRUMS — TRAFFIC FLOW ARROWS

NOTES

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DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

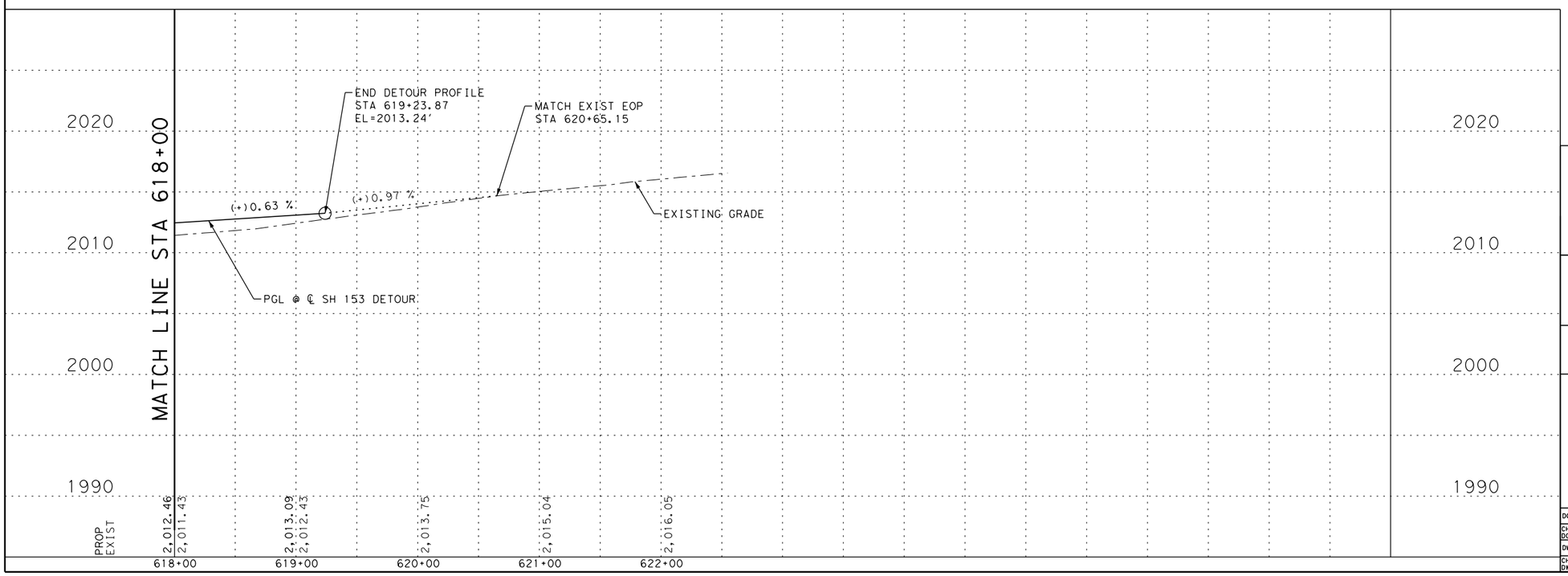
APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

0 50 100

SCALE: PLAN 1" = 100' PROFILE: 1" = 10'



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TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

STRUCTURAL ENGINEERING ASSOCIATES, INC.

CONSULTING ENGINEERS

TBPE FIRM REG. NO. F-199

TCP
PLAN AND PROFILE

PHASE I

SH 153 AT VALLEY CREEK

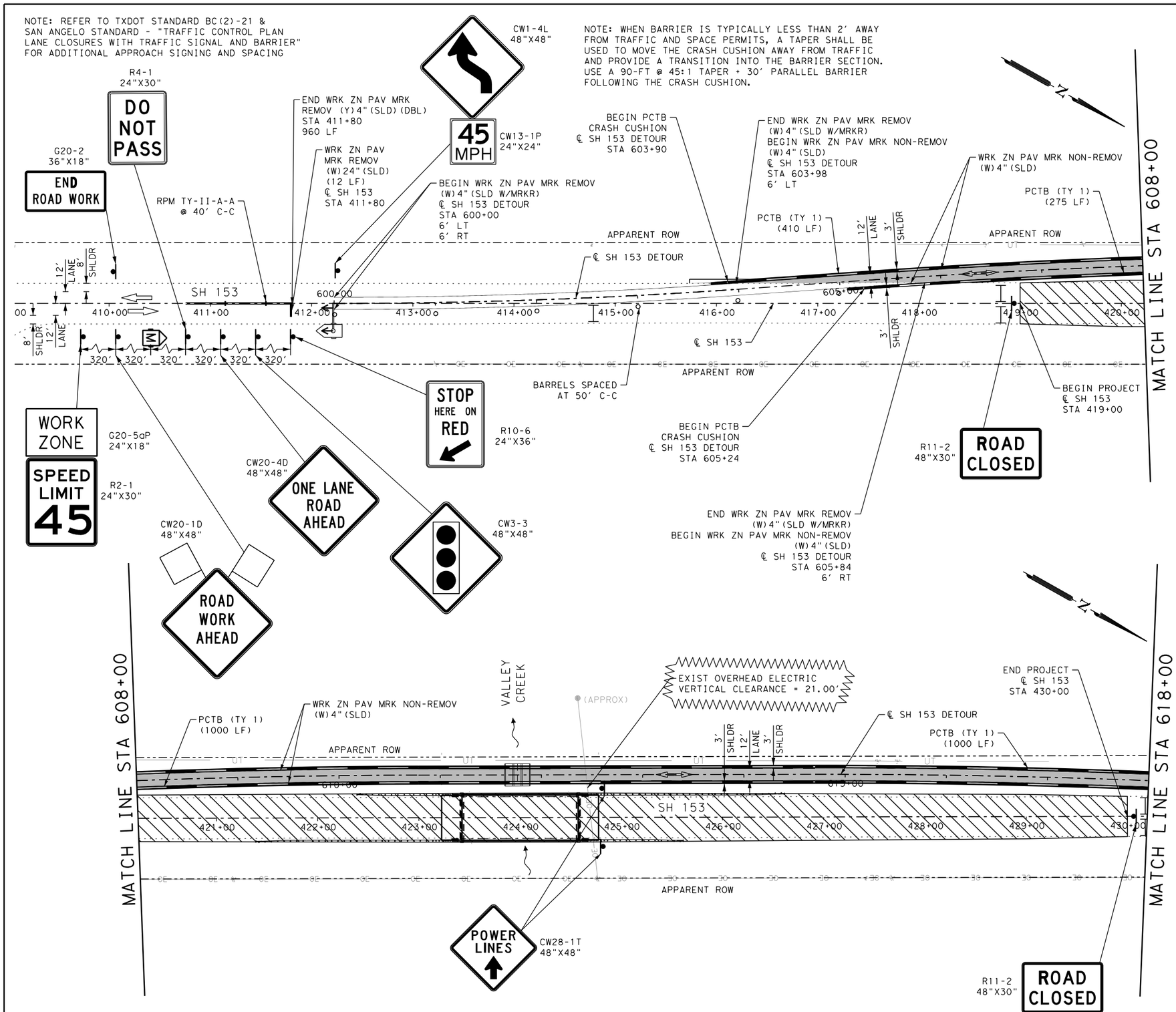
SHEET 3 OF 3

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	20

Design Filename: P:\118\79\01\Design\Civil\TCP\SH153-Phase I\SH153-TCP-P1-03.dgn

NOTE: REFER TO TXDOT STANDARD BC(2)-21 & SAN ANGELO STANDARD - "TRAFFIC CONTROL PLAN LANE CLOSURES WITH TRAFFIC SIGNAL AND BARRIER" FOR ADDITIONAL APPROACH SIGNING AND SPACING

NOTE: WHEN BARRIER IS TYPICALLY LESS THAN 2' AWAY FROM TRAFFIC AND SPACE PERMITS, A TAPER SHALL BE USED TO MOVE THE CRASH CUSHION AWAY FROM TRAFFIC AND PROVIDE A TRANSITION INTO THE BARRIER SECTION. USE A 90-FT @ 45:1 TAPER + 30' PARALLEL BARRIER FOLLOWING THE CRASH CUSHION.



ITEM	DESCRIPTION	UNIT	QTY
0510-6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO	7
0512-6005	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)	LF	2,685
0512-6053	PORT CTB (REMOVE)(F-SHAPE)(TY 1)	LF	2,685
0545-6005	CRASH CUSH ATTEN (REMOVE)	EA	2
0545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	2
0662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	2,618
0662-6050	WK ZN PAV MRK REMOV (REFL) TY II-A-A	EA	48
0662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	982
0662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	12
0662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	1,920
0677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	2,194
6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	200

LEGEND

- CONSTRUCTION AREA
- TEMPORARY PAVEMENT
- TYPE III BARRICADE
- PLASTIC DRUMS
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
- PCTB
- SIGN
- TRAFFIC FLOW ARROWS
- TEMPORARY TRAFFIC SIGNAL

NOTES

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2. EXISTING FEATURES ARE SHOWN SCREENED BACK; i.e. DOTTED.
3. EXISTING PAVEMENT MARKINGS CONFLICTING WITH WORK ZONE PAVEMENT MARKINGS SHALL BE REMOVED.
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DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

0 50 100 150

SCALE: 1"= 100'

PAPE-DAWSON ENGINEERS
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2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

TCP
PLAN AND PROFILE

PHASE II

SH 153 AT VALLEY CREEK

SHEET 1 OF 2

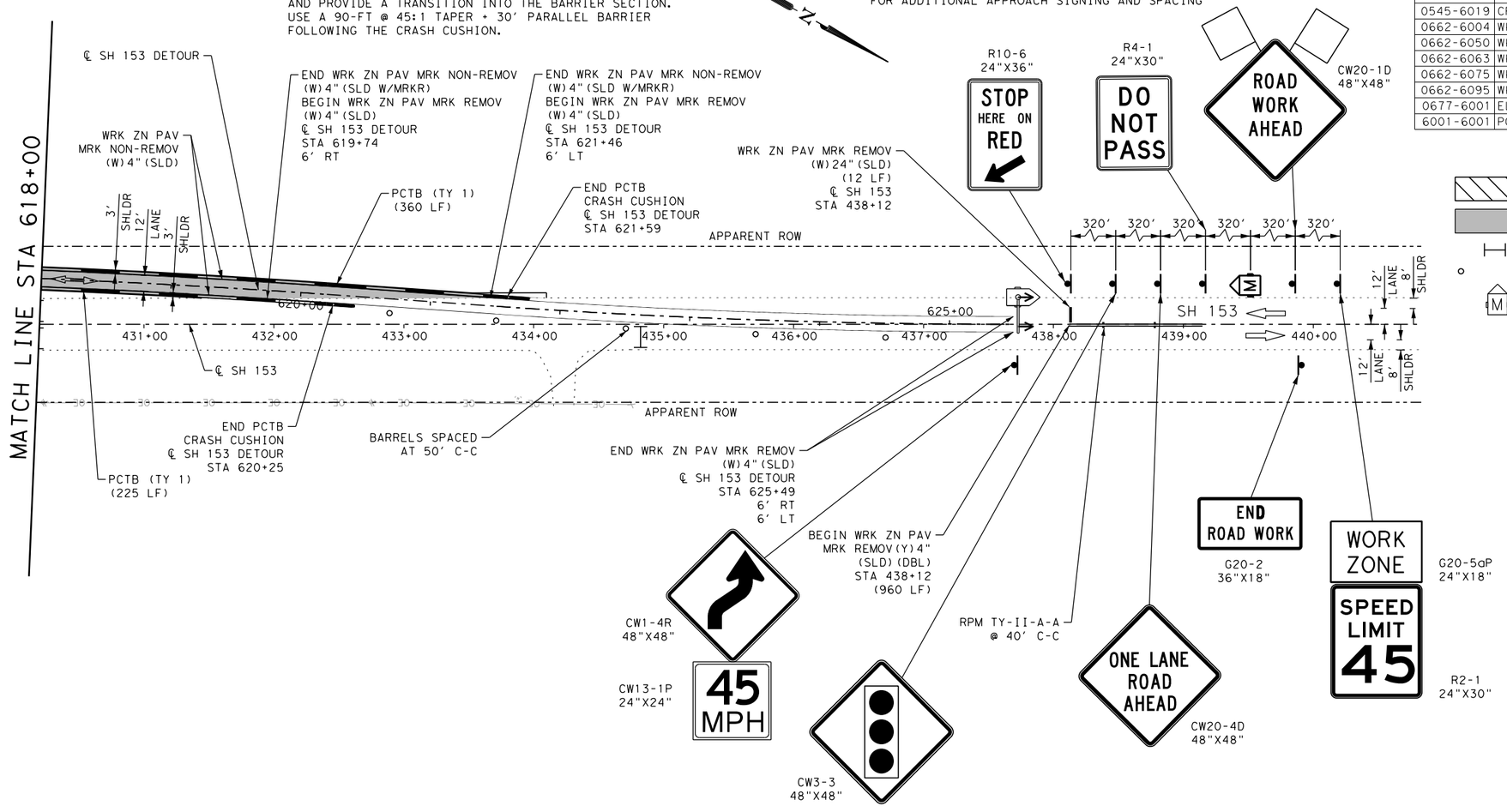
DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	21

Plotted on: 10/3/2022

Design Filename: P:\118\79\01\Design\Civil\TCP\SH153-Phase II\SH153-TCP-P2-01.dgn

NOTE: WHEN BARRIER IS TYPICALLY LESS THAN 2' AWAY FROM TRAFFIC AND SPACE PERMITS, A TAPER SHALL BE USED TO MOVE THE CRASH CUSHION AWAY FROM TRAFFIC AND PROVIDE A TRANSITION INTO THE BARRIER SECTION. USE A 90-FT @ 45:1 TAPER + 30' PARALLEL BARRIER FOLLOWING THE CRASH CUSHION.

NOTE: REFER TO TXDOT STANDARD BC(2)-21 & SAN ANGELO STANDARD - "TRAFFIC CONTROL PLAN LANE CLOSURES WITH TRAFFIC SIGNAL AND BARRIER" FOR ADDITIONAL APPROACH SIGNING AND SPACING



ITEM	DESCRIPTION	UNIT	QTY
0512-6005	PORT CTB (FUR & INST)(F-SHAPE)(TY 1)	LF	585
0512-6053	PORT CTB (REMOVE)(F-SHAPE)(TY 1)	LF	585
0545-6005	CRASH CUSH ATTEN (REMOVE)	EA	2
0545-6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA	2
0662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	521
0662-6050	WK ZN PAV MRK REMOV (REFL) TY II-A-A	EA	48
0662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	978
0662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	12
0662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	1,920
0677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	2,245
6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	200

LEGEND

- CONSTRUCTION AREA
- TEMPORARY PAVEMENT
- TYPE III BARRICADE
- PLASTIC DRUMS
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
- PCTB
- SIGN
- TRAFFIC FLOW ARROWS
- TEMPORARY TRAFFIC SIGNAL

NOTES

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DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

0 50 100 150

SCALE: 1" = 100'

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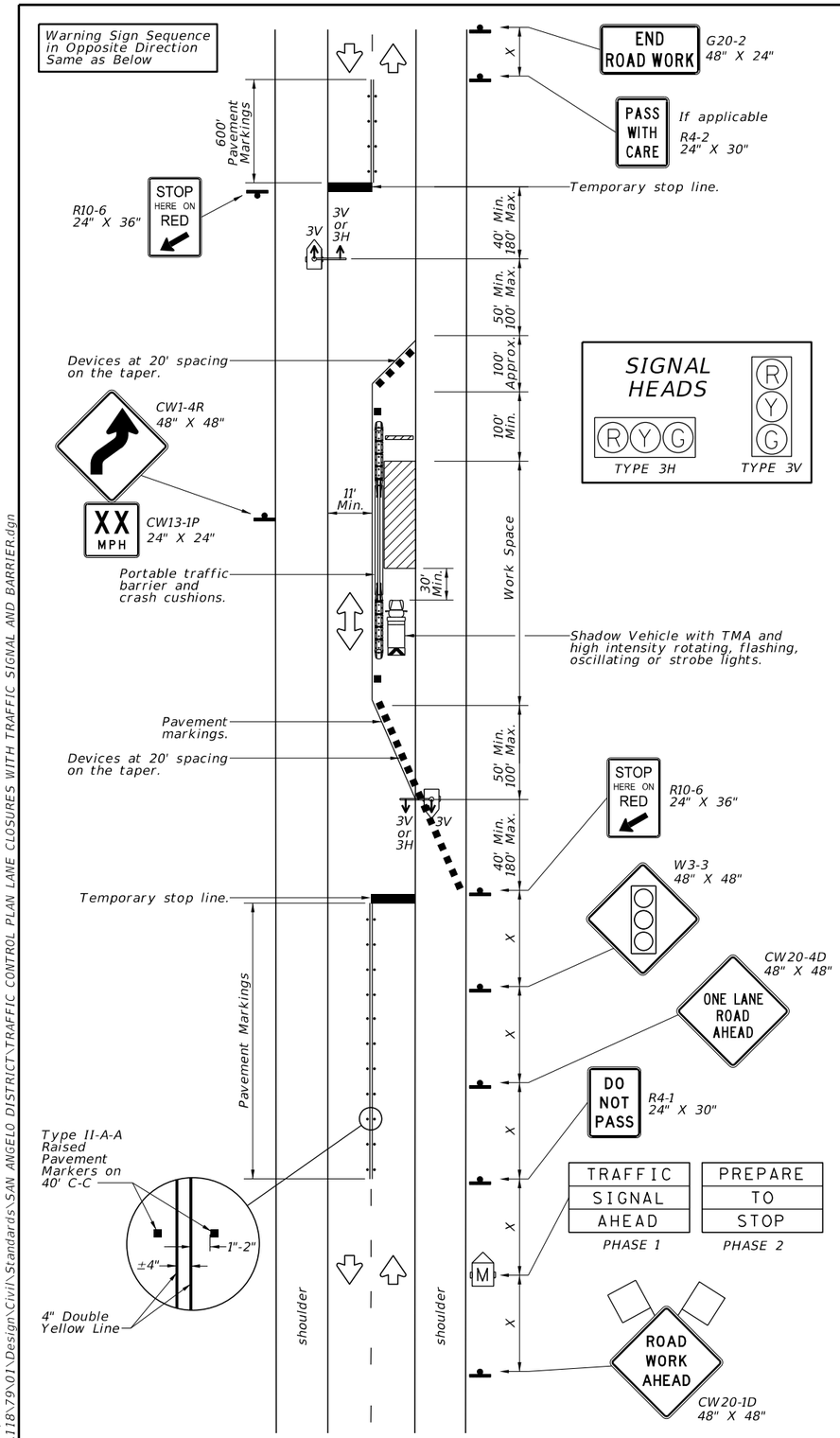
TCP
PLAN AND PROFILE

PHASE II

SH 153 AT VALLEY CREEK

SHEET 2 OF 2

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	22



TYPICAL CONVENTIONAL ROADWAY
LANE CLOSURE WITH TRAFFIC SIGNAL AND BARRIER

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FILE: P:\118\79\01\Design\Civil\Standards\SAN ANGELO DISTRICT\TRAFFIC CONTROL PLAN LANE CLOSURES WITH TRAFFIC SIGNAL AND BARRIER.dgn

TRAFFIC SIGNAL NOTES

1. Temporary traffic control signals shall be installed and operated in accordance with the provisions of TMUTCD Part 4. Temporary traffic control signals shall meet the physical display and operational requirements of conventional traffic control signals.
2. The Engineer will establish the initial (minimum green) time G. Durations of red clearance intervals shall be adequate to clear the one-lane section of conflicting vehicles.
3. When the temporary traffic control signal is changed to the flashing mode, either manually or automatically, red signal indications shall be flashed to both approaches.
4. Existing conflicting pavement markings and raised pavement marker reflectors between the activity area and the stop line shall be removed. After the temporary traffic control signal is removed, the stop lines and other temporary pavement markings shall be removed and the permanent pavement markings restored.
5. Where no-passing lines are not already in place, they should be added.
6. Adjustments in the location of the advance warning signs should be made as needed to accommodate the horizontal or vertical alignment of the roadway, recognizing that the distances shown for sign spacings are minimums. Adjustments in the height of the signal heads should be made as needed to conform to the vertical alignment.
7. The maximum length of activity area for one-way operation under temporary traffic control signal control is determined by the capacity required to handle the peak demand.
8. Adjust signal timing to accommodate field conditions, as directed. Make trial runs prior to opening work zone to traffic. The all-red time R should approximate the travel time between stop bars. The Engineer will determine the all-red time R based on trial runs.
9. Locate the detection areas approximately 30 ft. upstream of the stop bars. The size of the detection areas shall be approximately 6 ft. wide (lateral to the flow of traffic and centered in the lane) and approximately 6 ft. long (in the direction of traffic).
10. Whenever the signal heads for Phase 2 are green or yellow, the signal heads for Phase 6 shall be red. Whenever the signal heads for Phase 6 are green or yellow, the signal heads for Phase 2 shall be red.
11. Display all-red time R plus 5 seconds between the end of yellow for one phase and the beginning of green for the other phase.
12. In the absence of vehicle actuation, the signals shall have all-red time of R plus 5 seconds and then rest in red.

SIGNAL TIMING INFORMATION

PHASE		2	6
INITIAL (MINIMUM GREEN)		G	G
GREEN EXTENSION		2 TO 3	2 TO 3
YELLOW		4	4
ALL-RED BEFORE NEXT PHASE BEGINS	IF PHASE 2 FOLLOWS	-	R+5
	IF PHASE 6 FOLLOWS	R+5	-

PHASE SEQUENCE	ALL-RED TIME
PHASE 2 FOLLOWED BY PHASE 6	R+5
PHASE 6 FOLLOWED BY PHASE 2	R+5

STANDARD SHEETS

ITEM 512: BARRIERGUARD, ZONEGUARD, CSB(1), CSB(7), CSB(8), SSCB(2), SSCB(5)
ITEM 545: ABSORB(M), SLED, SLEDMINI

PAY ITEMS

0510 6003	ONE-WAY TRAF CONT (PORT TRAF SIG)	MO
0512 6089	PTB(FRN&INSTL)(SSCB OR CSB)(TY1)OR(STL)	LF
0512 6090	PTB(MOVE)(SSCB OR CSB)(TY1)OR(STL)	LF
0512 6091	PTB(REMOVE)(SSCB OR CSB)(TY1)OR(STL)	LF
0512 6094	PTB (FUR & INST)(STEEL)	LF
0512 6095	PTB (MOVE)(STEEL)	LF
0512 6096	PTB (REMOVE)(STEEL)	LF
0512 6097	PTB (STKPL)(STEEL)	LF
0512 6098	PTB (DES SOURCE)(STEEL)	LF
0545 6002	CRASH CUSH ATTEN (DES SOURCE)	EA
0545 6003	CRASH CUSH ATTEN (MOVE & RESET)	EA
0545 6004	CRASH CUSH ATTEN (STKPL)	EA
0545 6005	CRASH CUSH ATTEN (REMOVE)	EA
0545 6019	CRASH CUSH ATTEN (INSTL)(S)(N)(TL3)	EA
0662 6050	WK ZN PAV MRK REMOV (REFL) TY II-A-A	EA
0662 6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF
0662 6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF
0662 6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF
0677 6001	ELIM EXT PAV MRK & MRKS (4")	LF
6001 6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY
6185 6002	TMA (STATIONARY)	DAY

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
	Raised Pavement Markers Ty II-AA	P	Pilot Vehicle
	Temporary or Portable Traffic Signal		Automated Flagger Assistance Device (AFAD)

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'
80		800'	880'	960'	80'	160'	1000'	615'	910'

✻✻ 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
			✓	✓

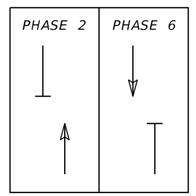
GENERAL NOTES

1. Drums are the typical channelizing devices.
2. 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 ft. to 100 ft. in advance of the area of crew exposure without adversely affecting the work performance. If workers are no longer present but road work 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. Additional shadow vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
3. Anchor portable traffic barrier so that deflection does not exceed three feet at base of barrier in roadway installations, and does not exceed seven feet in bridge installations.
4. When recommended by the manufacturer, provide steel traffic barrier expansion sections where crossing bridge expansion joints.
5. Install a temporary edge line from the upstream end of the merging taper to the downstream end of the downstream taper. Use temporary removable prefabricated pavement markings. Remove conflicting pavement markings as directed.
6. Alter the shoulder markings as required to provide 11 ft. minimum lane widths.
7. A list of approved portable traffic signals can be found in the "Compliant Work Zone Traffic Control Devices" list.

DESIGN
STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER
10/3/2022 DATE

APPROVAL
STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER
10/3/2022 DATE

PHASE DIAGRAMS



Texas Department of Transportation — San Angelo District

TRAFFIC CONTROL PLAN LANE CLOSURES WITH TRAFFIC SIGNAL AND BARRIER

SHEET 1 OF 1 — NOT TO SCALE

©TxDOT 2022	CONT	SECT	JOB	HIGHWAY
SHEET ISSUED OR LAST REVISED	0650	03	031	SH 153
07-20	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		23

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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

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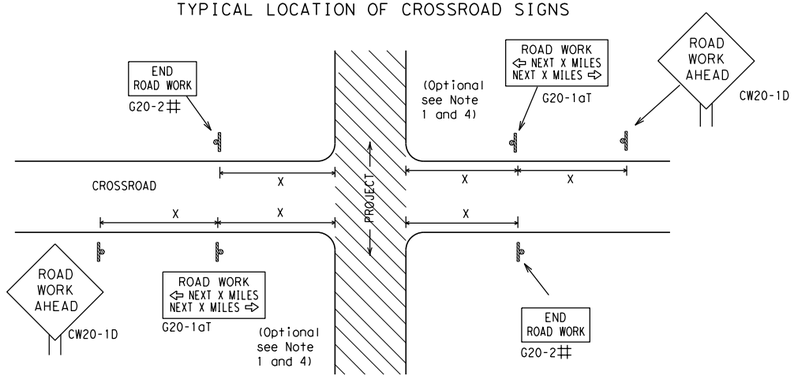
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13	0650	03	031	SH 153
9-07 8-14	DIST	COUNTY		SHEET NO.
5-10 5-21	SJT	RUNNELS		24

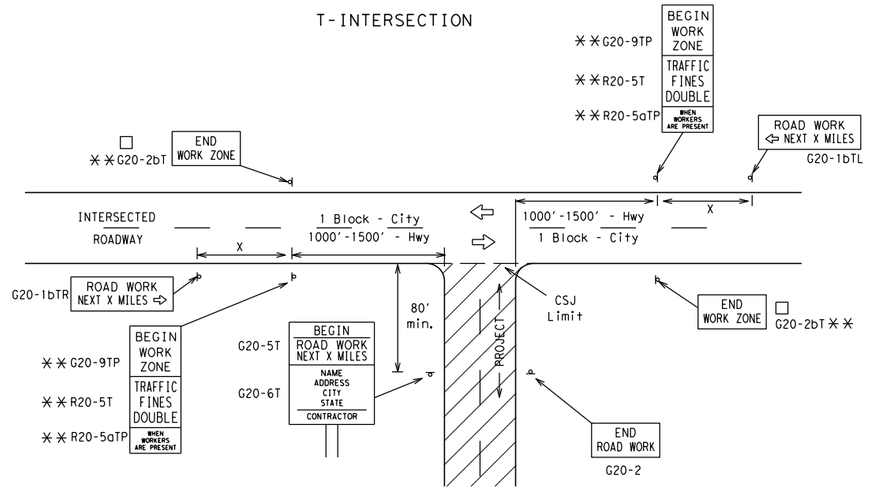
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

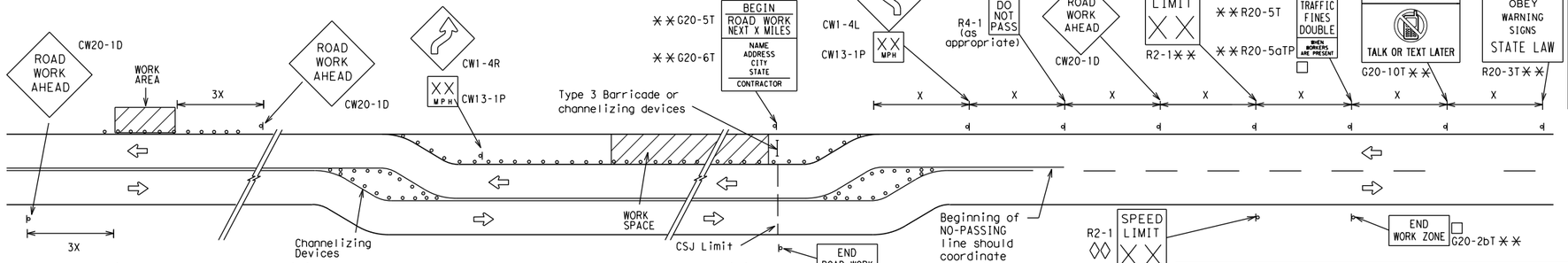
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

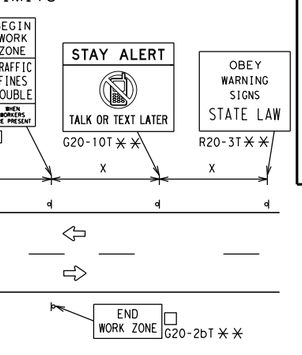
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

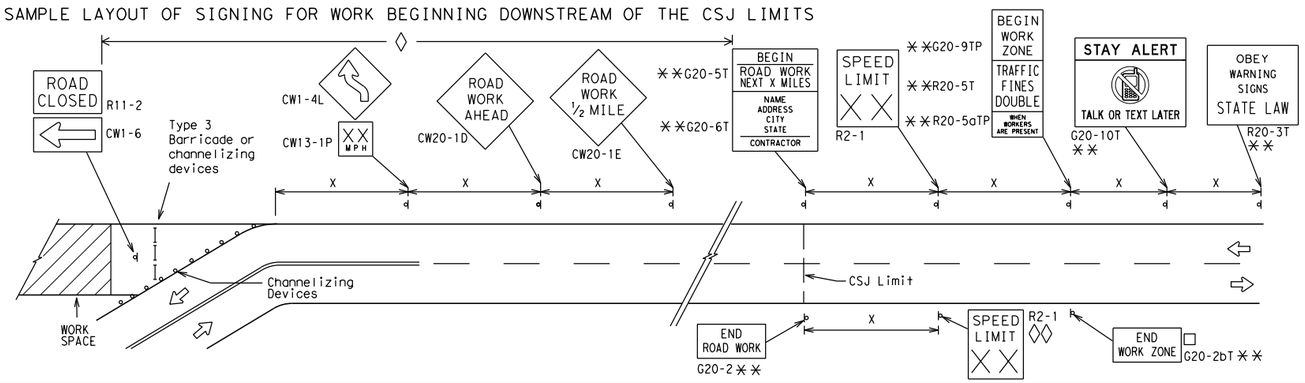


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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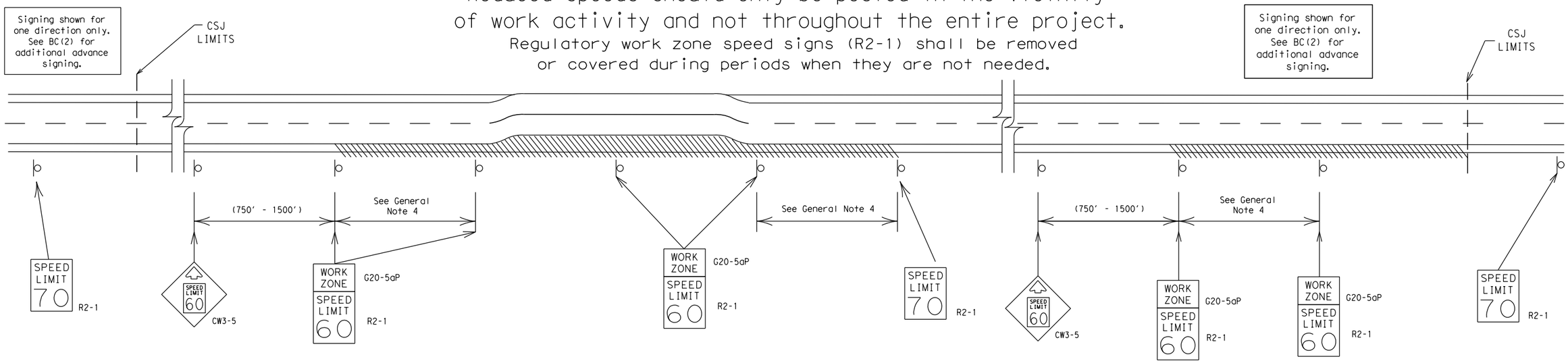
REVISIONS	0650	03	031	SH 153
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SJT	RUNNELS		25

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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7-13 5-21	SJT	RUNNELS		26

97

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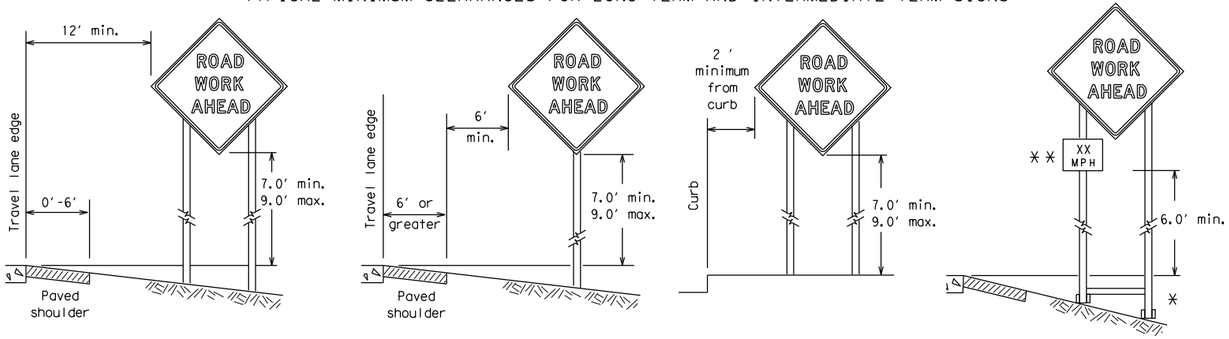
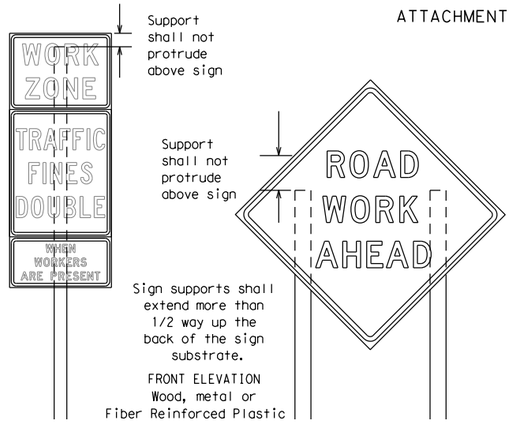
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

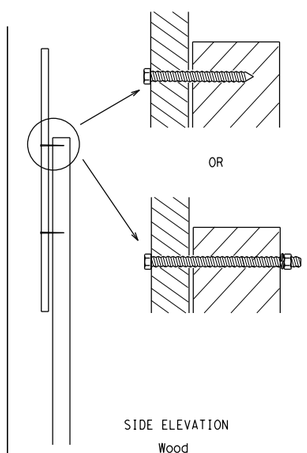


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





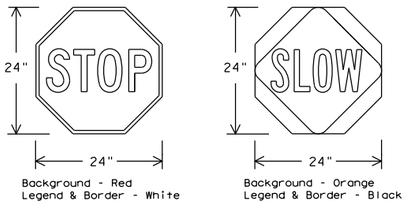
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SJT	RUNNELS		27

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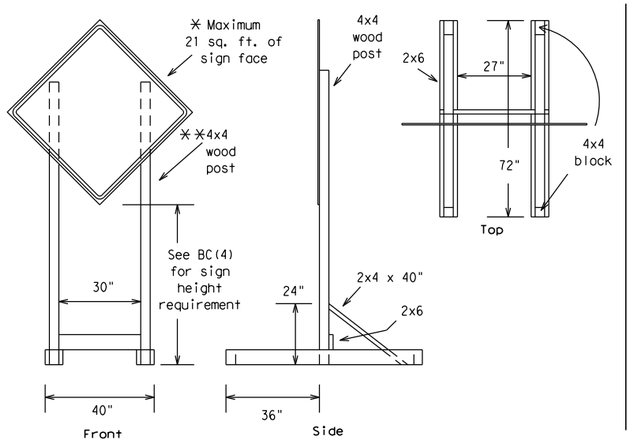
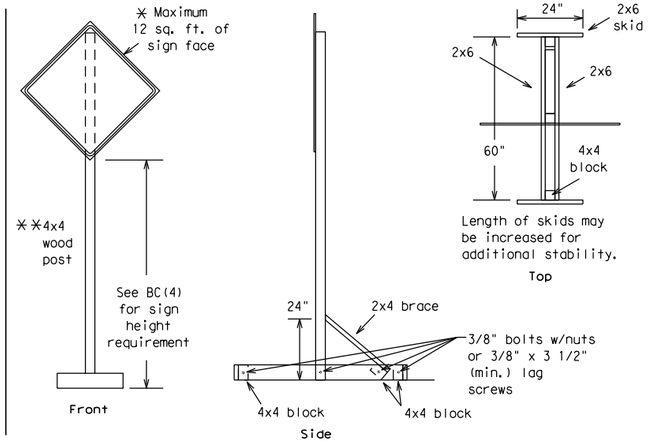
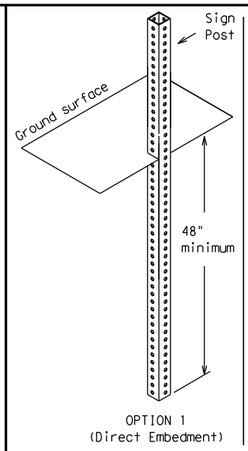
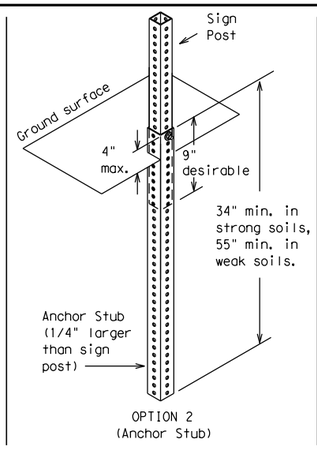


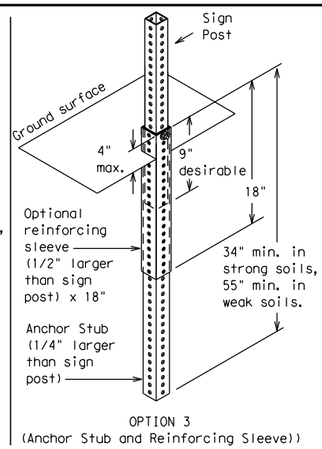


SKID MOUNTED WOOD SIGN SUPPORTS

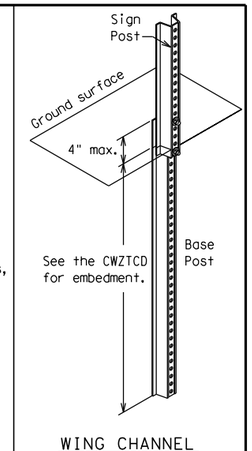
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







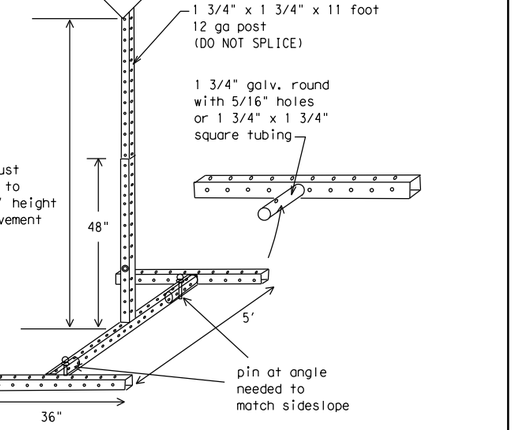
PERFORATED SQUARE METAL TUBING

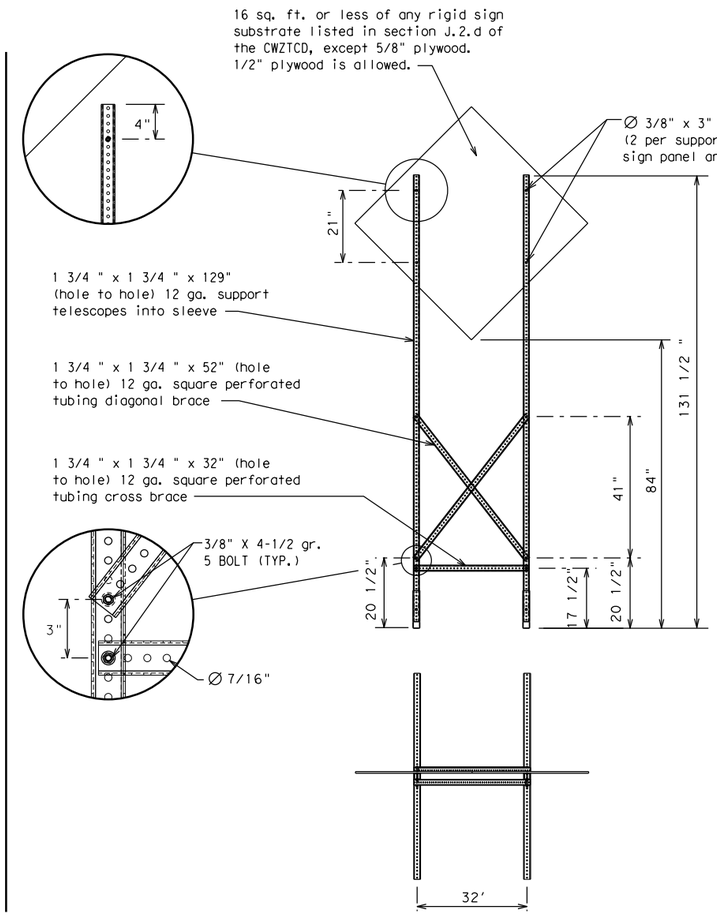


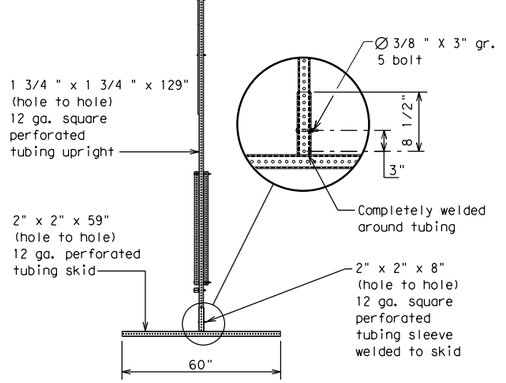
WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SJT	RUNNELS		28

DATE: 10/3/2022 4:12:13 PM
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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 *

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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7-13 5-21	SJT	RUNNELS		29

DATE: 10/3/2022 4:12:13 PM
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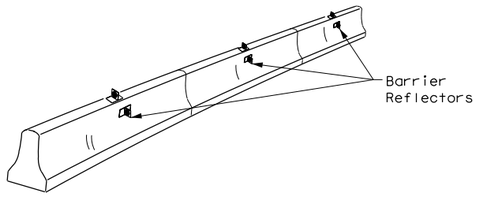
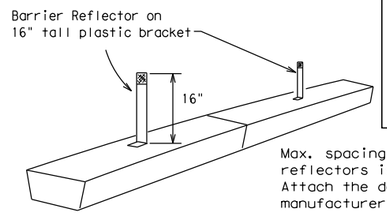
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost 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.

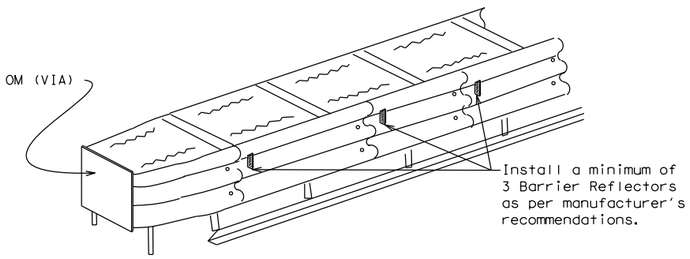


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

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.

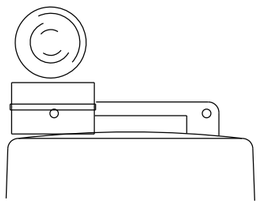


DELINEATION OF END TREATMENTS

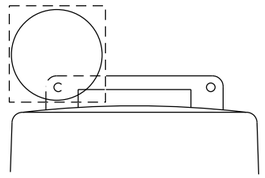
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

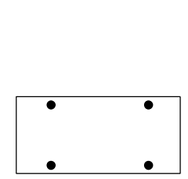
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

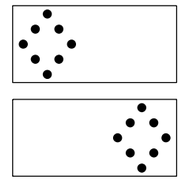
Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

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

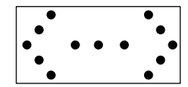


4 CORNER CAUTION

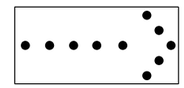
OR



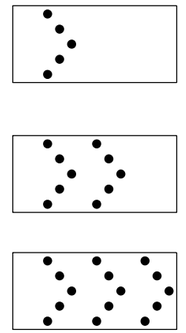
ALTERNATING DIAMOND CAUTION



DOUBLE ARROW



RIGHT/LEFT ARROW
(right arrow shown; left is similar)



RIGHT/LEFT SEQUENTIAL CHEVRON
(right chevron shown; left is similar)

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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SJT	RUNNELS		30

101

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

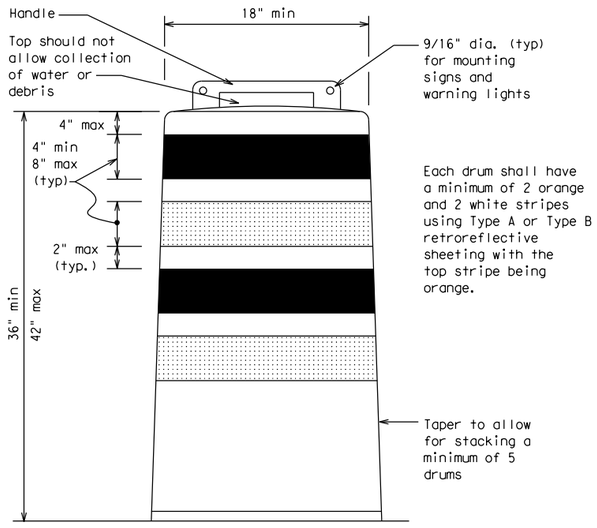
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

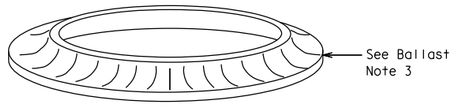
RETROREFLECTIVE SHEETING

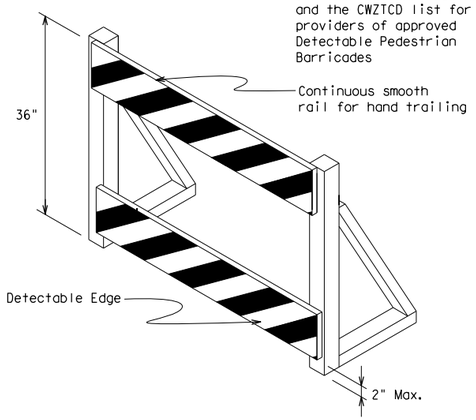
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

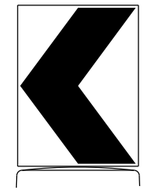




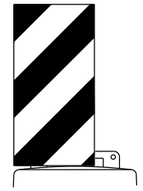


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	SJT	RUNNELS		31
7-13				

102

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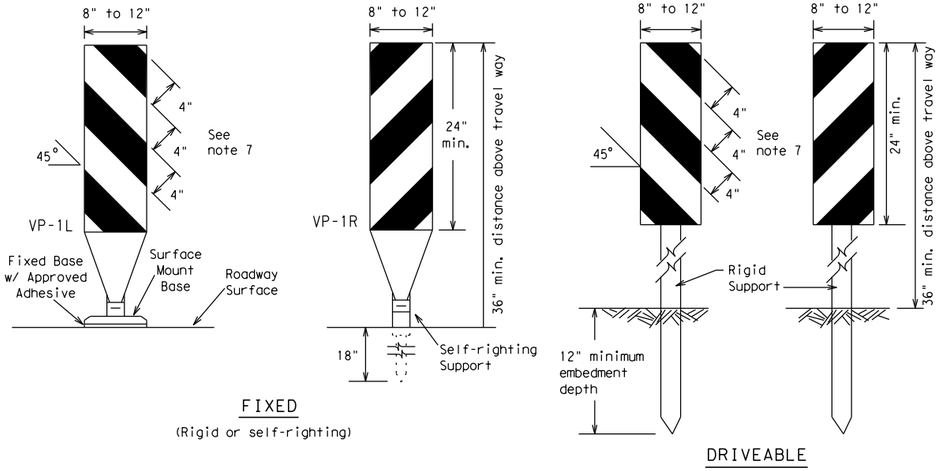
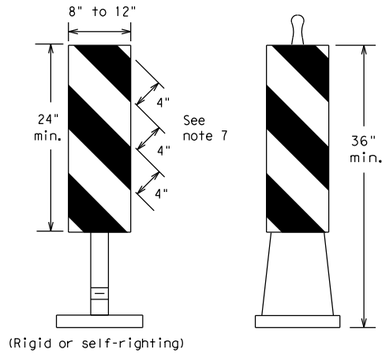


FIXED

(Rigid or self-righting)

DRIVEABLE

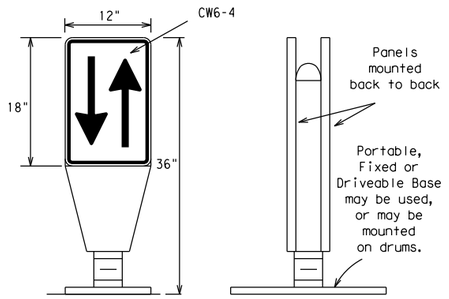


(Rigid or self-righting)

PORTABLE

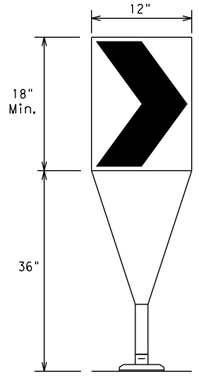
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

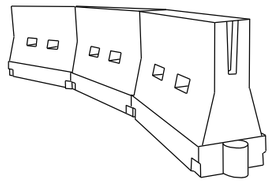
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



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

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

CHEVRONS



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

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.

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SJT	RUNNELS		32

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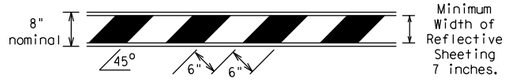
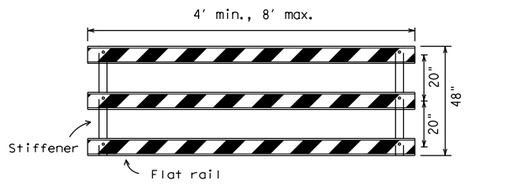
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



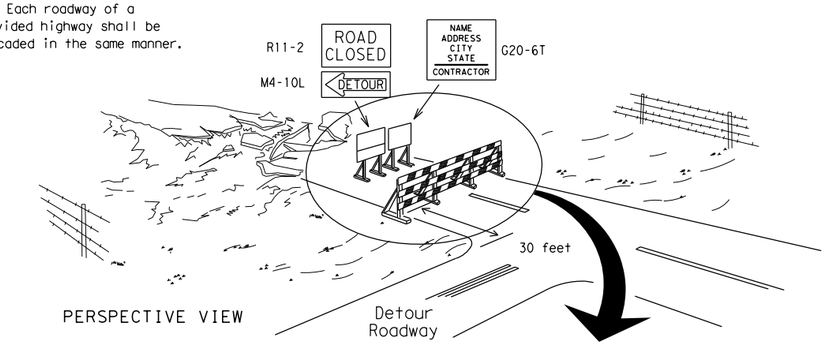
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

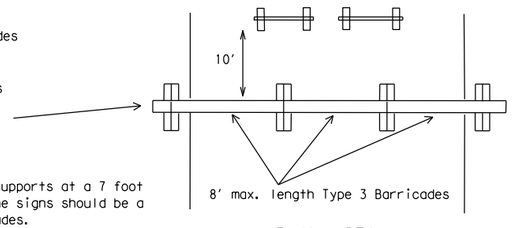
TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

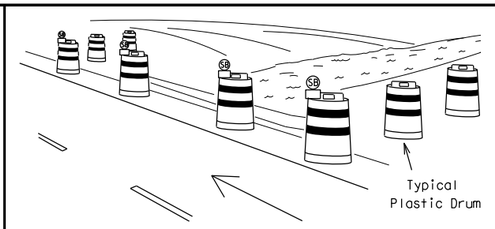
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

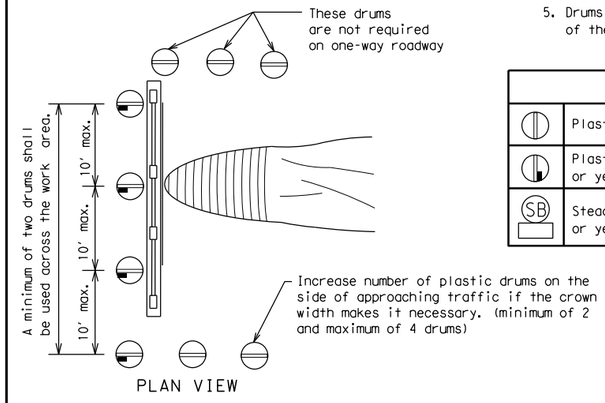
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

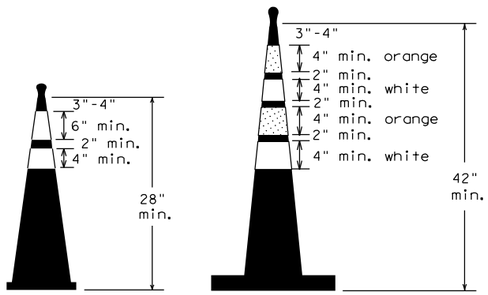
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

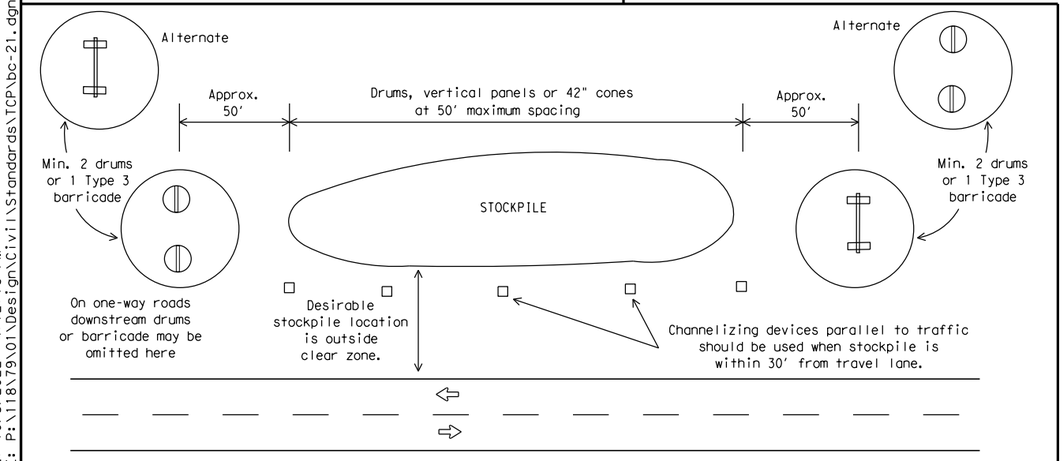
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
9-07 8-14	DIST	COUNTY		SHEET NO.
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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

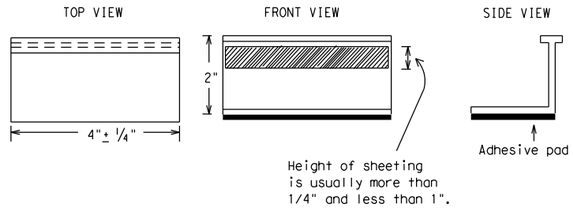
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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REVISIONS 2-98 9-07 5-21	0650	03	031	SH 153
1-02 7-13	DIST	COUNTY		SHEET NO.
11-02 8-14	SJT	RUNNELS		34

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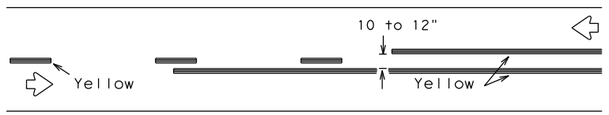
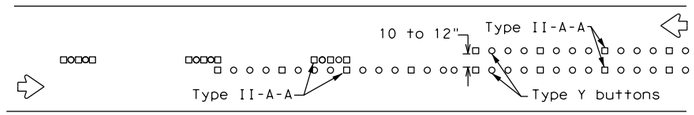
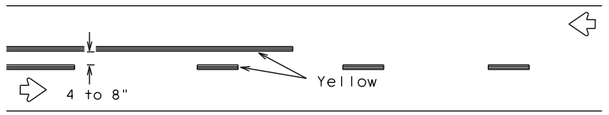
PAVEMENT MARKING PATTERNS



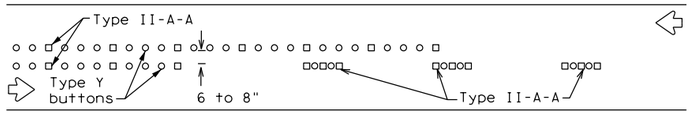
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



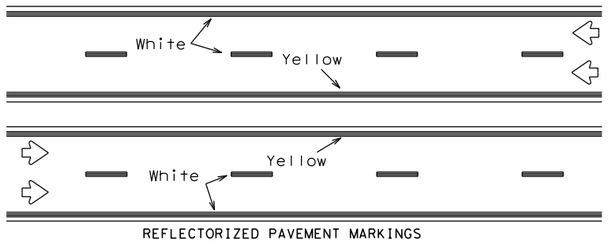
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



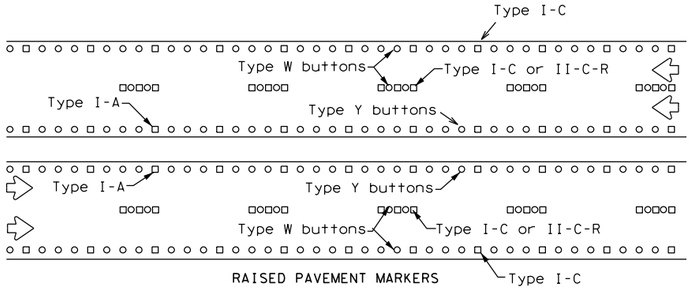
RAISED PAVEMENT MARKERS - PATTERN B

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



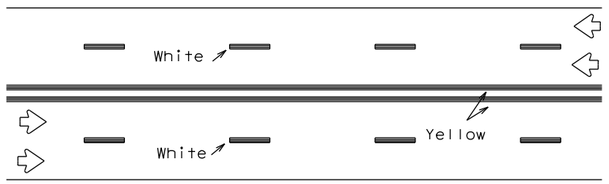
REFLECTORIZED PAVEMENT MARKINGS



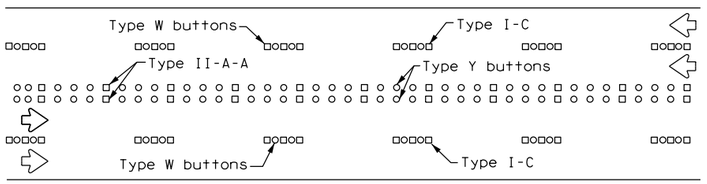
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



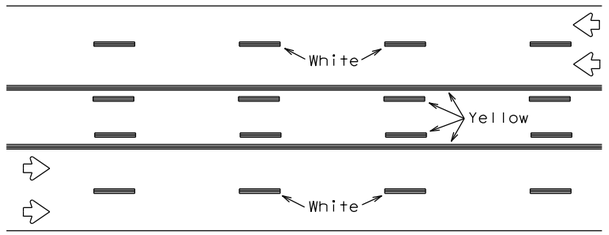
REFLECTORIZED PAVEMENT MARKINGS



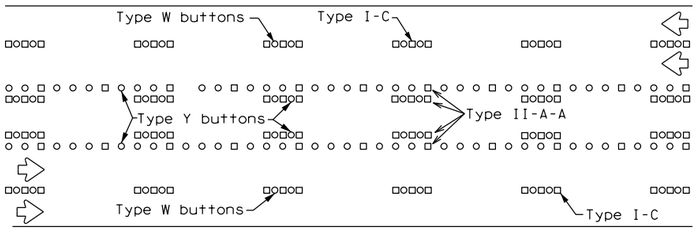
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

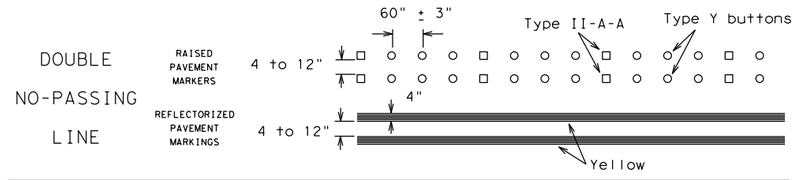
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

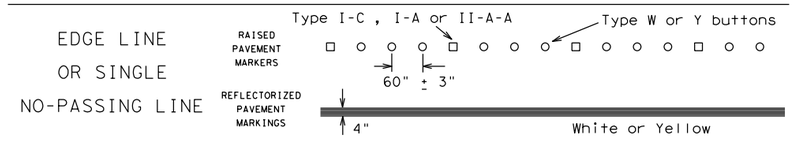
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

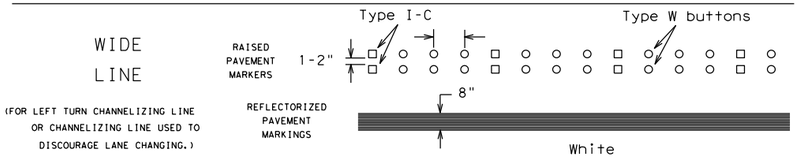


EDGE LINE OR SINGLE NO-PASSING LINE



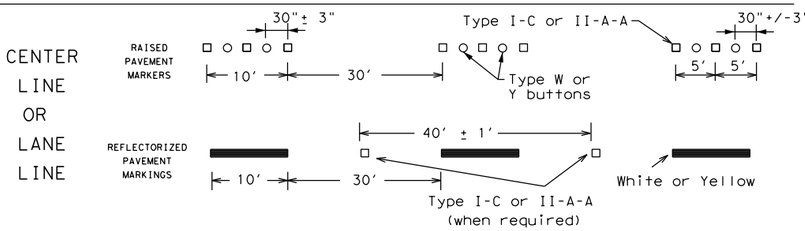
WIDE LINE

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

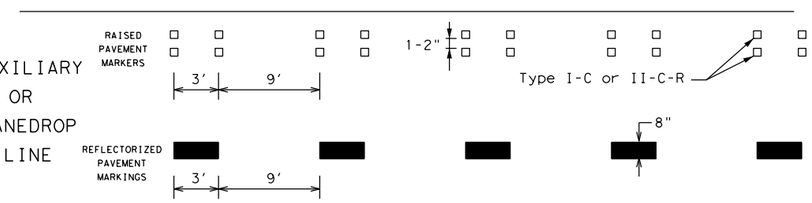


BROKEN LINES

CENTER LINE OR LANE LINE

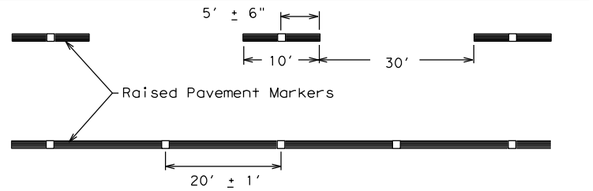


AUXILIARY OR LANEDROP LINE



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."

SHEET 12 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		35

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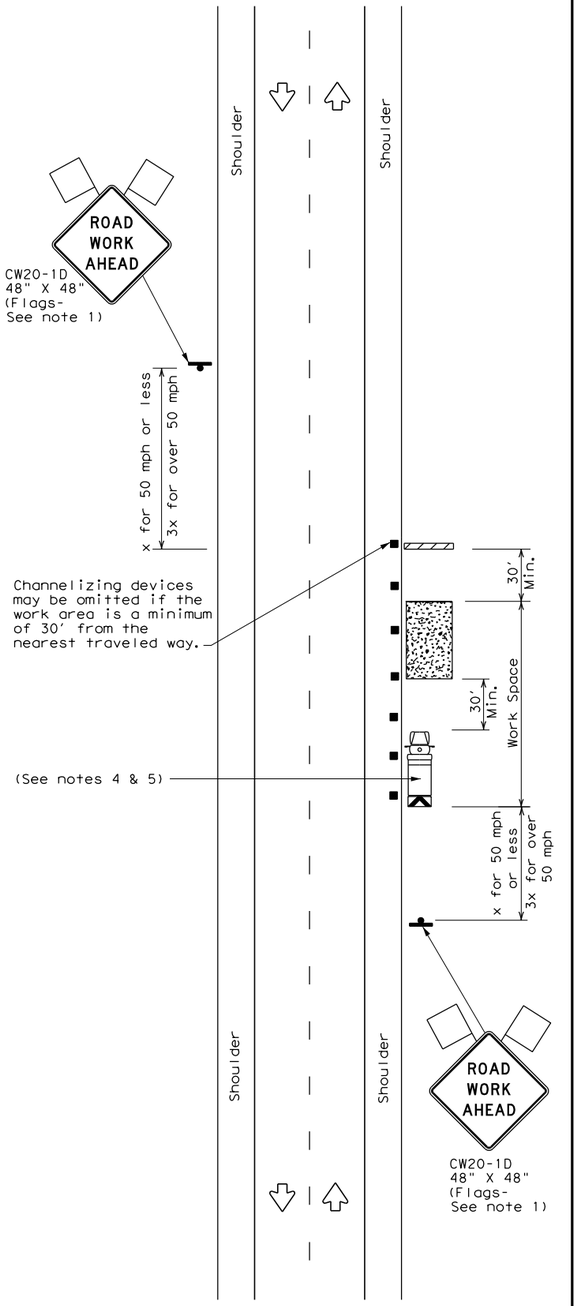
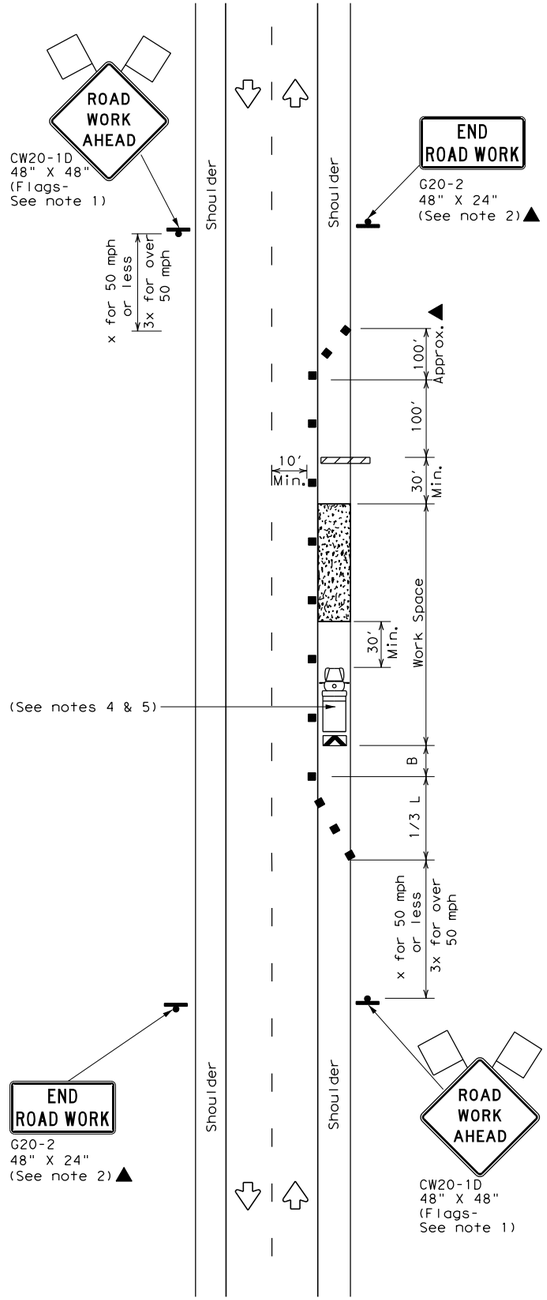


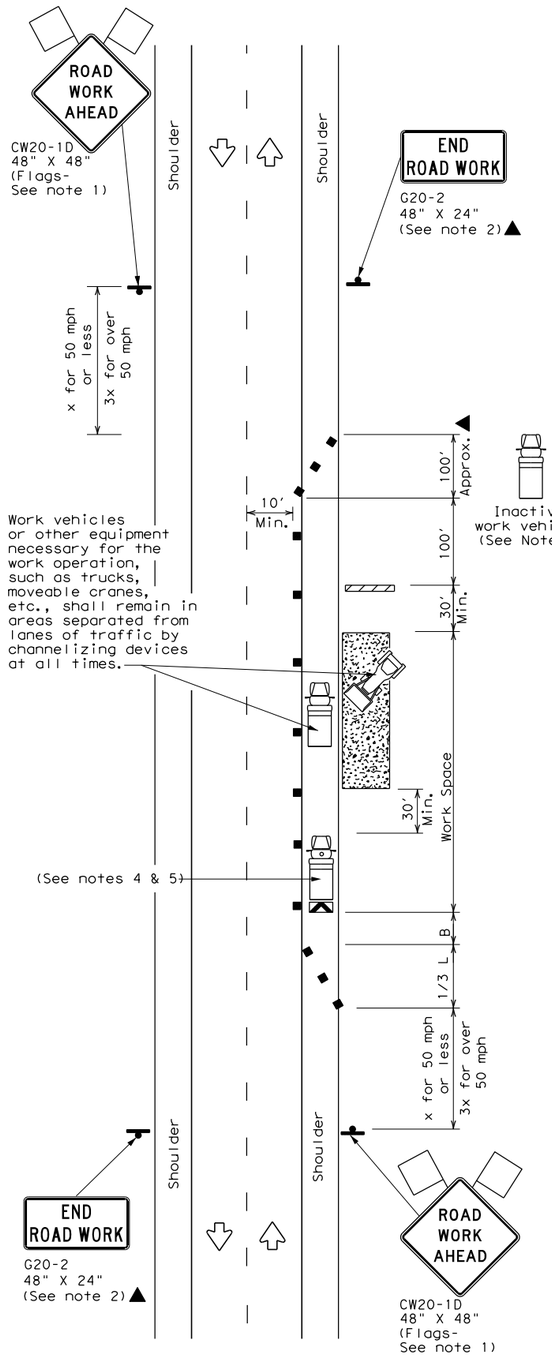
TCP (2-1a)

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	0650	03	031	SH 153
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	SJT	RUNNELS		36
1-97 2-18				

161

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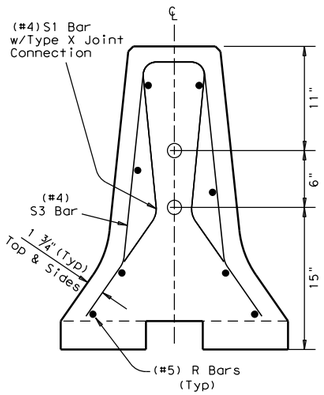
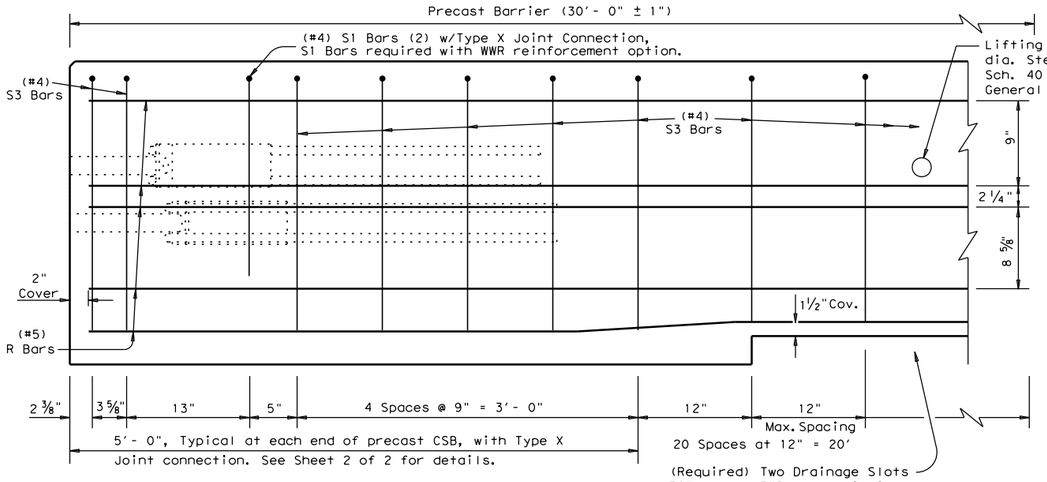


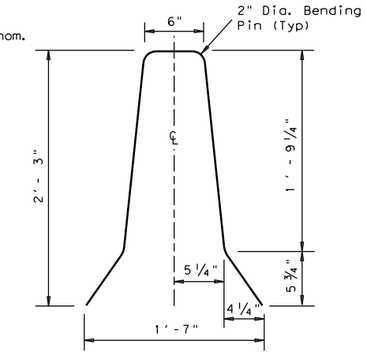
End View
Precast Barrier

See sheet 2 of 3 for Joint connection Type X

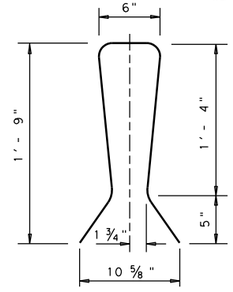


Reinforcement for Precast (CSB)
Concrete Safety Barrier (Type 1)

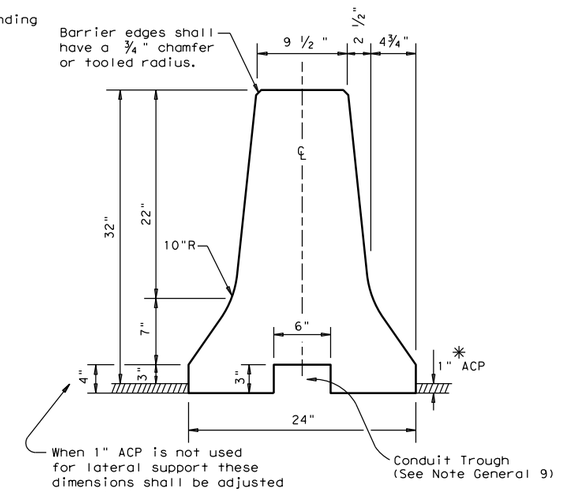
Showing reinforcement for Joint Type X



S3 Bar
#4 Bar



S1 Bar
#4 Bar (2)
(Joint Type X)

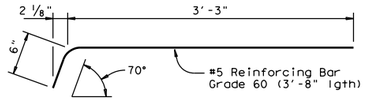


Concrete Safety Barrier

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

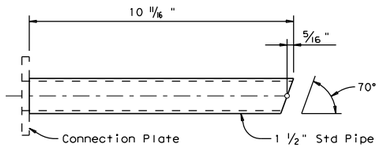
GENERAL NOTES

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



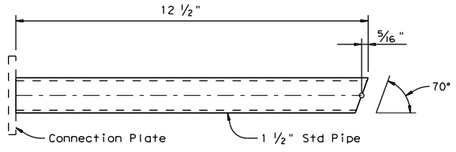
DEFORMED BAR ANCHOR DETAILS

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



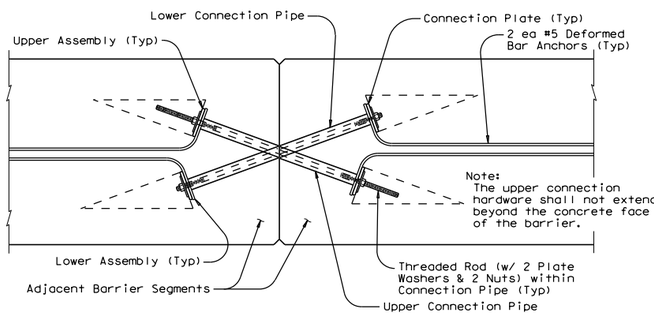
UPPER CONNECTION PIPE DETAILS

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



LOWER CONNECTION PIPE DETAILS

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



TYPE X JOINT INSTALLATION DETAIL

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

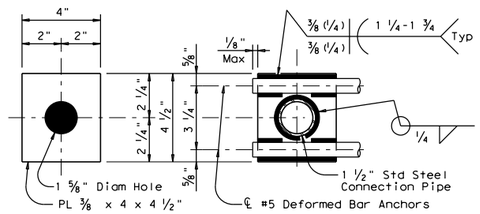
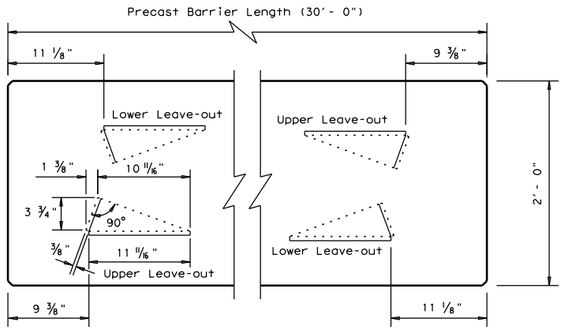


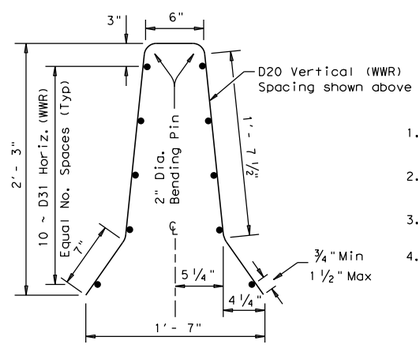
PLATE DIMENSIONS WELDING DETAILS

CONNECTION PLATE DETAILS

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



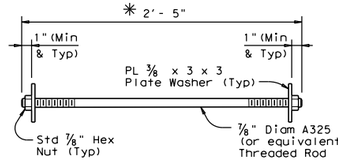
BARRIER PLAN AT END JOINTS



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

(WWR) General Notes

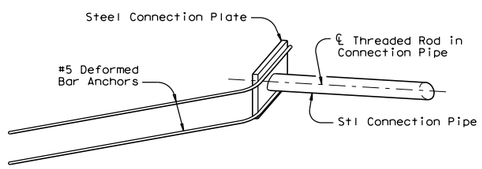
1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing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



CONNECTION BOLT OR THREADED ROD DETAIL

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

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



ISOMETRIC OF TYPICAL WELDED ASSEMBLY

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

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

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER
(TYPE 1)

CSB(1)-10

FILE: csb110.dgn	DN: TxDOT	CK: AM	DW: BD	CK: VP
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		37

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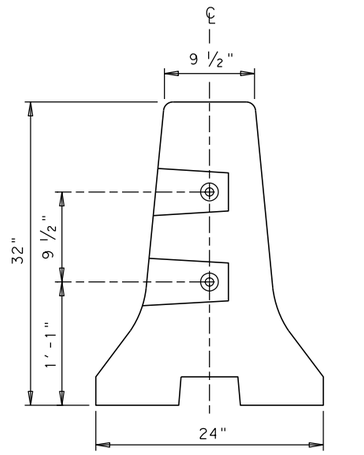
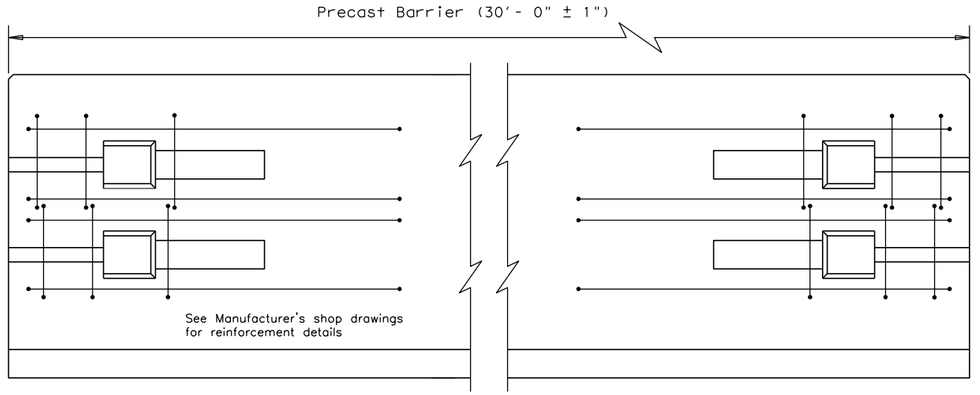
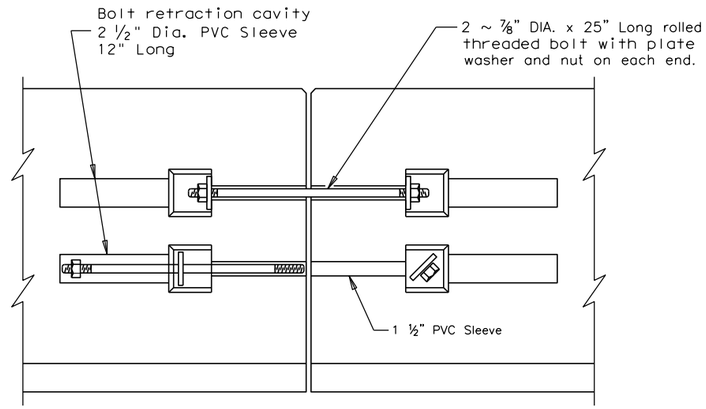


END VIEW (CSB) QUICK-BOLT
QUICK-BOLT POCKET LOCATIONS

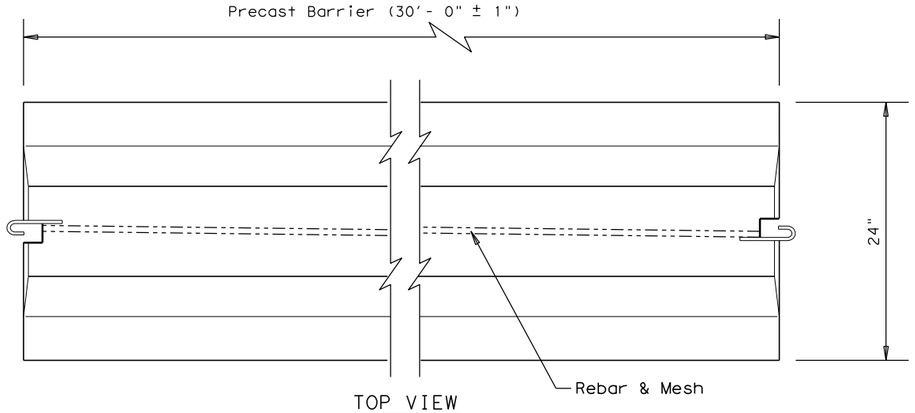


ELEVATION (CSB) QUICK-BOLT
See Manufacturer's shop drawing for additional details

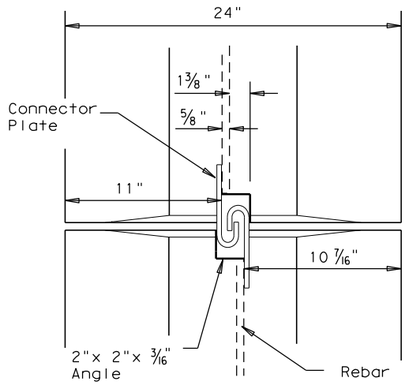


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

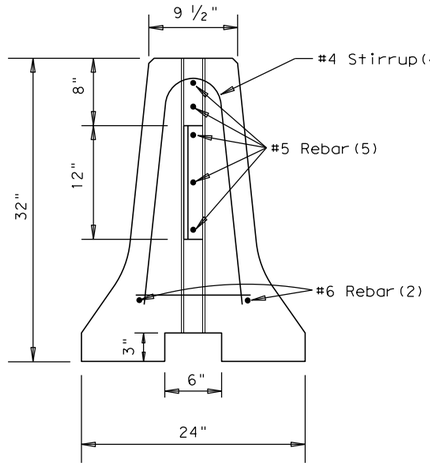
Joint Connection (Type Q)



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.

Texas Department of Transportation
Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER
(TYPE 1)

CSB(1)-10

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©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY		
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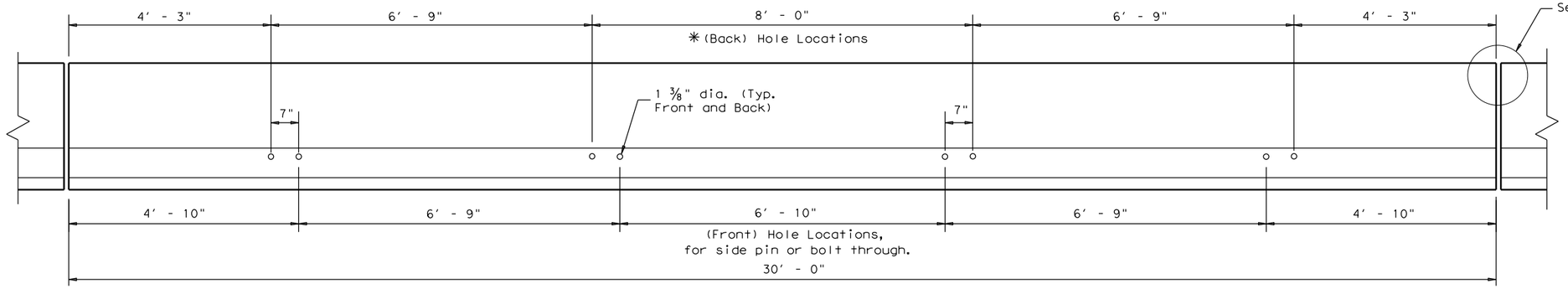
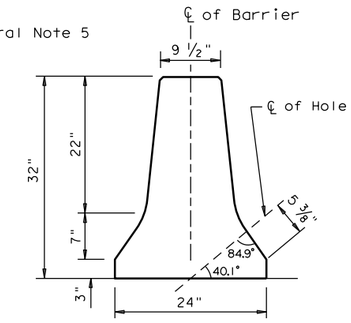
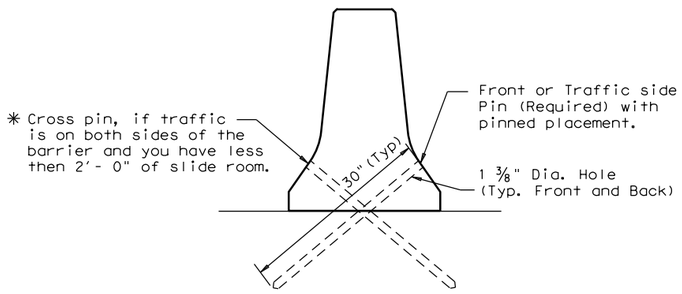


DETAIL 1

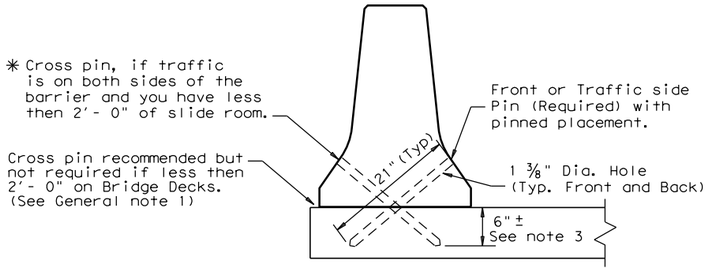


HOLE LOCATION DETAIL



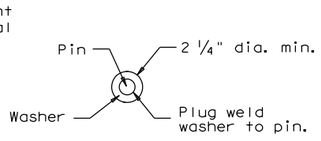
DETAIL 2

Placement on (ACP)
Asphalt Concete Pavement
or Treated Base Material
(30" Pin required)

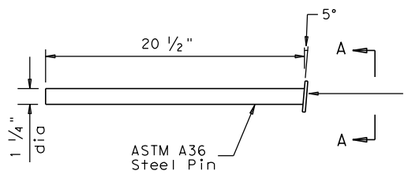


DETAIL 3

Bridge Deck or CRCP
(21" pin required)



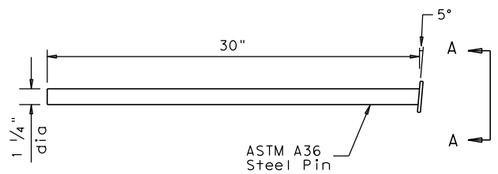
VIEW A-A



Steel washer welded to pin at 5° angle so that the washer is flush to the barrier surface. (See View A-A)

(21") PIN DETAIL

See Detail 3

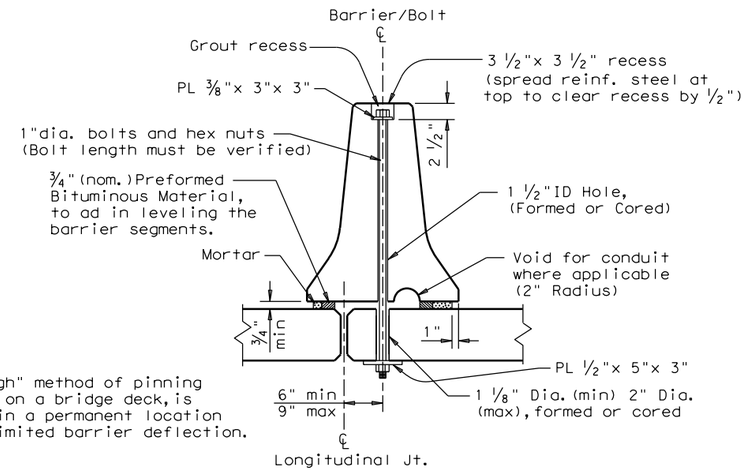


(30") PIN DETAIL

See Detail 2

CORE DRILLING EXISTING BARRIER

Core drilling existing concrete barrier is permitted. Holes shall be drilled with coring or masonry drilling type equipment. Percussion (star) drilling shall not be used. A special drill bit (to cut through existing reinforcing) will likely be required. Spalls in the concrete exceeding ½" shall be patched.



Note:
The "Bolt Through" method of pinning precast barrier on a bridge deck, is primarily used in a permanent location that requires limited barrier deflection.

PRECAST CSB (BOLT THROUGH) PLACEMENT OVER LONGITUDINAL EXPANSION JOINT

For bolt through locations, use the (Front) hole locations shown on Detail 1.

GENERAL NOTES

1. These details provide a method of laterally restraining precast concrete barrier to limit deflections under normally expected passenger vehicle impacts. These details are intended for use in work zones, primarily on bridge decks, or pavement where temporary barrier must be placed less then 2 ft. from the longitudinal edge of the deck or dropoff and parallel to the direction of travel. Other applications of these details are acceptable as directed by the Engineer.
2. Each precast concrete barrier section shall have a minimum of four or total of eight 1 ⅜" ID, holes formed or cored through the barrier. The center lines of the holes are shown in the hole location detail. If rebar is encountered, the entry point may be shifted 2" plus or minus longitudinally along the barrier. The eight holes are spaced along the length of the barrier as shown in Detail 1.
3. The drilling of the travel surface is accomplished by placing the pre-drilled barrier section on the travel surface in the desired position. Then the hole is drilled with the bit passing though the hole in the barrier. The bit is to be inserted into the hole in the barrier so that the travel surface is drilled to a point which is slightly more than the pin length.
4. Note that steel washers have been welded to the top of the steel pins to aid in the removal of the pins, when the barrier is removed.
5. See CSB(1) standard sheets for reinforcement requirements and joint connection types.
6. The forming or coring of holes in the barrier, drilling of holes in bridge deck or pavement, fabrication and materials for the 1 ¼" pins, installation of pins, and any repair to the barrier shall be considered as subsidiary to the barrier bid items.
7. The barrier and travel surface will be repaired as directed by the Engineer in accordance with Item 429, "Concrete Structure Repair."
8. Provide galvanized bolts, nuts, and plate washers. All steel pins shall be galvanized after fabrication in accordance with Item 445, "Galvanizing."
9. Weight of barrier is approx. 440 lbs per foot.

Texas Department of Transportation

Design Division Standard

CONCRETE SAFETY BARRIER (F-SHAPE)

PRECAST BARRIER
(TYPE 1)
PINNED PLACEMENT

CSB(7)-10

FILE: csb710.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		39

DATE: 10/3/2022
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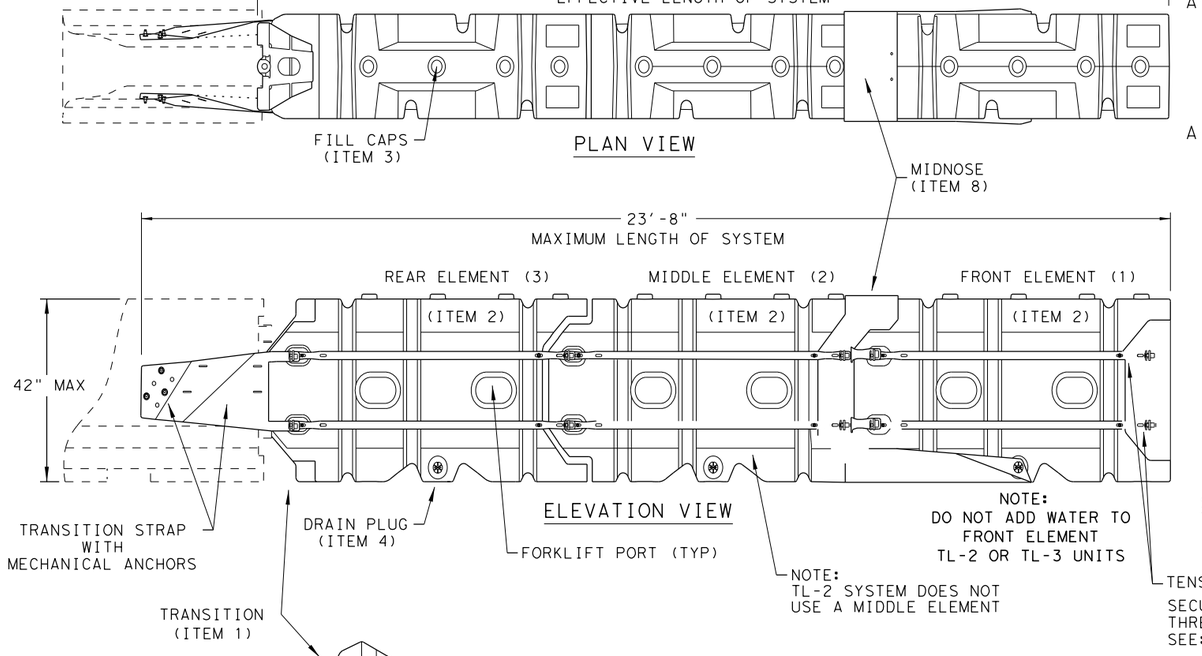
SYSTEM SHOWN - ABSORB-M TL-3



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

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

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

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

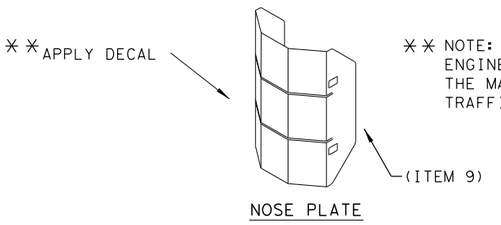
GENERAL NOTES

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

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

*COMPONENTS PRE-ASSEMBLED WITH ELEMENT ASSEMBLY

DELINEATION DECAL PLACEMENT GUIDE



NOSE PLATE

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

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

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

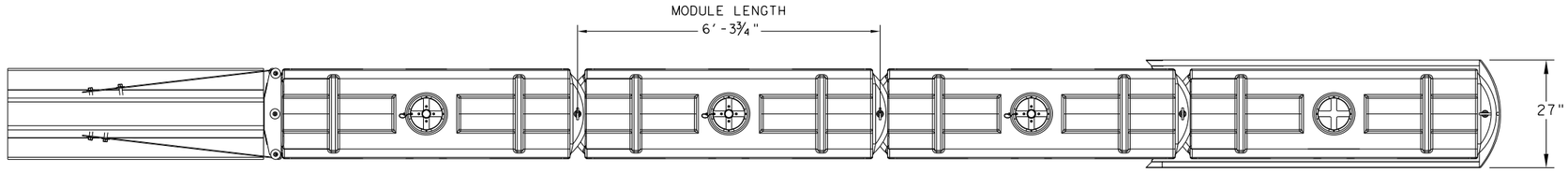
SACRIFICIAL

Texas Department of Transportation — Design Division Standard

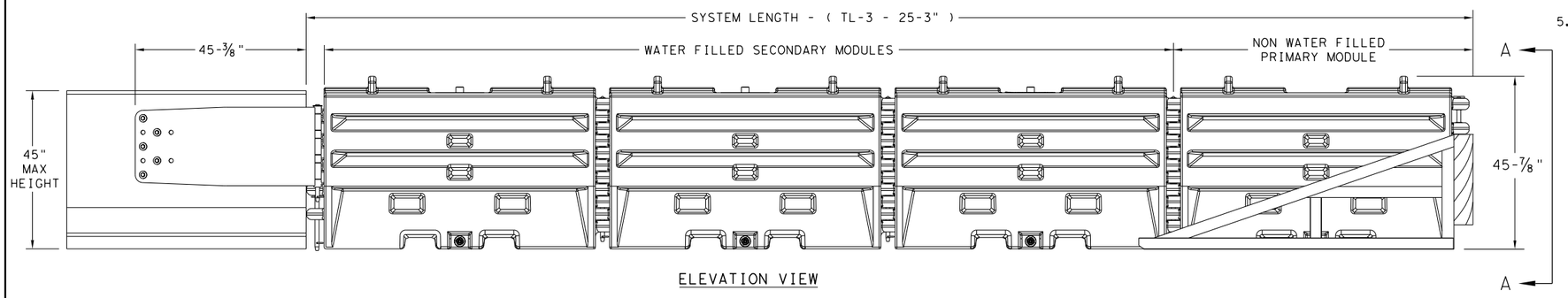
LINDSAY TRANSPORTATION SOLUTIONS
CRASH CUSHION
(MASH TL-3 & TL-2)
TEMPORARY - WORK ZONE
ABSORB(M)-19

FILE: absorbm19	DN: TxDOT	CK: KM	DW: VP	CK:
© TxDOT: JULY 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		40

DATE: 10/3/2022
FILE: P:\118179.01\Design\Civil\Standards\TCP\sled19.dgn



PLAN VIEW



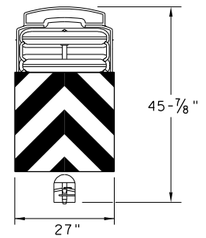
ELEVATION VIEW

GENERAL NOTES

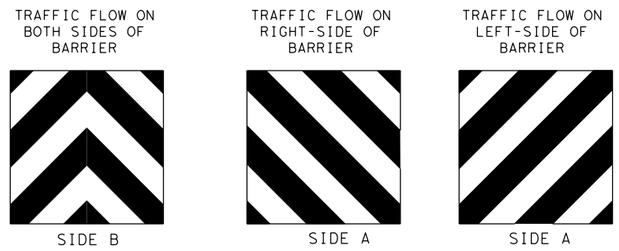
1. REFER TO THE INSTALLATION MANUAL FOR SPECIFIC SYSTEM ASSEMBLY AND MODULE ORIENTATION. FOR ADDITIONAL INFORMATION, CONTACT TRAFFIX, INC. AT (949) 361-5663.
2. THE SLED SYSTEM IS A MASH APPROVED TEST LEVEL 3 (TL-3) CRASH CUSHION APPROVED FOR USE IN TEMPORARY WORK ZONES. THE SLED SYSTEM IS A NON-REDIRECTIVE,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

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

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

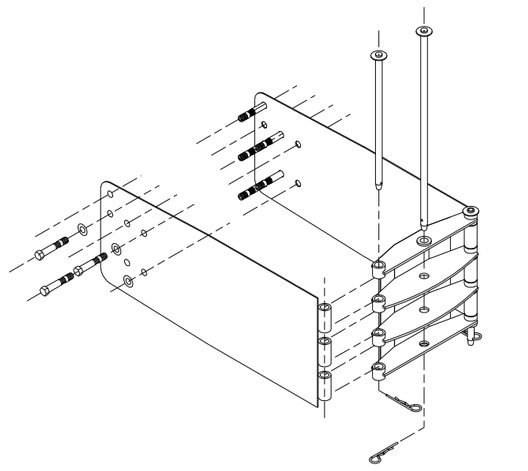


SECTION A-A



NOSE SHEETING PANEL DELINEATION

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



SLED TRANSITION COMPONENTS FOR ATTACHMENT TO CMB

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

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

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

SACRIFICIAL

BILL OF MATERIAL

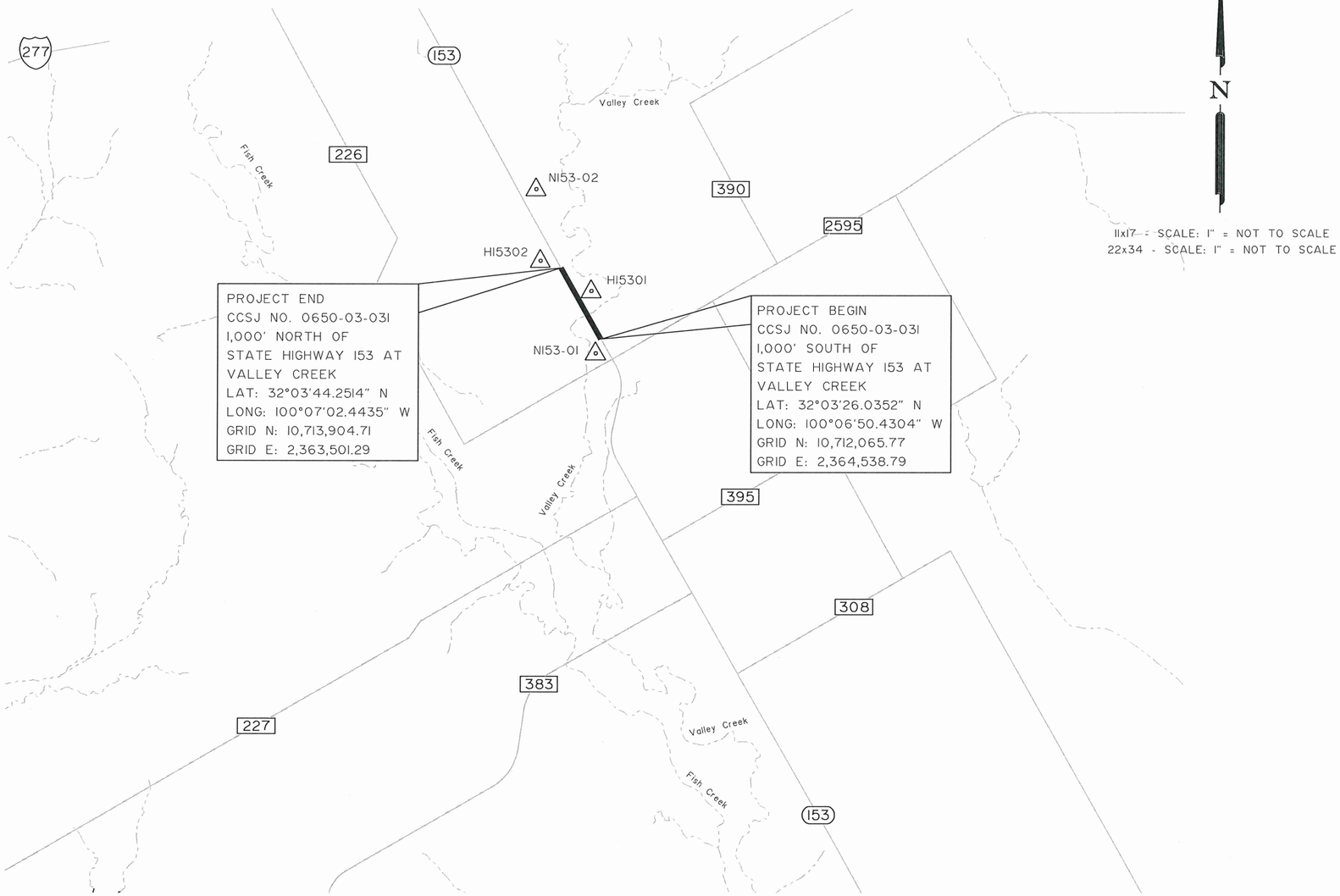
PART NUMBER	DESCRIPTION	QTY: TL-3
45131	TRANSITION FRAME, GALVANIZED	1
45150	TRANSITION PANEL, GALVANIZED	2
45147-CP	TRANSITION SHORT DROP PIN W/ KEEPER PIN, GALVANIZED	2
45148-CP	TRANSITION LONG DROP PIN W/ KEEPER PIN, GALVANIZED	1
45050	ANCHOR BOLTS	9
12060	WASHER, 3/4" ID X 2" OD	9
45044-Y	SLED YELLOW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

Texas Department of Transportation

Design Division Standard

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

FILE: sled19.dgn	DN: TxDOT	CK: KM	DW: VP	CK:
©TxDOT: DECEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		41



N

11x17 - SCALE: 1" = NOT TO SCALE
22x34 - SCALE: 1" = NOT TO SCALE

NOTES:

1. ALL BEARINGS ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE (NAD83, 2011 ADJUSTMENT, EPOCH 2010.00).

2. ALL DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TxDOT SURFACE ADJUSTMENT FACTOR OF 1.00004353.

3. ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) USING GEOID12B.

4. FIELD SURVEYING WAS PREFORMED FROM APRIL 2020 TO JUNE 2020.

TRAVERSE TABLE

FROM	TO	BEARING	DISTANCE
NI53-01	HI5301	N 27°18'13" W	1,389.35'
HI5301	HI5302	N 31°15'37" W	1,491.73'
HI5302	NI53-02	N 27°42'18" W	1,484.71'

Point No.	Latitude (N)	Longitude (W)	Grid Northing	Grid Easting	Surface Northing	Surface Easting	Elevation	Description
HI5301	32°03'34.2278"	100°06'55.4720"	10,712,892.88	2,364,103.25	10,713,359.19	2,364,206.15	2,010.51'	CP°3.5" ATCC IN DIRT
HI5302	32°03'46.8598"	100°07'04.4374"	10,714,167.99	2,363,329.18	10,714,634.35	2,363,432.05	2,017.97'	CP°3.5" ATCC IN DIRT
NI53-01	32°03'22.0001"	100°06'48.0959"	10,711,658.37	2,364,740.52	10,712,124.63	2,364,843.45	2,002.23'	CP°3.5" ATTC IN CONC
NI53-02	32°03'59.8790"	100°07'12.4285"	10,715,482.41	2,362,638.94	10,715,948.84	2,362,741.78	2,021.19'	CP°3.5" ATTC IN CONC

NOT TO SCALE
U.S. SURVEY FEET

THE SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.

STATE OF TEXAS
REGISTERED
JIBRAEL K. AHMAD
6183
PROFESSIONAL
LAND SURVEYOR

11/20/20

I HEREBY CERTIFY THAT THIS CONTROL MAP WAS PREPARED UNDER MY SUPERVISION IN NOVEMBER 2020.

REVISIONS:

JONES|CARTER
2322 West Grand Parkway North, Suite 150
• Katy, Texas 77449 • 832.913.4000
Texas Board of Professional Engineers and Land Surveyors Registration No. 10194039

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

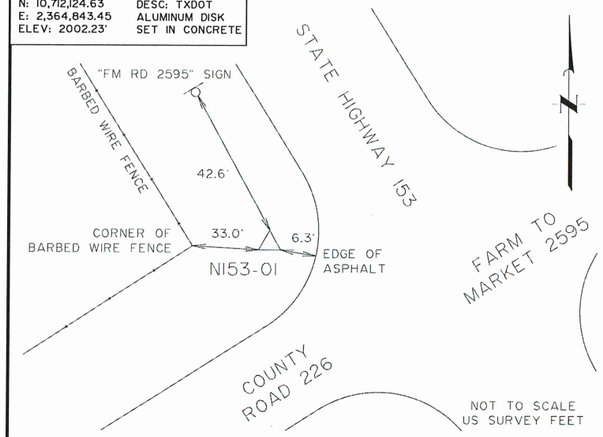
SH 153 AT VALLEY CREEK
SURVEY CONTROL
INDEX SHEET

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
06			42
STATE	DIST.	COUNTY	
TEXAS	SJT	RUNNELS	
CONT.	SECT.	JOB	HIGHWAY
0650	03	031	SH 153

NI53-01

N: 10,712,124.63
E: 2,364,843.45
ELEV: 2002.23'

DESC: TXDOT ALUMINUM DISK SET IN CONCRETE

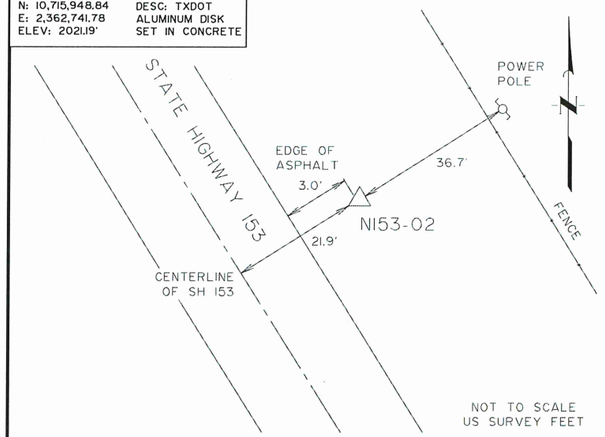


CONTROL POINT NI53-01 IS A TXDOT ALUMINUM DISK SET IN CONCRETE, AT THE NORTHWEST CORNER OF THE INTERSECTION OF STATE HIGHWAY 153 AND COUNTY ROAD 266.

NI53-02

N: 10,715,948.84
E: 2,362,741.78
ELEV: 2021.19'

DESC: TXDOT ALUMINUM DISK SET IN CONCRETE

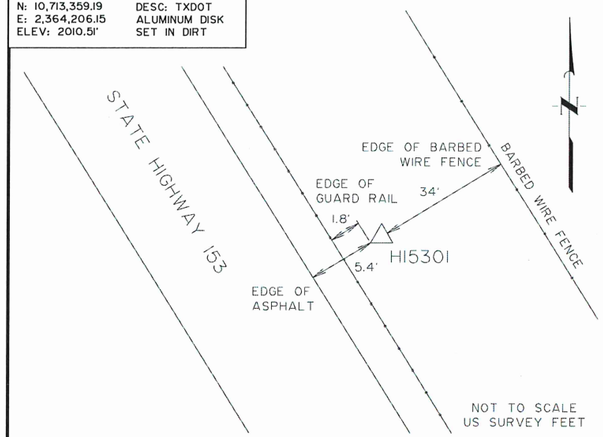


CONTROL POINT NI53-02 IS A TXDOT ALUMINUM DISK SET IN CONCRETE, ON THE EAST SIDE OF STATE HIGHWAY 153, APPROXIMATELY 4,400' NORTHWEST OF FARM TO MARKET 2595.

HI5301

N: 10,713,359.19
E: 2,364,206.15
ELEV: 2010.51'

DESC: TXDOT ALUMINUM DISK SET IN DIRT



CONTROL POINT HI5301 IS A TXDOT ALUMINUM DISK SET IN DIRT, ON THE EAST SIDE OF STATE HIGHWAY 153, APPROXIMATELY 1,500' NORTHWEST OF FARM TO MARKET 2595.

HI5302

N: 10,714,634.35
E: 2,363,432.05
ELEV: 2017.97'

DESC: TXDOT ALUMINUM DISK SET IN DIRT

CONTROL POINT HI5302 IS A TXDOT ALUMINUM DISK SET IN DIRT, ON THE WEST SIDE OF STATE HIGHWAY 153, APPROXIMATELY 2,900' NORTHWEST OF FARM TO MARKET 2595.

NOTES:

1. ALL BEARINGS ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, CENTRAL ZONE (NAD83, 2011 ADJUSTMENT, EPOCH 2010.00).

2. ALL DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TxDOT SURFACE ADJUSTMENT FACTOR OF 1.00004353.

3. ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) USING GEOID12B.

4. FIELD SURVEYING WAS PREFORMED FROM APRIL 2020 TO JUNE 2020.

THE SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.

STATE OF TEXAS
REGISTERED
JIBRAEL K. AHMAD
6183
PROFESSIONAL
LAND SURVEYOR

11/10/20

I HEREBY CERTIFY THAT THIS CONTROL MAP WAS PREPARED UNDER MY SUPERVISION IN NOVEMBER 2020.

REVISIONS:

JONES|CARTER
2322 West Grand Parkway North, Suite 150
• Katy, Texas 77449 • 832.913.4000
Texas Board of Professional Engineers and Land Surveyors Registration No. 10194039

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SH 153 AT VALLEY CREEK
SURVEY CONTROL
HORIZONTAL & VERTICAL CONTROL

FED. RD. DIV. NO.	FEDERAL AID PROJECT		SHEET NO.
06			43
STATE	DIST.	COUNTY	
TEXAS	SJT	RUNNELS	
CONT.	SECT.	JOB	HIGHWAY
0650	03	031	SH 153

Plotted on: 10/3/2022

Design Filename: P:\118\79\01\Design\Civil\Roadway\SH153-ROWY-HALN-01.dgn

℄ SH 153

Beginning chain SH153CL description

Point VALLEYCL01 N 10,709,941.58 E 2,364,881.62 Sta 386+00.00

Course from VALLEYCL01 to PC VALLEYCUR01 N 12° 34′ 24.56" E Dist 1,153.94

		Curve Data				
Curve VALLEYCUR01						
P.I. Station		401+93.85	N	10,711,497.20	E	2,365,228.59
Delta	=	42° 00′ 00.00"	(LT)			
Degree	=	4° 59′ 58.67"				
Tangent	=	439.91				
Length	=	840.06				
Radius	=	1,146.00				
External	=	81.53				
Long Chord	=	821.38				
Mid. Ord.	=	76.12				
P.C. Station		397+53.94	N	10,711,067.84	E	2,365,132.82
P.T. Station		405+94.00	N	10,711,880.35	E	2,365,012.46
C.C.			N	10,711,317.31	E	2,364,014.31
Back	= N	12° 34′ 24.56" E				
Ahead	= N	29° 25′ 35.44" W				
Chord Bear	= N	8° 25′ 35.44" W				

Course from PT VALLEYCUR01 to VALLEYCL04 N 29° 25′ 35.44" W Dist 5,406.00

Point VALLEYCL04 N 10,716,588.91 E 2,362,356.45 Sta 460+00.00

Ending chain SH153CL description

DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

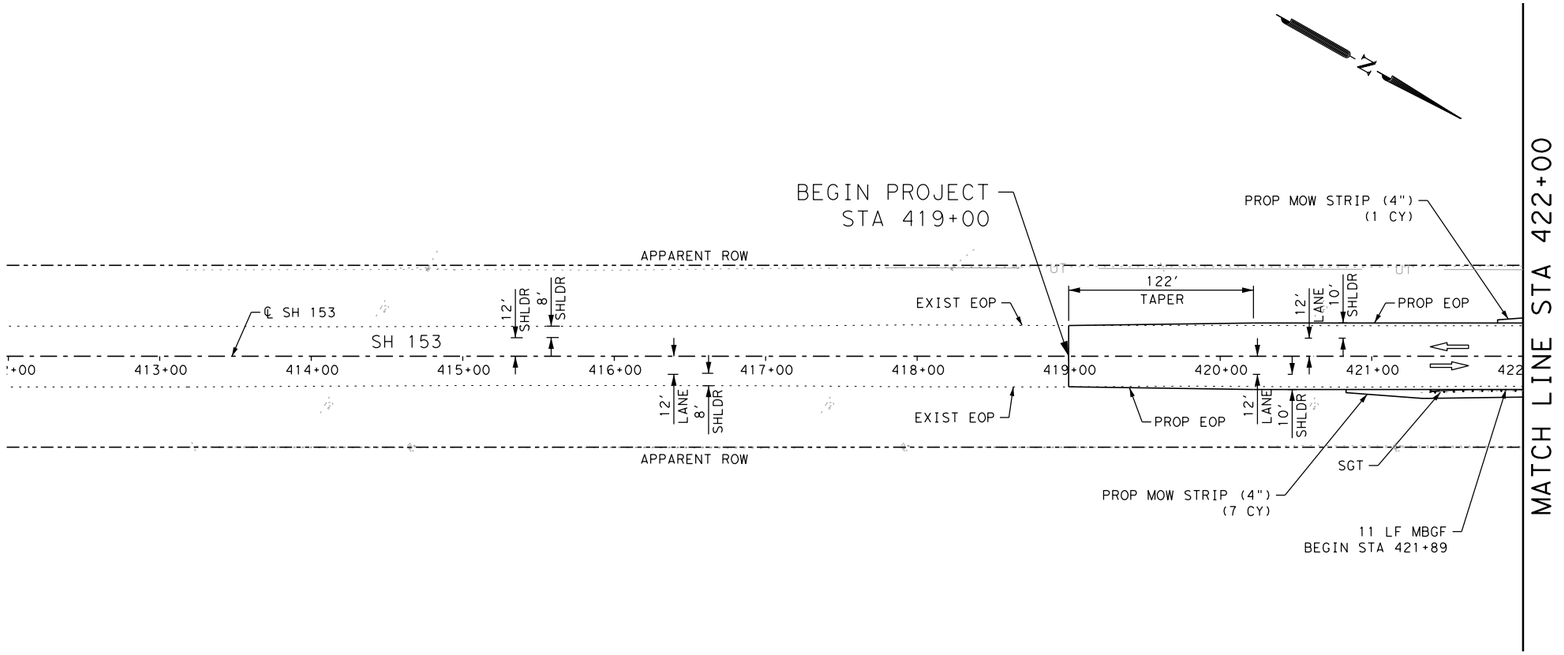
HORIZONTAL ALIGNMENT DATA

SH 153 AT VALLEY CREEK

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	44

Plotted on: 10/3/2022

Design Filename: P:\118\79\01\Design\Civil\Roadway\SH153-PP-01.dgn



ITEM	DESCRIPTION	UNIT	QTY
0100-6002	PREPARING ROW	STA	3.0
0110-6001	EXCAVATION (ROADWAY)	CY	578
0132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	332
0247-6231	FL BS (CMP IN PLACE)(TY A GR 1&2)(10")	SY	1,523
0260-6012	LIME(HYD,COM OR QK)(SLRY)OR QK(DRY)	TON	32
0260-6073	LIME TRT (SUBGRADE)(8")	SY	1,523
0310-6027	PRIME COAT(MC-30 OR AE-P)	GAL	289
0316-6224	AGGR(TY-PB GR-4 SAC-B)	CY	13
0316-6400	ASPH (AC-15P OR AC-10-2TR OR CRS-2P)	GAL	534
0432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	8
0540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF	11
0542-6001	REMOVE METAL BEAM GUARD FENCE	LF	18
0544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1
0544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	1
3077-6023	SP MIXES SP-C SAC-B PG70-22	TON	238
3077-6075	TACK COAT	GAL	130

LEGEND

DIRECTION OF TRAFFIC

CONCRETE RIPRAP

NOTES

1. SEE HORIZONTAL ALIGNMENT DATA SHEETS FOR HORIZONTAL ALIGNMENT DATA.
2. EXISTING FEATURES ARE SHOWN SCREENED BACK; i.e. DOTTED.
3. REMOVAL OF MBGF ON BRIDGE IS SUBSIDIARY TO BRIDGE QUANTITY ITEM 496.

DESIGN

STATE OF TEXAS
HEATHER McNEAL
114428
LICENSED
PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

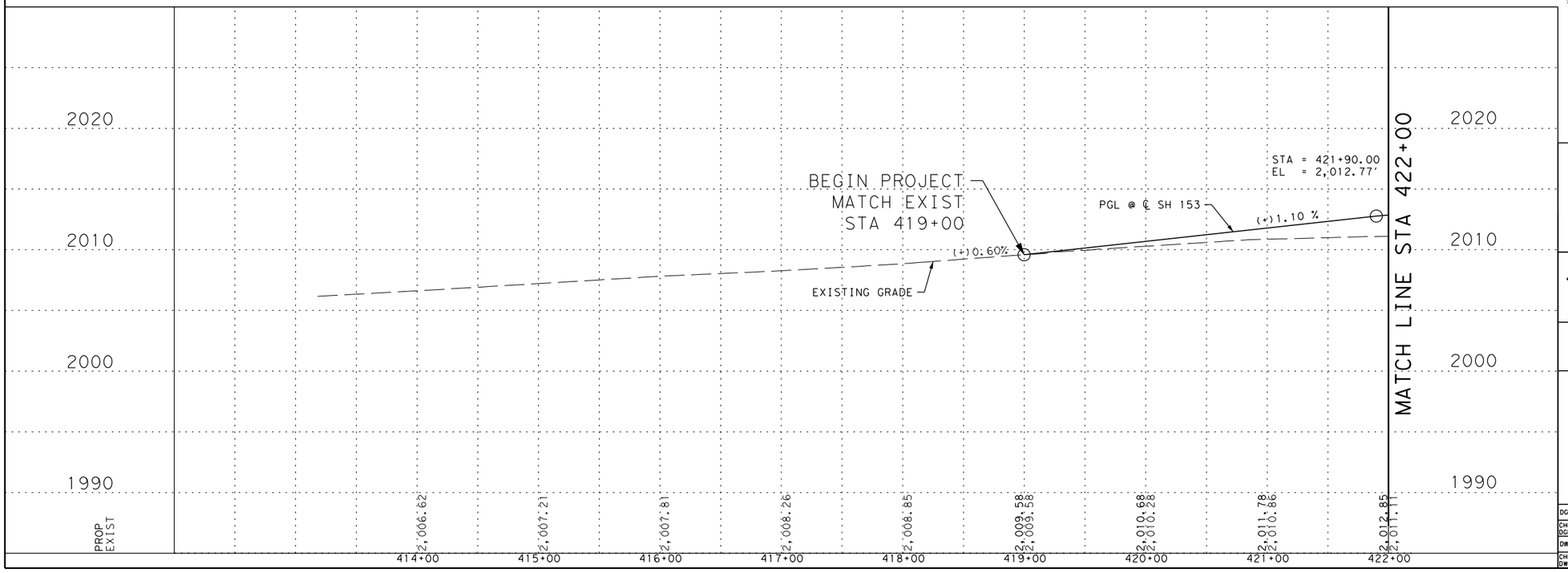
APPROVAL

STATE OF TEXAS
JAMES A. LUTZ
84722
LICENSED
PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

0 50 100

SCALE: PLAN 1" = 100′ PROFILE: 1" = 10′



PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

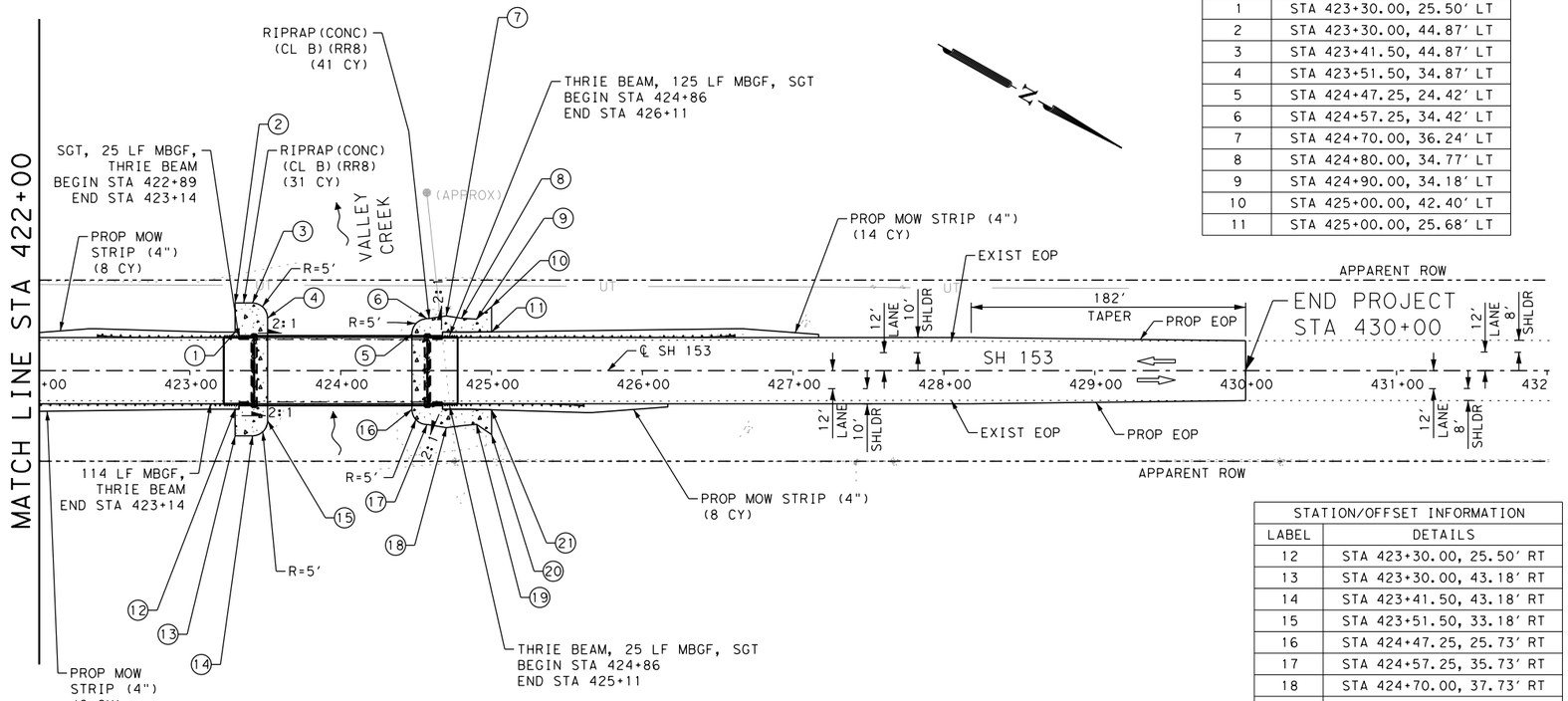
STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

PLAN AND PROFILE

SH 153 AT VALLEY CREEK

SHEET 1 OF 2

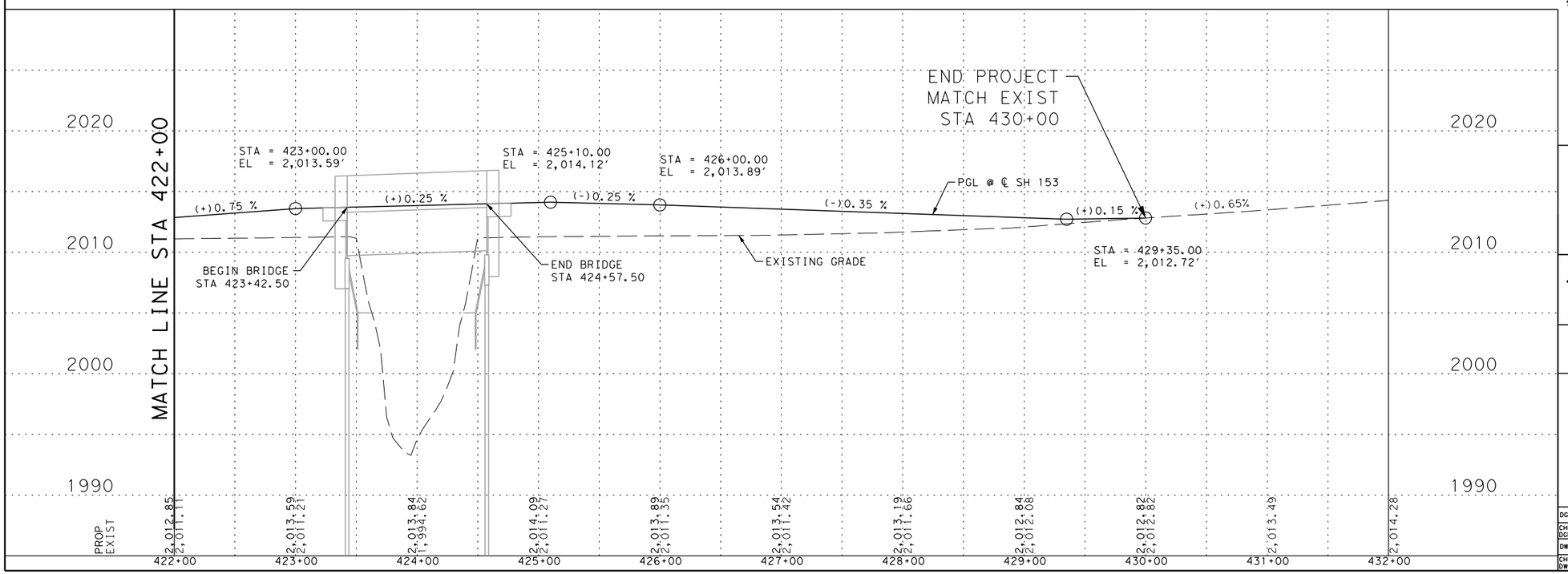
DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	45



STATION/OFFSET INFORMATION	
LABEL	DETAILS
1	STA 423+30.00, 25.50' LT
2	STA 423+30.00, 44.87' LT
3	STA 423+41.50, 44.87' LT
4	STA 423+51.50, 34.87' LT
5	STA 424+47.25, 24.42' LT
6	STA 424+57.25, 34.42' LT
7	STA 424+70.00, 36.24' LT
8	STA 424+80.00, 34.77' LT
9	STA 424+90.00, 34.18' LT
10	STA 425+00.00, 42.40' LT
11	STA 425+00.00, 25.68' LT

STATION/OFFSET INFORMATION	
LABEL	DETAILS
12	STA 423+30.00, 25.50' RT
13	STA 423+30.00, 43.18' RT
14	STA 423+41.50, 43.18' RT
15	STA 423+51.50, 33.18' RT
16	STA 424+47.25, 25.73' RT
17	STA 424+57.25, 35.73' RT
18	STA 424+70.00, 37.73' RT
19	STA 424+90.00, 35.57' RT
20	STA 425+00.00, 42.31' RT
21	STA 425+00.00, 25.92' RT

ITEM	DESCRIPTION	UNIT	QTY
0100-6002	PREPARING ROW	STA	8.0
0110-6001	EXCAVATION (ROADWAY)	CY	477
0132-6003	EMBANKMENT (FINAL) (ORD COMP) (TY B)	CY	1,736
0247-6231	FL BS (CMP IN PLACE) (TY A GR 1&2) (10")	SY	3,256
0260-6012	LIME (HYD, COM OR QK) (SLRY) OR QK (DRY)	TON	68
0260-6073	LIME TRT (SUBGRADE) (8")	SY	3,256
0310-6027	PRIME COAT (MC-30 OR AE-P)	GAL	622
0316-6224	AGGR (TY-PB GR-4 SAC-B)	CY	28
0316-6400	ASPH (AC-15P OR AC-10-2TR OR CRS-2P)	GAL	1,151
0432-6008	RIPRAP (CONC) (CL B) (RR8&RR9)	CY	77
0432-6045	RIPRAP (MOW STRIP) (4 IN)	CY	36
0540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF	289
0540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4
0542-6001	REMOVE METAL BEAM GUARD FENCE	LF	432
0544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	3
0544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	3
3077-6023	SP MIXES SP-C SAC-B PG70-22	TON	513
3077-6075	TACK COAT	GAL	280



LEGEND

DIRECTION OF TRAFFIC

CONCRETE RIPRAP

NOTES

1. SEE HORIZONTAL ALIGNMENT DATA SHEETS FOR HORIZONTAL ALIGNMENT DATA.
2. EXISTING FEATURES ARE SHOWN SCREENED BACK; i.e. DOTTED.
3. REMOVAL OF MBGF ON BRIDGE IS SUBSIDIARY TO BRIDGE QUANTITY ITEM 496.

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

0 50 100

SCALE: PLAN 1" = 100' PROFILE: 1" = 10'

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

PLAN AND PROFILE

SH 153 AT VALLEY CREEK

SHEET 2 OF 2

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	46

Plotted on: 10/3/2022

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DATE: 10/3/2022 4:12:40 PM
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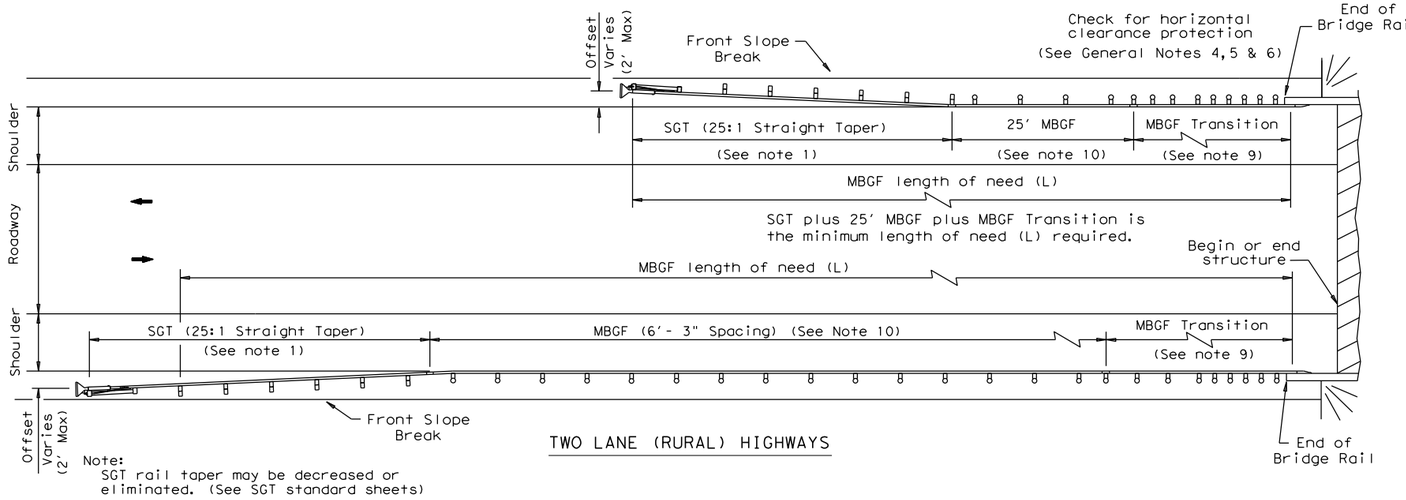
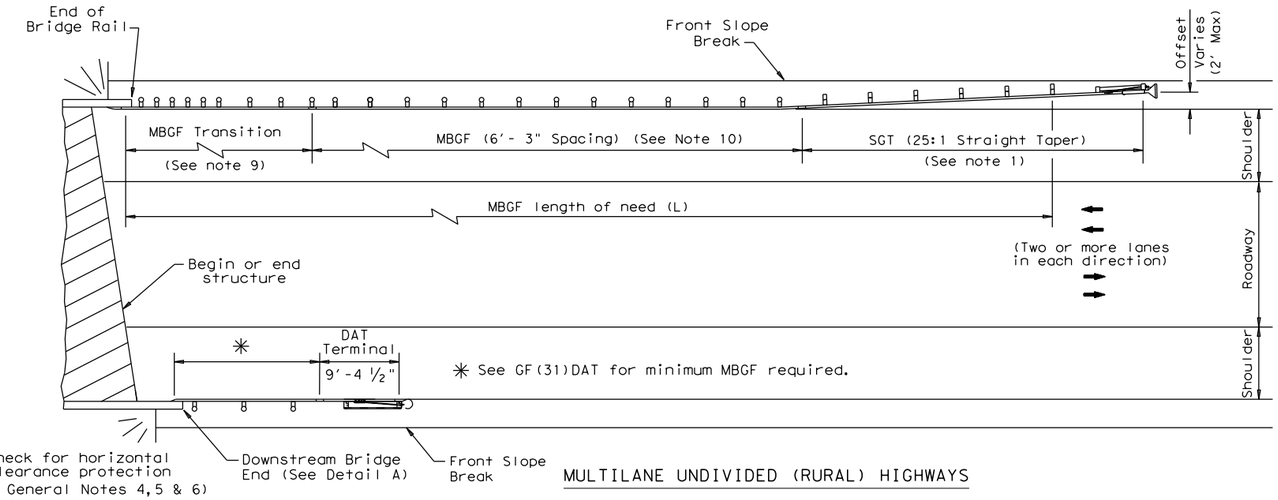
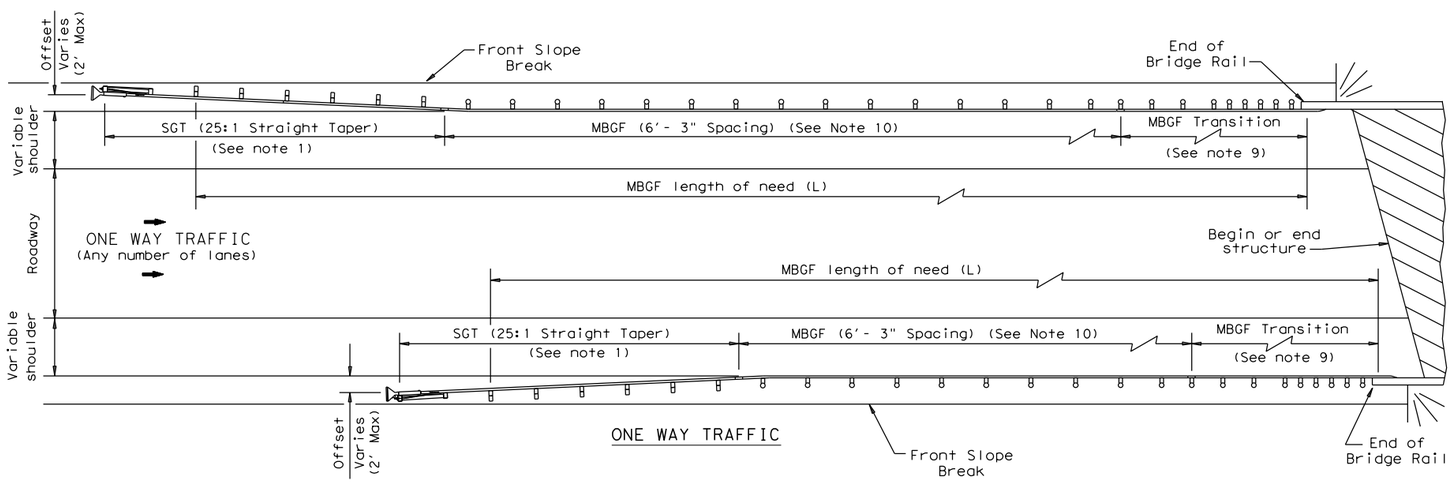


TWO LANE (RURAL) HIGHWAYS

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



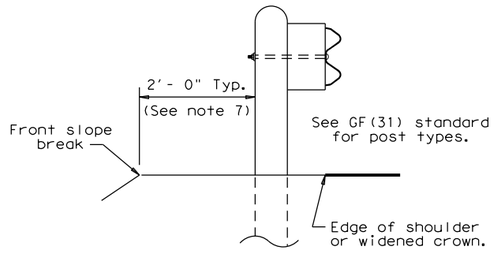
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



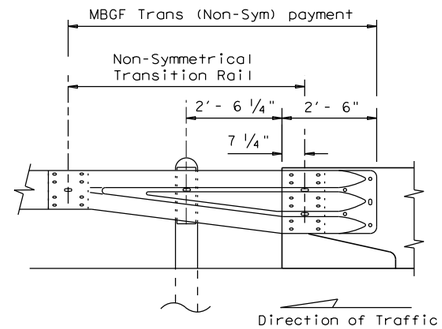
ONE WAY TRAFFIC

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
©TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED APRIL 2014 SEE (MEMO 0414)	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		47

DATE: 10/3/2022
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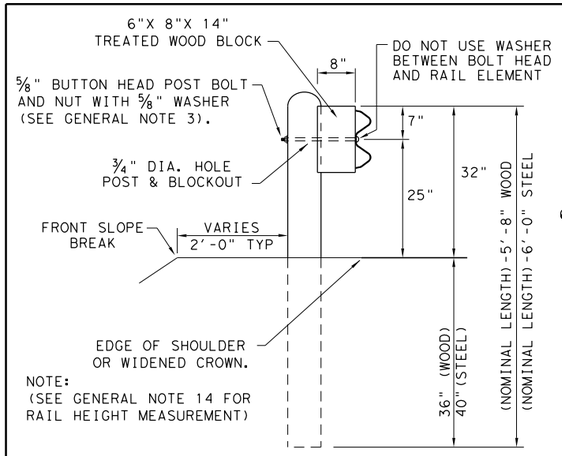
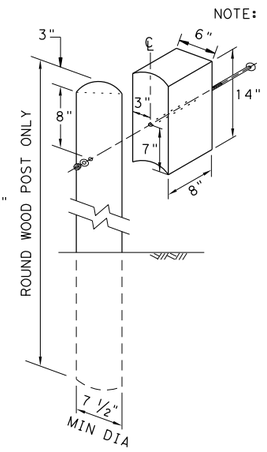
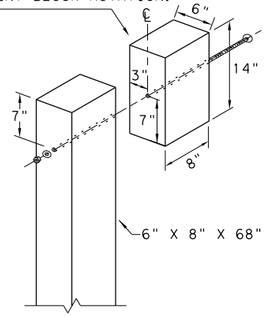


TYPICAL POST PLACEMENT

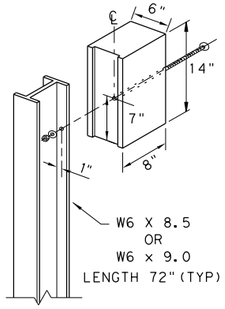


WOOD BLOCK TO
ROUND WOOD POST

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

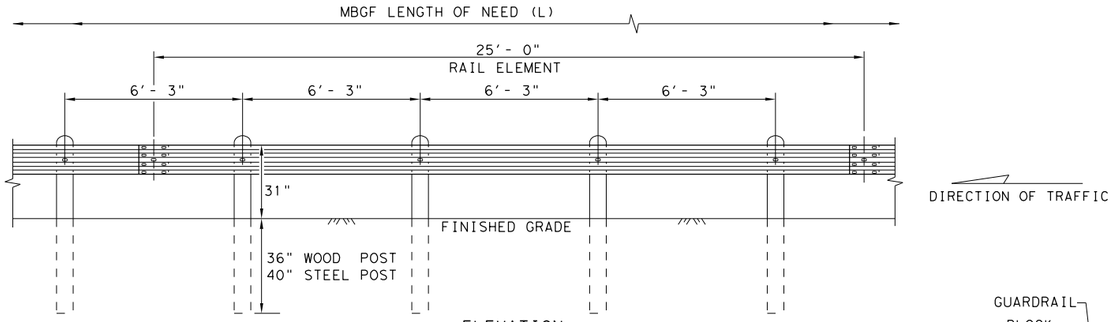


WOOD BLOCK TO
RECTANGULAR WOOD POST



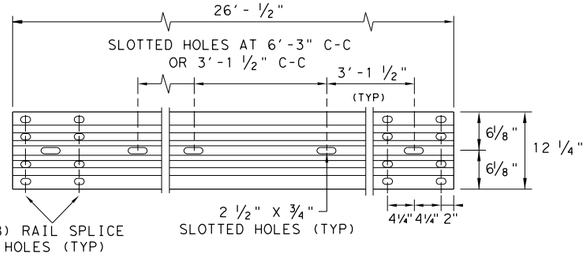
ROUTED WOOD BLOCK
TO I-BEAM STEEL POST

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



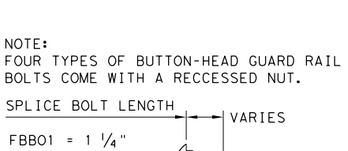
ELEVATION
MID-SPAN RAIL SPLICE

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



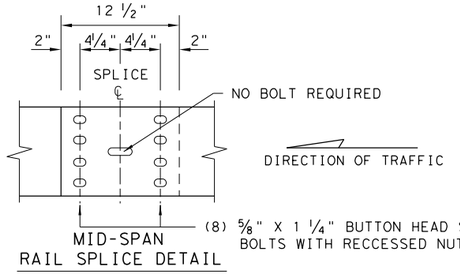
ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

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



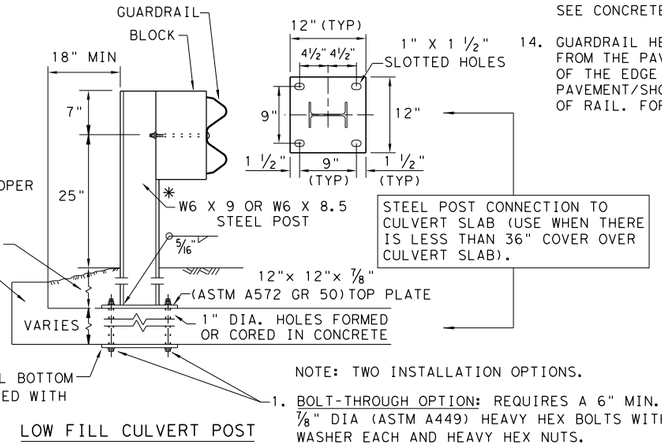
BUTTON HEAD BOLT

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



MID-SPAN
RAIL SPLICE DETAIL

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



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

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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
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	SJT	RUNNELS		48

DATE: 10/3/2022
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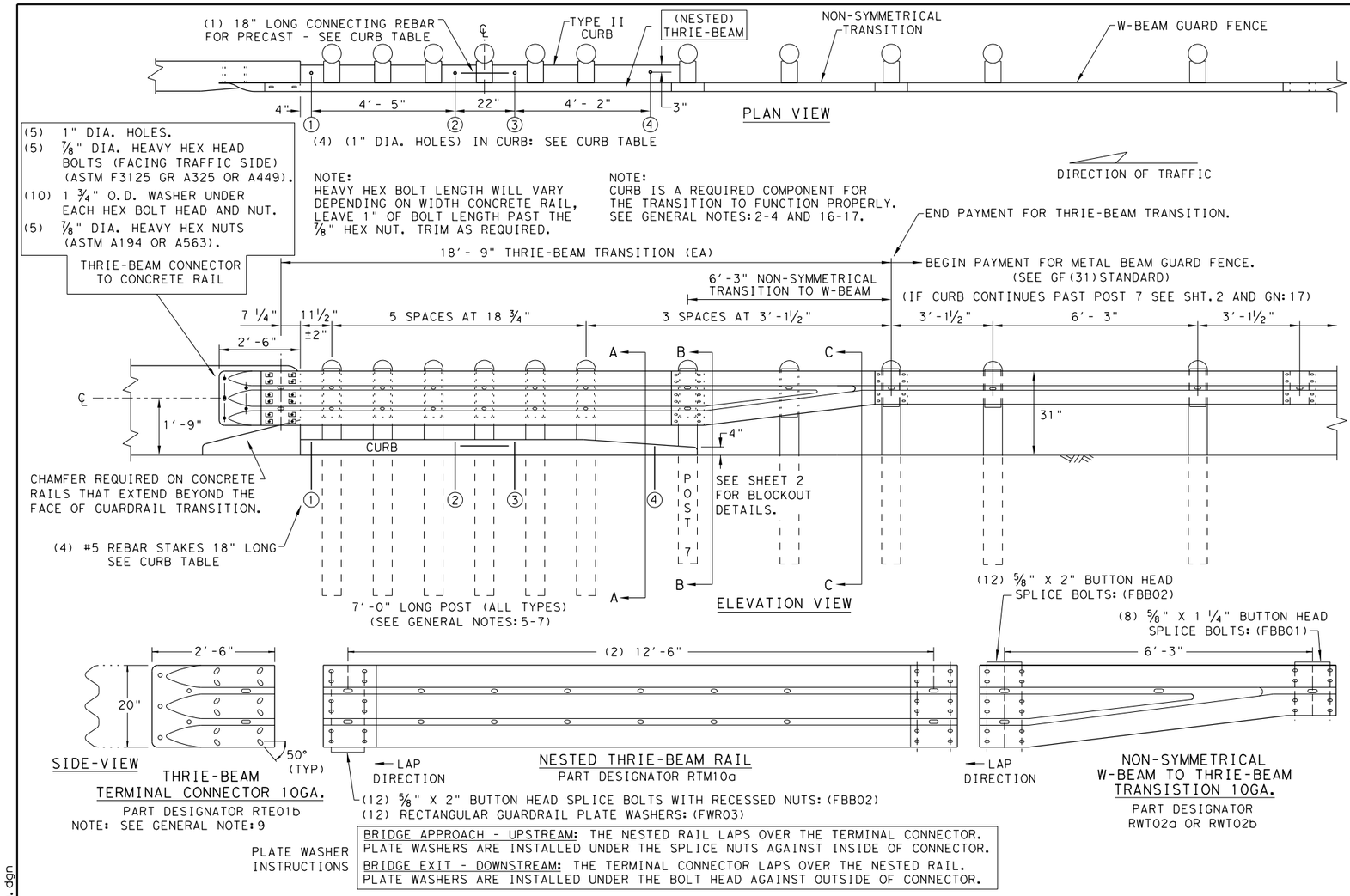


GENERAL NOTES

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

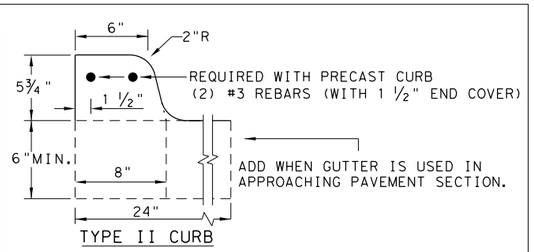
PRECAST CURB FULL LENGTH EQUALS 12'- 2"
THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.

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.

* 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

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

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
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		49

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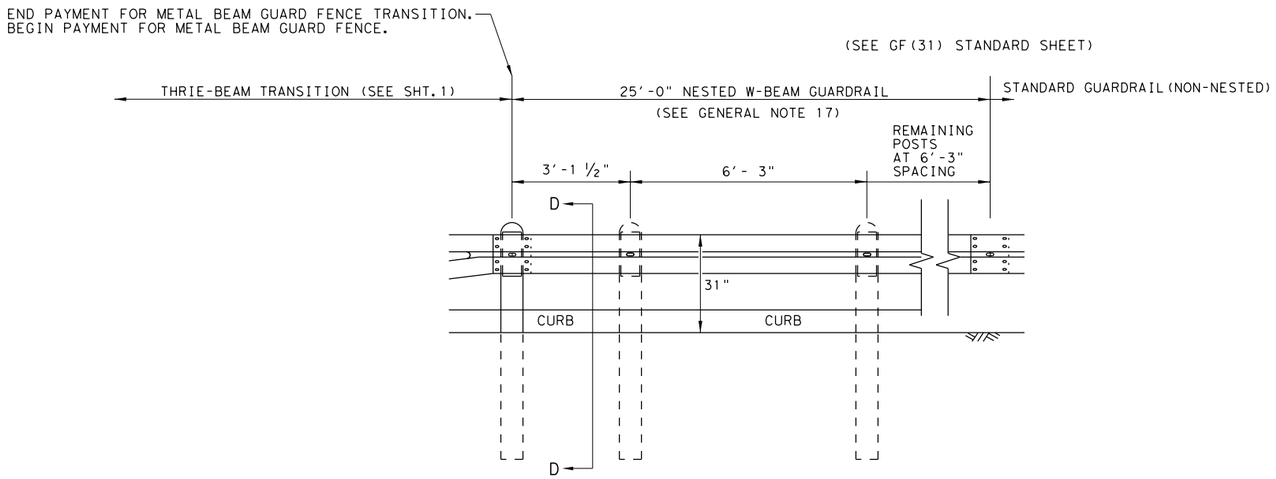
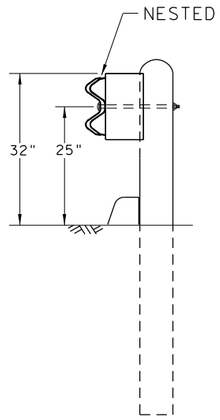
THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE: 10/3/2022
FILE: P:\118V79\01\Design\Civil\Standards\Roadway\gf31trt1320.dgn

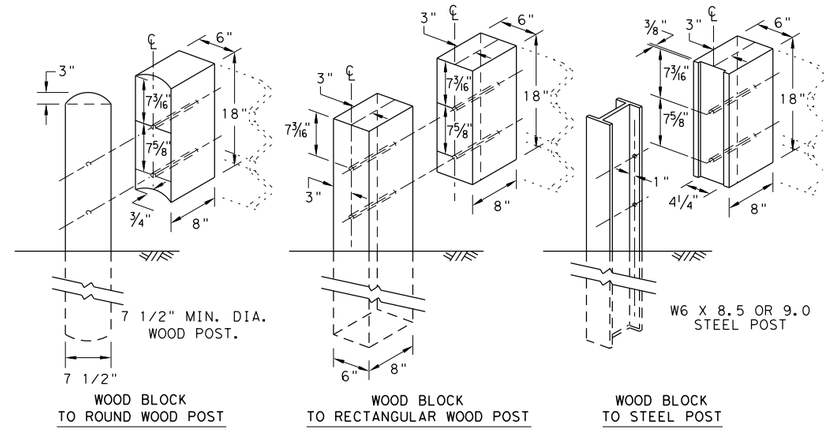
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

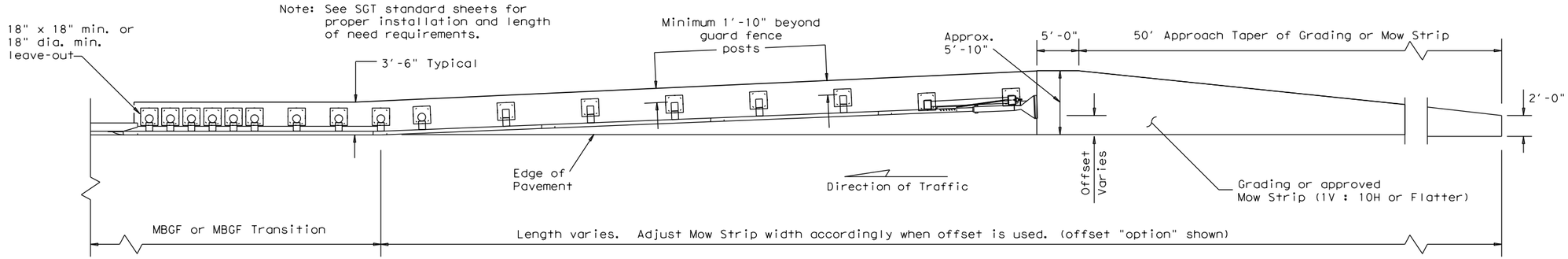
Texas Department of Transportation | Design Division Standard

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

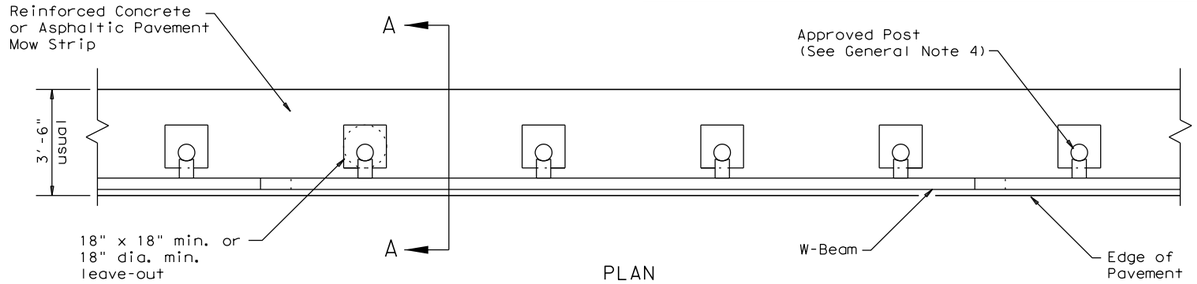
GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		50

DATE: 10/3/2022
FILE: P:\118179.01\Design\Civil\Standards\Roadway\gf31ms19.dgn

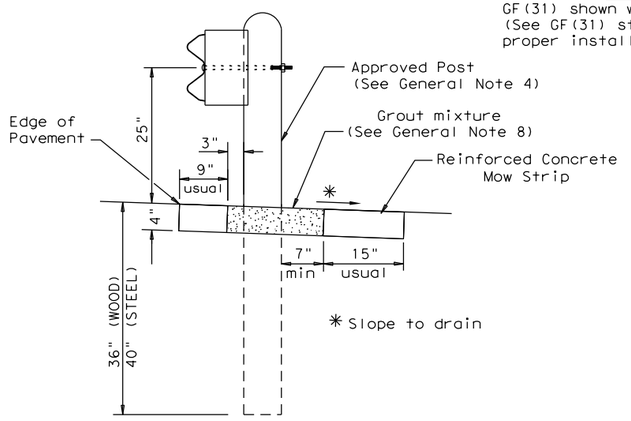


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



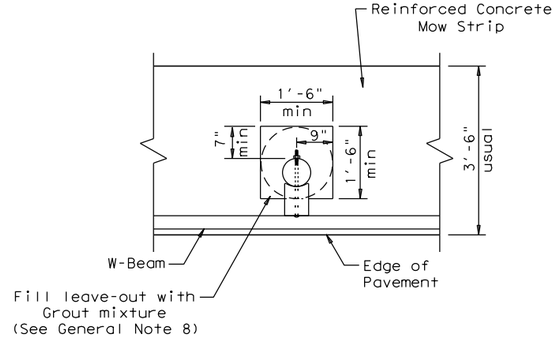
PLAN

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



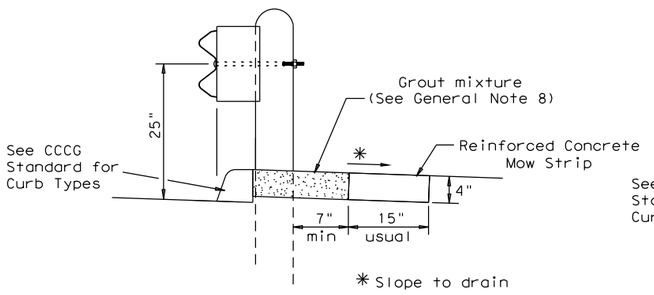
SECTION A-A

Typical



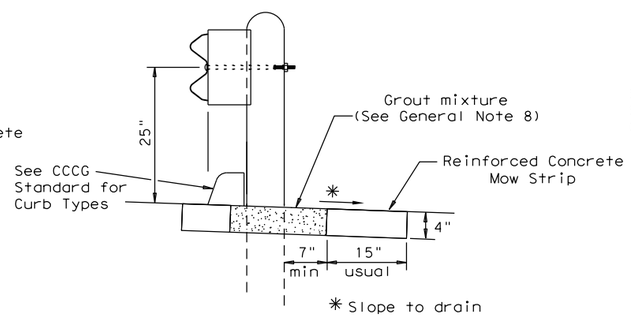
MOW STRIP DETAIL

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



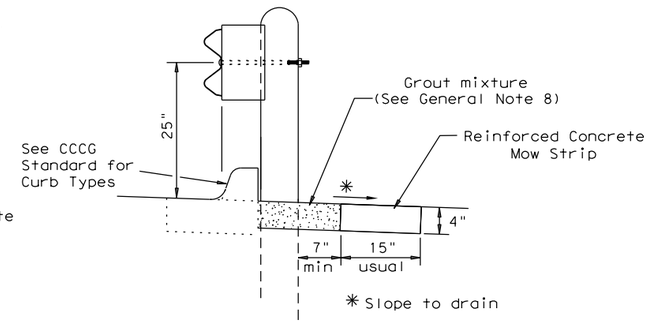
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG		
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0650	03	031		SH 153	
	DIST	COUNTY			SHEET NO.	
	SJT	RUNNELS			51	

DATE: 10/3/2022
FILE: P:\118179.01\Design\Civil\Standards\Roadway\sgt10s3116.dgn

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

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

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

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

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

PLAN VIEW

TRAFFIC FLOW

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

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT (2)1½" X 6'-9 ⅝"

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

SoftStop FACE SEE GN(3) & NOTE: B

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

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: C

SEE NOTE: A

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

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

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

POST 40" DEPTH (TYP 1-8)

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

SEE DETAIL 3

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

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

6'-1⅜"

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

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

ELEVATION VIEW

B B A A

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

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

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

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

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16"DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

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

FINISHED GRADE

SECTION VIEW B-B

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

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

POST(2)

FINISHED GRADE

SECTION VIEW A-A

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

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

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

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

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

POST 17"- ½" HEIGHT

4'- 9 ½"

40"

13/16" DIA. YIELDING HOLES

POST(1)

FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

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

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR.DH PN: 3245G

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

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

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

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

(2) ANCHOR POST ANGLE PN: 15201G

6'- 1 ⅜" POST DEPTH

DETAIL 3

AT POST(0)

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

TRAFFIC FLOW

APPROX 5'-10" 5'-0" 50' APPROACH GRADING 2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

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

2'-0" MAX. RAIL OFFSET

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

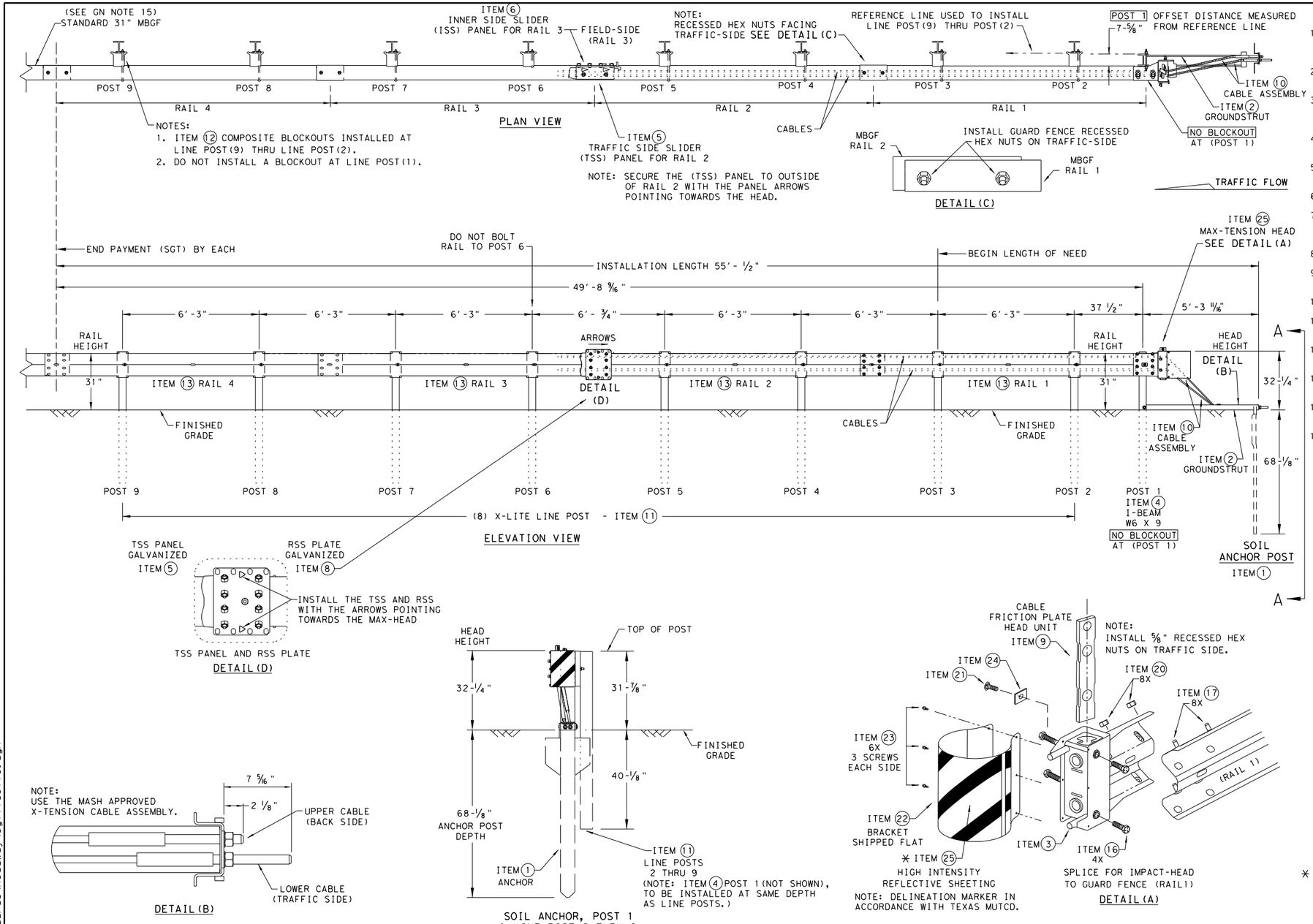
PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅞")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR.DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

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	0650	03	031		SH 153	
	DIST	COUNTY			SHEET NO.	
	SJT	RUNNELS			52	



GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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

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

Texas Department of Transportation

Design Division Standard

MAX-TENSION END TERMINAL MASH - TL-3

SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		53

DATE: 10/3/2022
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DATE: 10/3/2022
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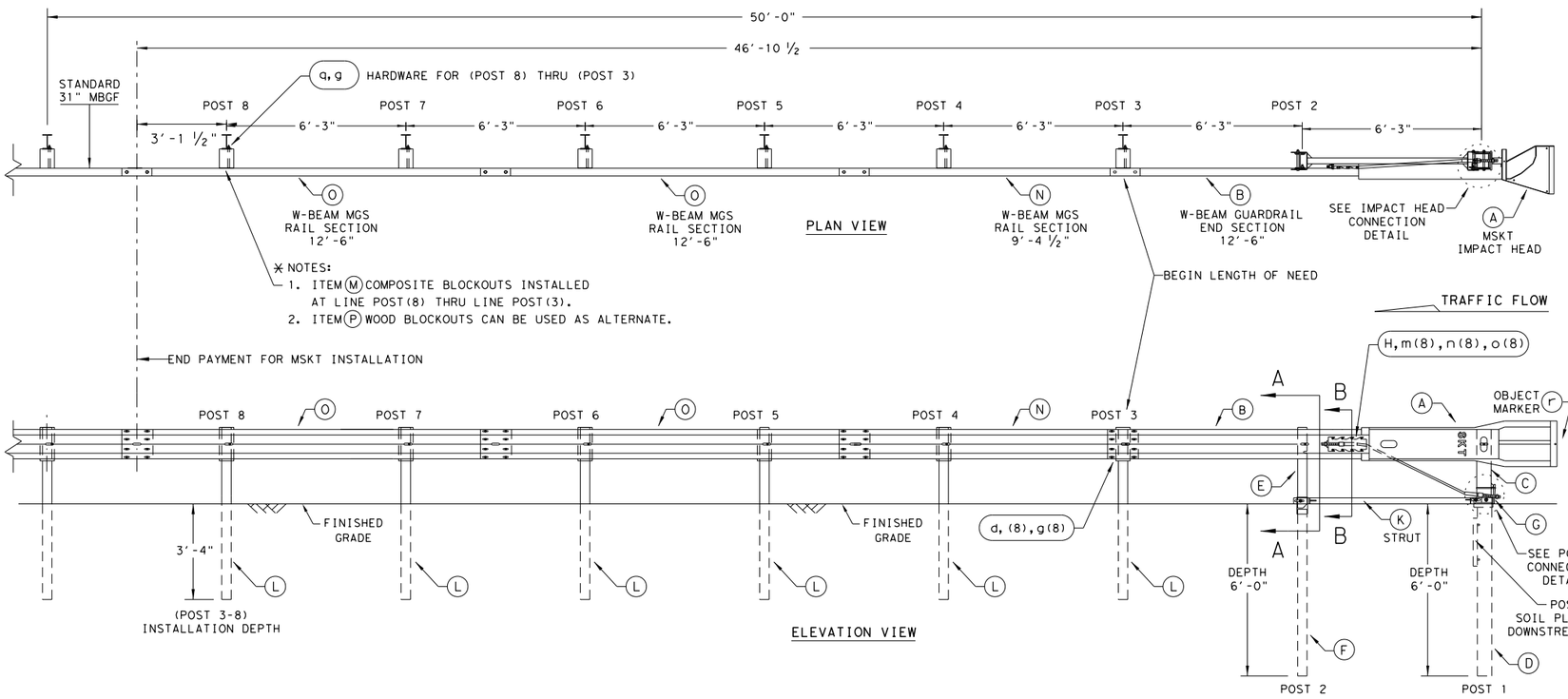
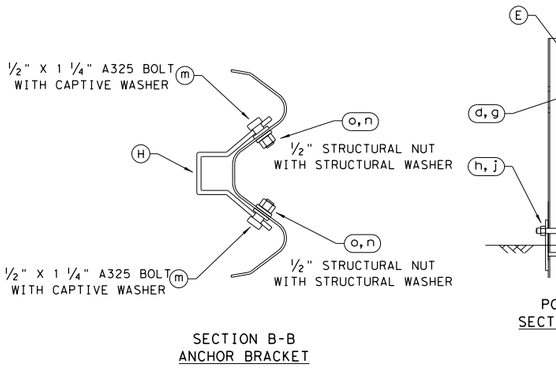
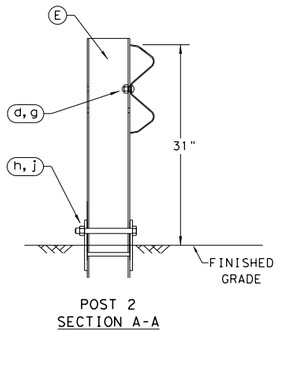


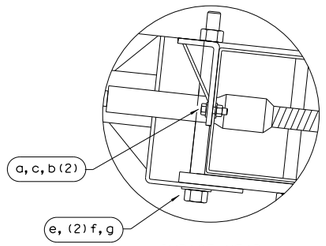
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



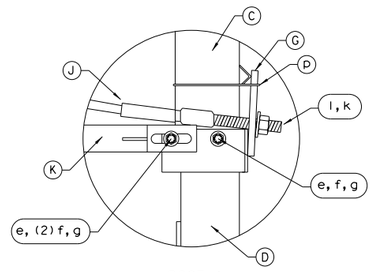
SECTION B-B
ANCHOR BRACKET



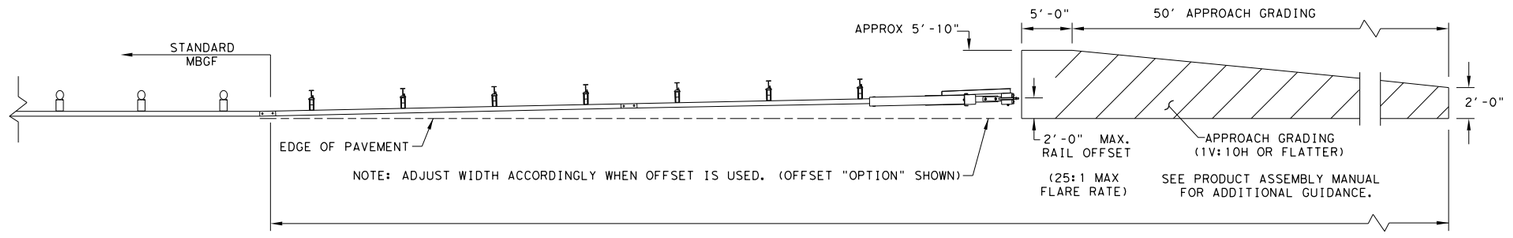
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



TRAFFIC FLOW

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

GENERAL NOTES

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

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

SEE NOTES: ✳

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

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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	DIST	COUNTY		SHEET NO.	
	SJT	RUNNELS		54	

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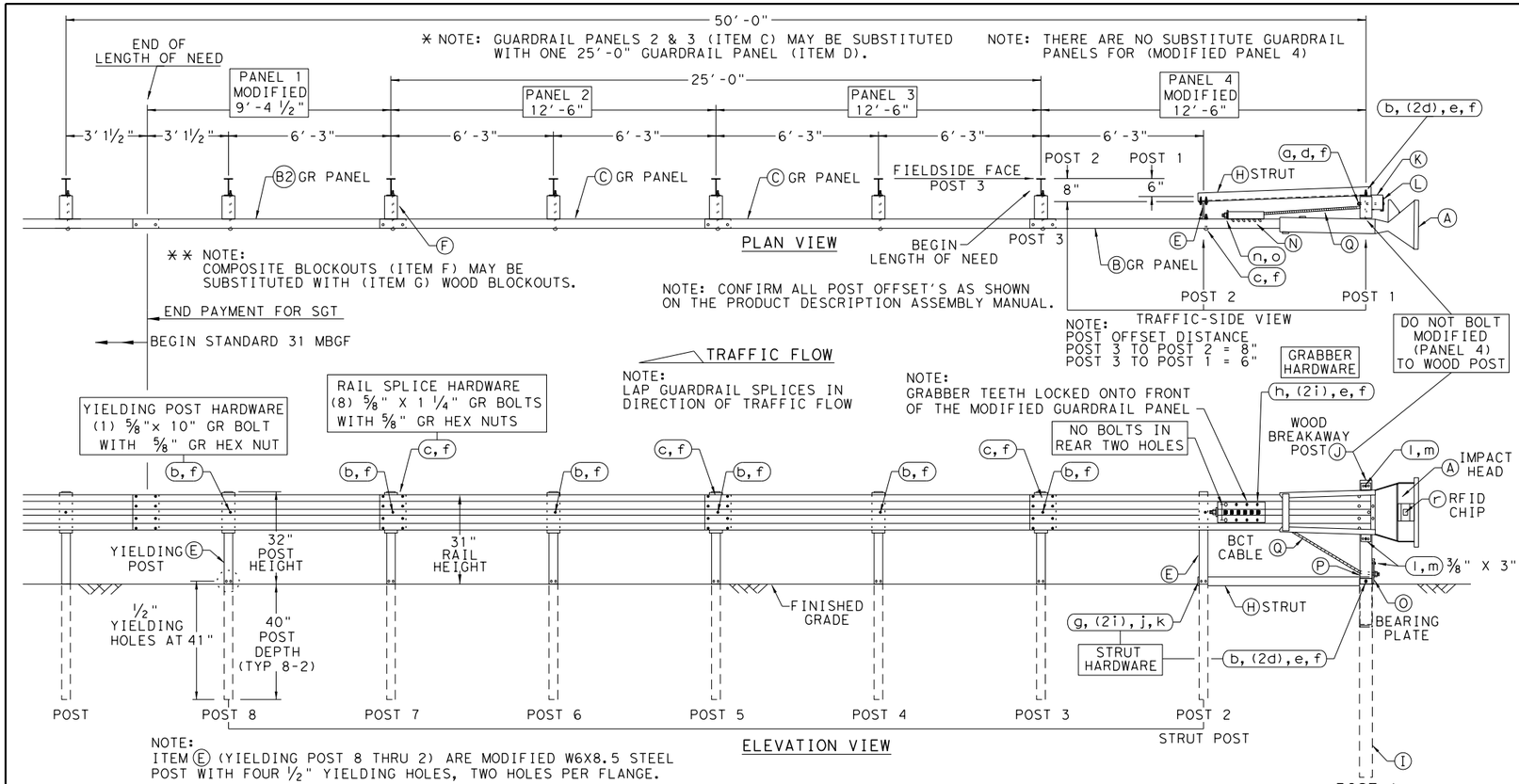
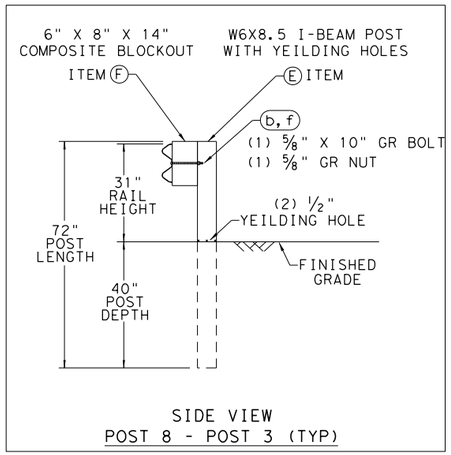


GENERAL NOTES

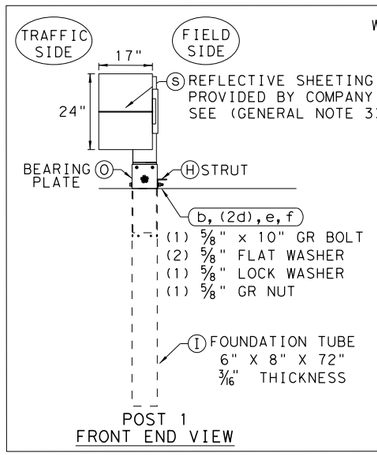
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY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

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

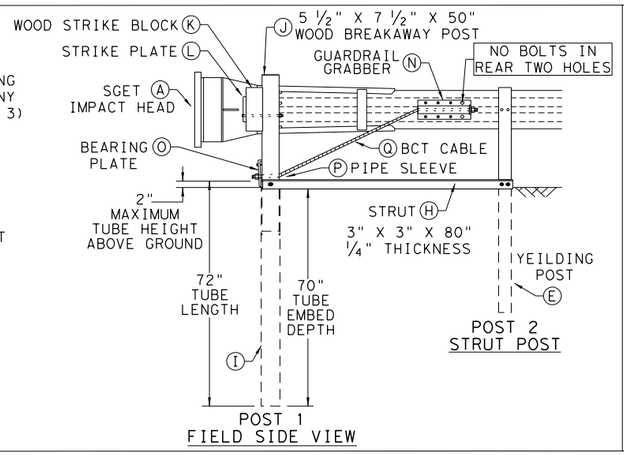
ALTERNATIVE ITEMS
NOTE: SEE PLAN VIEW
* D
** G



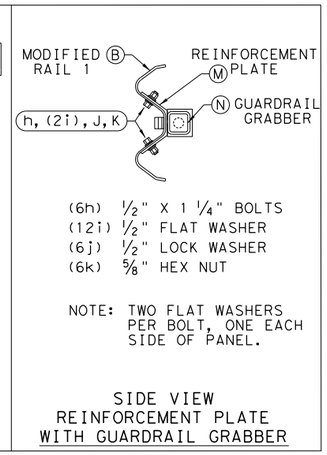
SIDE VIEW
POST 8 - POST 3 (TYP)



POST 1
FRONT END VIEW



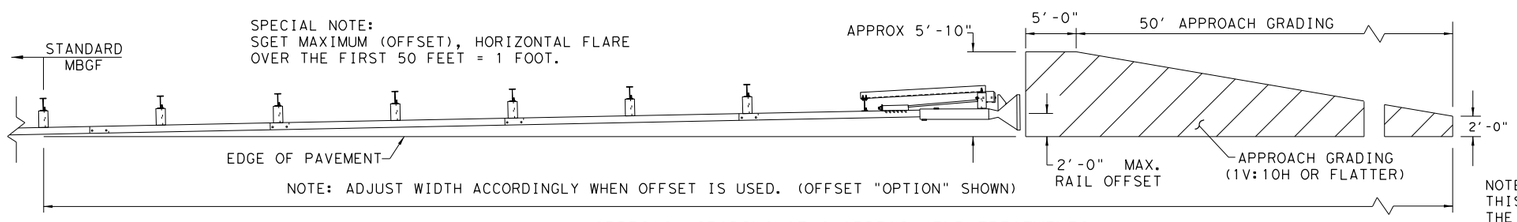
POST 1
FIELD SIDE VIEW



(6h) 1/2" X 1 1/4" BOLTS
(12i) 1/2" FLAT WASHER
(6j) 1/2" LOCK WASHER
(6k) 5/8" HEX NUT

NOTE: TWO FLAT WASHERS PER BOLT, ONE EACH SIDE OF PANEL.

SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

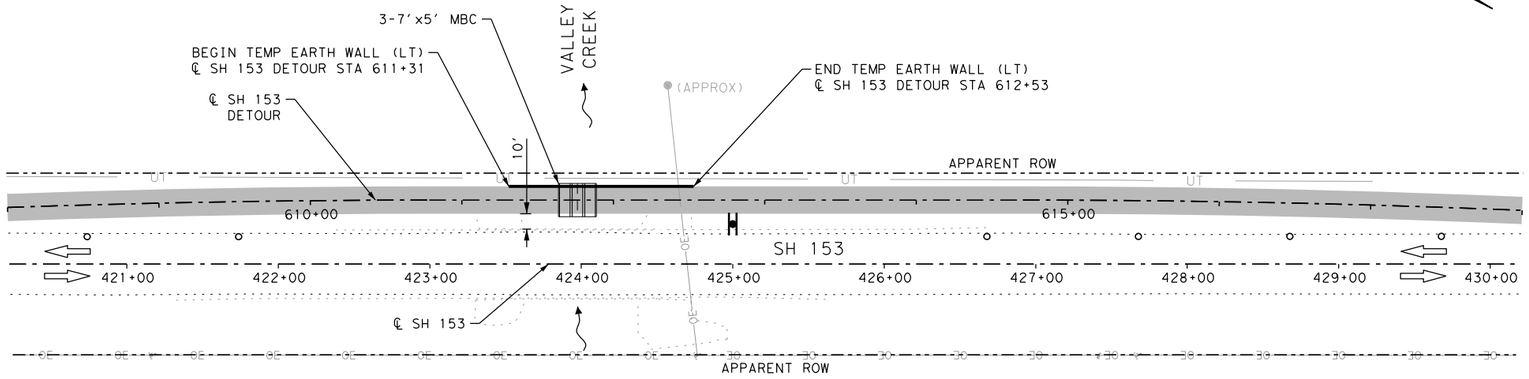
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

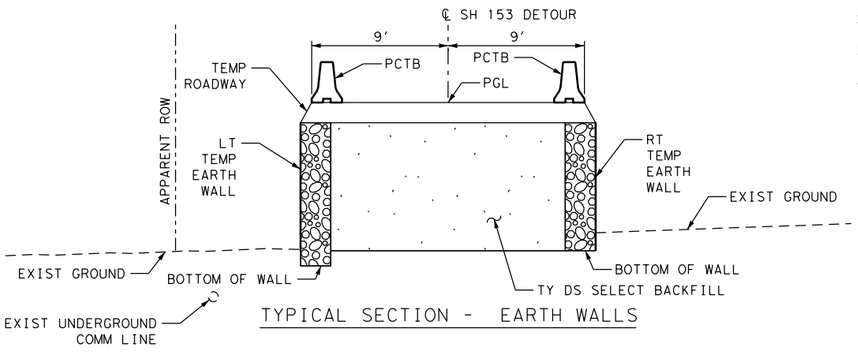
Texas Department of Transportation
Design Division Standard

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

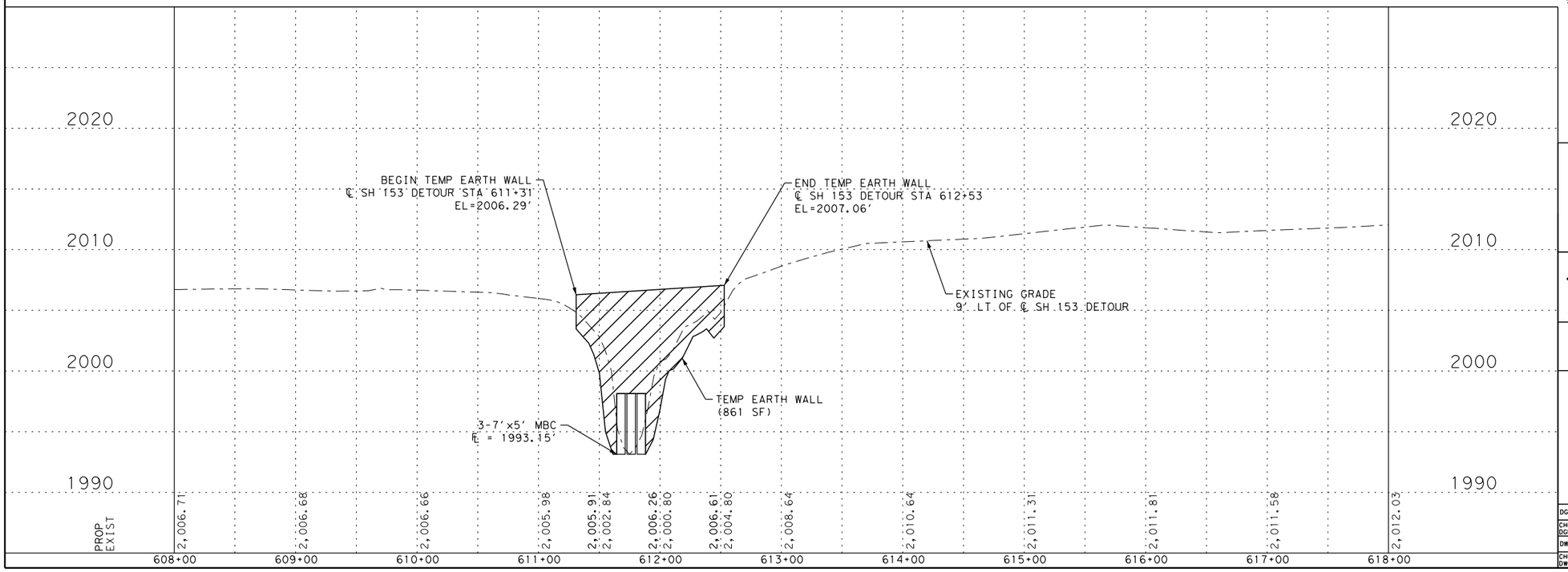
FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		55

Plotted on: 10/3/2022





TYPICAL SECTION - EARTH WALLS



LEGEND

- TEMPORARY PAVEMENT
- PROP CONSTRUCTION
- TEMP EARTH WALL
- PLASTIC DRUMS
- TRAFFIC FLOW ARROWS

NOTES

1. SEE HORIZONTAL ALIGNMENT DATA SHEETS FOR HORIZONTAL ALIGNMENT DATA.
2. EXISTING FEATURES ARE SHOWN SCREENED BACK; i.e. DOTTED.
3. SEE TCP TYPICAL SECTIONS, RW(TEW) AND CULVERT B LAYOUT FOR MORE INFORMATION.
4. CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

0 50 100

SCALE: PLAN 1" = 100' PROFILE: 1" = 10'

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

TEMPORARY EARTH WALL LAYOUTS

PHASE I - LEFT

SH 153 AT VALLEY CREEK

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	56

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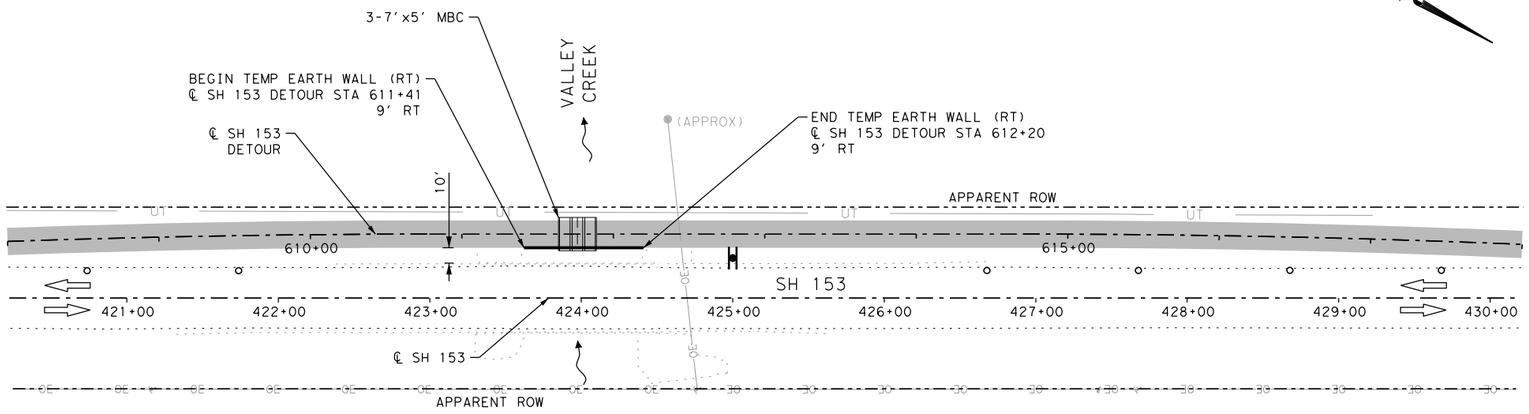
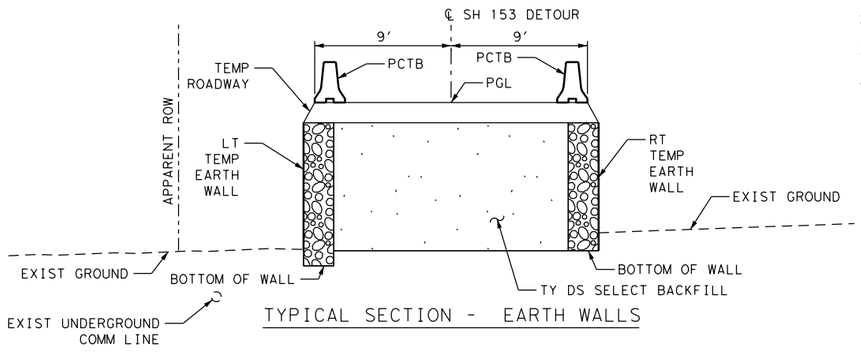
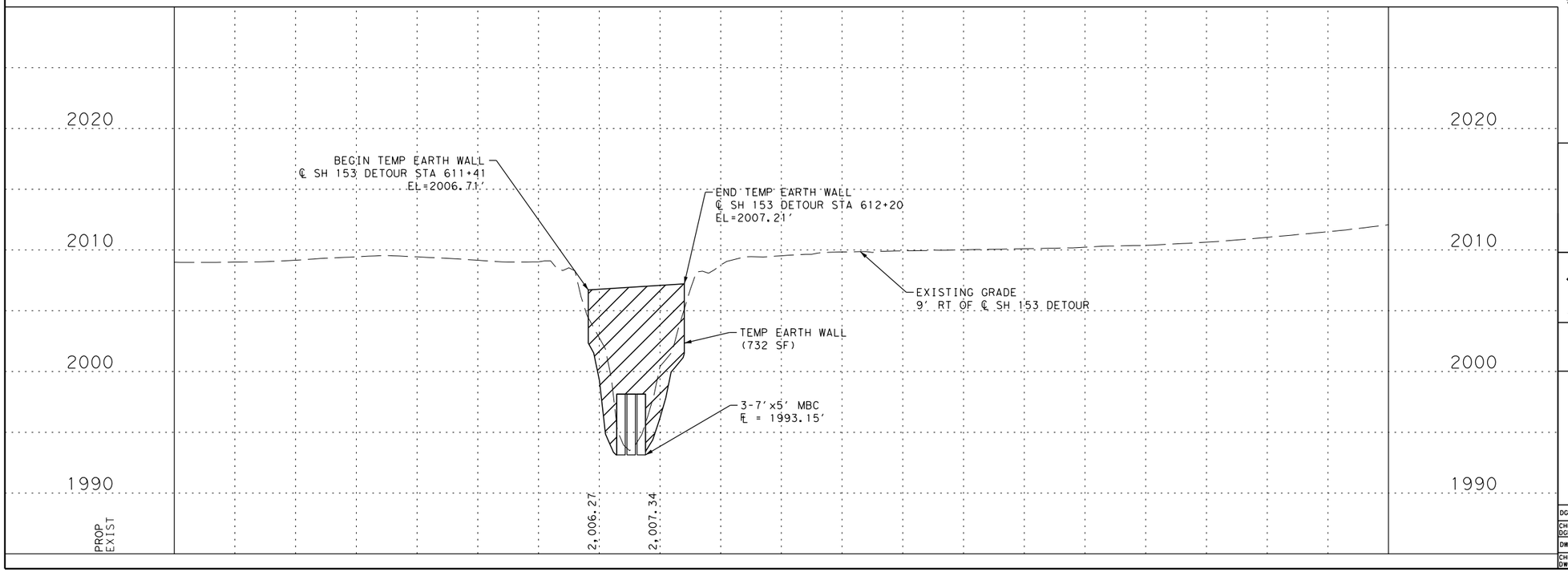




TYPICAL SECTION - EARTH WALLS



LEGEND

- TEMPORARY PAVEMENT
- PROP CONSTRUCTION
- TEMP EARTH WALL
- PLASTIC DRUMS
- TRAFFIC FLOW ARROWS

NOTES

1. SEE HORIZONTAL ALIGNMENT DATA SHEETS FOR HORIZONTAL ALIGNMENT DATA.
2. EXISTING FEATURES ARE SHOWN SCREENED BACK; i.e. DOTTED.
3. SEE TCP TYPICAL SECTIONS, RW(TEW) AND CULVERT B LAYOUT FOR MORE INFORMATION.
4. CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.

DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

0 50 100

SCALE: PLAN 1" = 100' PROFILE: 1" = 10'

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

TEMPORARY EARTH WALL LAYOUTS

PHASE I - RIGHT

SH 153 AT VALLEY CREEK

SHEET 2 OF 2

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
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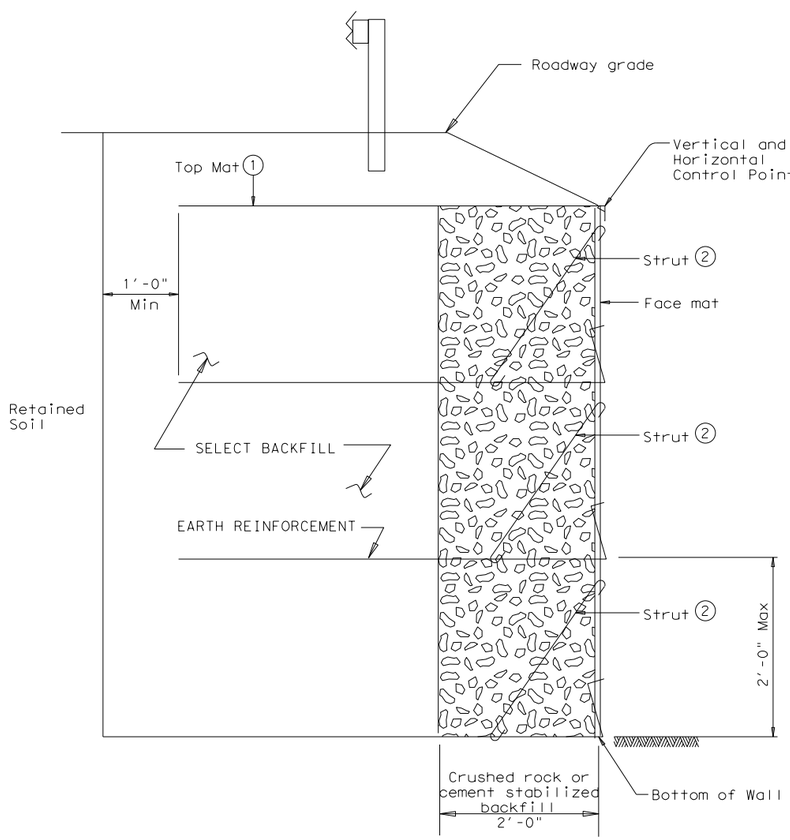
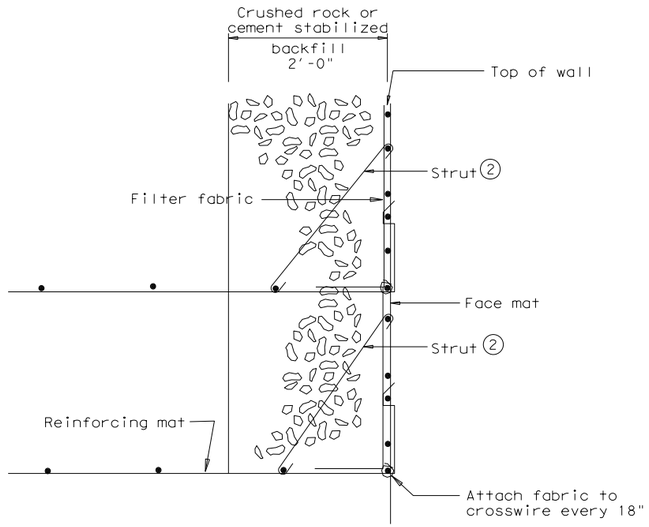


TYPICAL SECTION

(SHOWING TOP MAT OPTION)

(1) Provide top mat to stabilize top of wall. Contractor may propose alternate method to stabilize top of wall.

(2) Provide intermediate stuts as required to stabilize face.



DETAIL OF WALL FACE

(SHOWING STRUT OPTION)

SPECIAL NOTE - FACE CONSTRUCTION

When constructing wire faced walls, it is critical that the area immediately behind the face mat be completely filled. Failure to fill and compact this area will result in bulging of the face mats and settlement of the top of wall. The filter fabric shall closely follow the contours of the face unit, with particular attention paid to the lower corner of the basket. The fabric shall be pulled into the corner and attached to the basket with hog rings or tie wire. The coarse rock or cement stabilized backfill in the two foot zone behind the face shall extend completely to the top of the face mat. Particular care shall be taken not to leave a gap or void below the next layer of earth reinforcement.

EARTH REINFORCEMENTS:

The maximum vertical spacing of earth reinforcements shall be 24 inches.

The minimum length of earth reinforcements shall be 6 feet for walls 6 feet and shorter, and 8 feet for walls over 6 feet tall.

Minimum wire size for welded wire earth reinforcements shall be W4.5. Longitudinal wire spacing shall not exceed 12 inches. Transverse wire spacing shall not exceed 24 inches.

Earth reinforcement allowable stresses and pullout shall be calculated with current AASHTO Standard and Interim Specifications.

Factor of safety in pullout of the earth reinforcements shall be greater than 1.5 at each reinforcement level.

Temporary Earth Wall reinforcements that will be placed in the reinforced volume of a permanent MSE wall shall either be non-metallic or galvanized.

WALL FACE:

Minimum wire size for welded wire material used for all facing shall be W4.5. Spacing of the wire shall not exceed 6 inches in either the horizontal or vertical direction. The facing shall be designed to maintain a vertical position during wall backfilling. This may be accomplished with wire struts, external bracing, or other means which provide acceptable performance. If the face does not remain vertical during wall backfilling, work shall be stopped until the system is modified to meet this requirement.

Angled struts or a top mat shall be provided to stabilize the top basket face. Strut spacing shall not exceed 24 inches.

STABILITY CRITERIA:

Factor of safety in sliding along the base of the structure shall be greater than or equal to 1.5.

Factor of safety in overturning shall be greater than or equal to 2.0.

The base pressure resultant shall fall within the middle third of the retaining wall.

DESIGN PARAMETERS:

Structure shall be based on the following design parameters:

Random Backfill: Unit weight = 120 pcf.
(Embankment or Existing Soils) ø = 30° c = 0 psf
Select Backfill: Unit weight = 120 pcf
ø = 30° c = 0 psf

GENERAL NOTES:

Sections shown are for informational purposes only. Specific geometry is to be determined based on wall layouts and other plan information.

The select backfill specified for use within the Temporary Earth Wall Select Volume shall extend horizontally from the back of the 2' backfill zone to a minimum of 1' beyond the end of the earth reinforcements.

Texas Department of Transportation

Bridge Division Standard

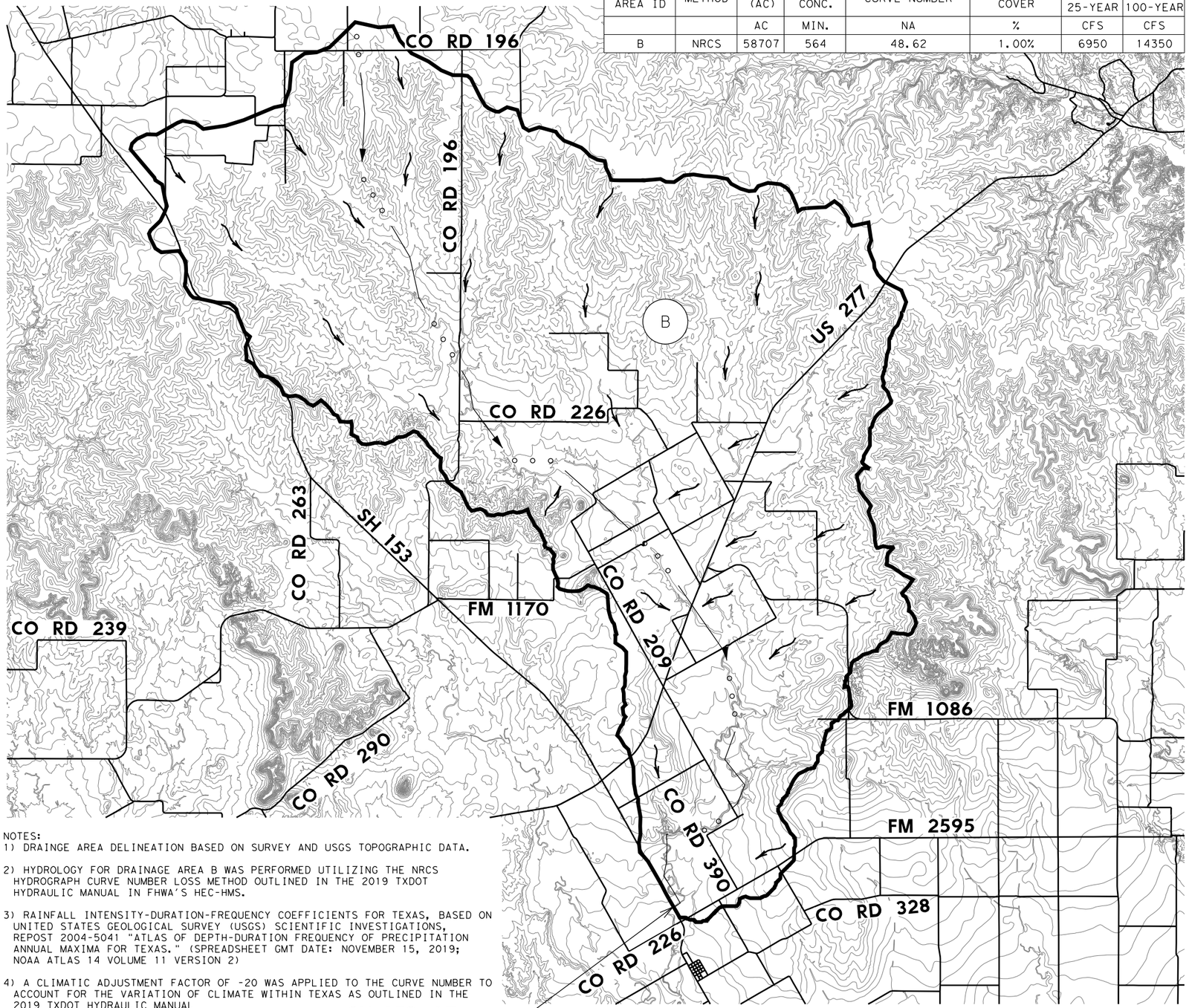
TEMPORARY EARTH RETAINING WALL

RW(TEW)

FILE: rwstde04.dgn	DN: TxDOT	CK: TxDOT	DW: GHO	CK: MPM
©TxDOT March 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
01-13: Added Struts.	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		58

Plotted on: 10/5/2022

DRAINAGE AREA ID	METHOD	AREA (AC)	TIME OF CONC.	CURVE NUMBER	IMPERVIOUS COVER	PEAK FLOW	
						25-YEAR	100-YEAR
		AC	MIN.	NA	%	CFS	CFS
B	NRCS	58707	564	48.62	1.00%	6950	14350



NOTES:
1) DRAINGE AREA DELINEATION BASED ON SURVEY AND USGS TOPOGRAPHIC DATA.

2) HYDROLOGY FOR DRAINAGE AREA B WAS PERFORMED UTILIZING THE NRCS HYDROGRAPH CURVE NUMBER LOSS METHOD OUTLINED IN THE 2019 TXDOT HYDRAULIC MANUAL IN FHWA'S HEC-HMS.

3) RAINFALL INTENSITY-DURATION-FREQUENCY COEFFICIENTS FOR TEXAS, BASED ON UNITED STATES GEOLOGICAL SURVEY (USGS) SCIENTIFIC INVESTIGATIONS, REPOST 2004-5041 "ATLAS OF DEPTH-DURATION FREQUENCY OF PRECIPITATION ANNUAL MAXIMA FOR TEXAS." (SPREADSHEET GMT DATE: NOVEMBER 15, 2019; NOAA ATLAS 14 VOLUME 11 VERSION 2)

4) A CLIMATIC ADJUSTMENT FACTOR OF -20 WAS APPLIED TO THE CURVE NUMBER TO ACCOUNT FOR THE VARIATION OF CLIMATE WITHIN TEXAS AS OUTLINED IN THE 2019 TXDOT HYDRAULIC MANUAL

SH 153 AT VALLEY CREEK

N

LEGEND

XX — DRAINAGE AREA ID

DRAINAGE AREA BOUNDARY

FLOW DIRECTION ARROW

STATE OF TEXAS
CODY J. MOCZYGEMBA
133448
LICENSED
PROFESSIONAL ENGINEER
10/5/2022

0 5000 10000 15000
SCALE: 1"= 10000'

LJA Engineering, Inc.
FRN - F-1386

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

Texas Department of Transportation

SH 153 AT VALLEY CREEK

DRAINAGE AREA MAP

BRIDGE AREA

SHEET 1 OF 1

DGN: CM	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DG	6	TEXAS				SH 153
DWG: JT	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: CHECK	SJT	RUNNELS	0650	03	031	59

Design Filename: ...\SH153-DAM-01.dgn

Plotted on: 10/5/2022

Plan: Proposed	Valley	Creek RS: 3738	Profile: Q25 =	
E.G. US. (ft)	2008.77	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	2007.97	E.G. Elev (ft)	2008.71	2008.48
Q Total (cfs)	6950	W.S. Elev (ft)	2007.82	2007.79
Q Bridge (cfs)	6950	Crit W.S. (ft)	2003.48	2003.91
Q Weir (cfs)		Max Chl Dpth (ft)	15.15	14.68
Weir Sta Lft (ft)		Vel Total (ft/s)	7.54	5.7
Weir Sta Rgt (ft)		Flow Area (sq ft)	921.87	1218.61
Weir Submerg		Froude # Chl	0.46	0.43
Weir Max Depth (ft)		Specif Force (cu ft)	6596.82	6190.95
Min El Weir Flow (ft	2009.08	Hydr Depth (ft)	8.48	2.9
Min El Prs (ft)	2009.54	W.P. Total (ft)	114.04	427.9
Delta EG (ft)	0.35	Conv. Total (cfs)	128311.7	135958.2
Delta WS (ft)	0.21	Top Width (ft)	108.7	448.12
BR Open Area (sq ft	1076.28	Frctn Loss (ft)	0.13	0.05
BR Open Vel (ft/s)	7.75	C & E Loss (ft)	0.1	0.02
BR Sluice Coef		Shear Total (lb/sq ft	1.48	0.46
BR Sel Method	Energy only	Power Total (lb/ft s)	11.16	2.65

Plan: Proposed	Valley	Creek RS: 3738	Profile: Q100 =	
E.G. US. (ft)	2012.28	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	2010.25	E.G. Elev (ft)	2011.99	2010.61
Q Total (cfs)	14350	W.S. Elev (ft)	2009.26	2010.1
Q Bridge (cfs)	14348.24	Crit W.S. (ft)	2007.45	2008.71
Q Weir (cfs)		Max Chl Dpth (ft)	16.59	16.99
Weir Sta Lft (ft)		Vel Total (ft/s)	13.24	5.65
Weir Sta Rgt (ft)		Flow Area (sq ft)	1083.82	2538.7
Weir Submerg		Froude # Chl	0.57	0.24
Weir Max Depth (ft)		Specif Force (cu ft)	12321.16	11638.08
Min El Weir Flow (ft	2009.08	Hydr Depth (ft)	8.97	4.65
Min El Prs (ft)	2009.54	W.P. Total (ft)	127.03	786.41
Delta EG (ft)	1.89	Conv. Total (cfs)	161686.2	218028.6
Delta WS (ft)	0.88	Top Width (ft)	140.57	639.07
BR Open Area (sq ft	1076.28	Frctn Loss (ft)	0.27	0.07
BR Open Vel (ft/s)	13.33	C & E Loss (ft)	1.11	0.15
BR Sluice Coef		Shear Total (lb/sq ft	4.2	0.87
BR Sel Method	Energy only	Power Total (lb/ft s)	55.55	4.93

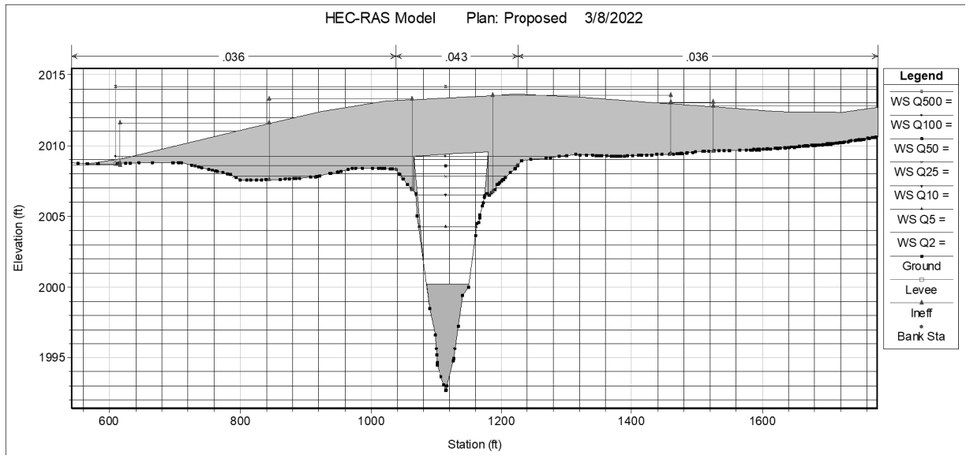
NOTES:
1. FHWA'S HEC-RAS VERSION 5.1 WAS USED FOR THE HYDRAULIC
ANALYSIS AND DESIGN OF THE BRIDGE.

3. DISCHARGES WERE DETERMINED USING THE HEC-HMS MODEL.
(SCS METHOD)

4. ALL ELEVATIONS BASED ON THE NAVD88 VERTICAL DATUM.

5. DOWNSTREAM BOUNDARY CONDITIONS BASED ON NORMAL DEPTH
CALCULATED BASED ON CHANNEL SLOPE.

6. REFER TO DRAINGE AREA MAP FOR ADDITIONAL HYDROLOGIC
INFORMATION.



Plan: Existing	Valley	Creek RS: 3738	Profile: Q25 =	
E.G. US. (ft)	2009.45	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	2008.53	E.G. Elev (ft)	2009.24	2008.76
Q Total (cfs)	6950	W.S. Elev (ft)	2008.08	2008.02
Q Bridge (cfs)	6950	Crit W.S. (ft)	2004.82	2005.56
Q Weir (cfs)		Max Chl Dpth (ft)	15.4	14.91
Weir Sta Lft (ft)		Vel Total (ft/s)	8.67	6.07
Weir Sta Rgt (ft)		Flow Area (sq ft)	801.57	1145.69
Weir Submerg		Froude # Chl	0.39	0.31
Weir Max Depth (ft)		Specif Force (cu ft)	6220.34	5478.66
Min El Weir Flow (ft	2009.16	Hydr Depth (ft)	8.29	2.81
Min El Prs (ft)	2009.07	W.P. Total (ft)	167.18	470.15
Delta EG (ft)	0.76	Conv. Total (cfs)	84666.8	99276.4
Delta WS (ft)	0.52	Top Width (ft)	96.74	477.82
BR Open Area (sq ft	859.64	Frctn Loss (ft)	0.27	0.04
BR Open Vel (ft/s)	9.15	C & E Loss (ft)	0.22	0.03
BR Sluice Coef		Shear Total (lb/sq ft	2.02	0.75
BR Sel Method	Energy only	Power Total (lb/ft s)	17.49	4.52

Plan: Existing	Valley	Creek RS: 3738	Profile: Q100 =	
E.G. US. (ft)	2013.03	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	2012.92	E.G. Elev (ft)	2012.75	2010.53
Q Total (cfs)	14350	W.S. Elev (ft)	2011.8	2009.85
Q Bridge (cfs)	8777.12	Crit W.S. (ft)	2011.8	2009.09
Q Weir (cfs)		Max Chl Dpth (ft)	19.13	16.74
Weir Sta Lft (ft)		Vel Total (ft/s)	7.47	6.61
Weir Sta Rgt (ft)		Flow Area (sq ft)	1921.49	2170.38
Weir Submerg		Froude # Chl	0.31	0.29
Weir Max Depth (ft)		Specif Force (cu ft)	11778.68	10020.33
Min El Weir Flow (ft	2009.16	Hydr Depth (ft)	2.1	3.98
Min El Prs (ft)	2009.07	W.P. Total (ft)	1190.01	812.5
Delta EG (ft)	2.59	Conv. Total (cfs)	110686.7	166937.8
Delta WS (ft)	3.25	Top Width (ft)	1010.01	641.7
BR Open Area (sq ft	859.64	Frctn Loss (ft)	0.5	0.05
BR Open Vel (ft/s)	10.21	C & E Loss (ft)	0.13	0.03
BR Sluice Coef		Shear Total (lb/sq ft	1.69	1.23
BR Sel Method	Energy only	Power Total (lb/ft s)	12.65	8.15

STATE OF TEXAS
CODY J. MOCZYGEMBA
133448
LICENSED
PROFESSIONAL ENGINEER
10/5/2022

NOT TO SCALE

LJA Engineering, Inc.
FRN - F-1386

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SH 153 AT VALLEY CREEK
HYDRAULIC DATA SHEET

SHEET 1 OF 3

DGN: CM	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DG	6	TEXAS				SH 153
DWG: JT	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: CHECK	SJT	RUNNELS	0650	03	031	60

Design Filename: ...\SH153-HYD-01.dgn

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Creek	5347	Q25 =	Existin	6950	1999.96	2012.35	2010	2013.14	0.004331	7.38	1162.94	810.15	0.56
Creek	5347	Q25 =	Propose	6950	1999.96	2012.35	2010	2013.14	0.004334	7.38	1162.45	809.89	0.56
Creek	5347	Q100 =	Existin	14350	1999.96	2014.16	2013.5	2014.64	0.002546	6.87	3319.48	1525.19	0.45
Creek	5347	Q100 =	Propose	14350	1999.96	2014.11	2013.5	2014.61	0.002682	7.02	3247.05	1517.7	0.46
Creek	4995	Q25 =	Existin	6950	1997.88	2011.75		2012.14	0.00152	5.35	1755.19	885.85	0.35
Creek	4995	Q25 =	Propose	6950	1997.88	2011.75		2012.14	0.001521	5.36	1754.41	885.42	0.35
Creek	4995	Q100 =	Existin	14350	1997.88	2013.68		2013.98	0.001162	5.47	4249.57	1572.99	0.32
Creek	4995	Q100 =	Propose	14350	1997.88	2013.59		2013.91	0.001258	5.66	4109.02	1559.8	0.33
Creek	4440	Q25 =	Existin	6950	1998.05	2010.67		2011.09	0.002409	5.68	1667.51	1021.33	0.42
Creek	4440	Q25 =	Propose	6950	1998.05	2010.58		2011.04	0.00265	5.9	1577.77	990.12	0.44
Creek	4440	Q100 =	Existin	14350	1998.05	2013.27		2013.42	0.000752	4.09	5493.1	1814.64	0.25
Creek	4440	Q100 =	Propose	14350	1998.05	2013.13		2013.29	0.000857	4.31	5234.08	1788.61	0.27
Creek	4211	Q25 =	Existin	6950	1998.55	2010.21		2010.48	0.002569	5.13	1972.54	1184.09	0.42
Creek	4211	Q25 =	Propose	6950	1998.55	2009.81		2010.28	0.004198	6.54	1545.19	1029.92	0.54
Creek	4211	Q100 =	Existin	14350	1998.55	2013.2		2013.27	0.000419	2.86	7168.42	2081.8	0.18
Creek	4211	Q100 =	Propose	14350	1998.55	2013.05		2013.12	0.000482	3.02	6845.51	2070.5	0.2
Creek	3934	Q25 =	Existin	6950	1993.97	2010.02		2010.12	0.000619	3.12	3318.5	1491.95	0.22
Creek	3934	Q25 =	Propose	6950	1993.97	2009.56		2009.71	0.000942	3.68	2690.41	1238.27	0.27
Creek	3934	Q100 =	Existin	14350	1993.97	2013.15		2013.19	0.000187	2.23	9237.46	2164.62	0.13
Creek	3934	Q100 =	Propose	14350	1993.97	2012.98		2013.03	0.000209	2.33	8887.69	2140.76	0.14
Creek	3849	Q25 =	Existin	6950	1993.91	2009.83		2009.87	0.000323	2.37	4605.08	1777.46	0.16
Creek	3849	Q25 =	Propose	6950	1993.91	2009.16		2009.26	0.000735	3.34	3438.15	1734.64	0.23
Creek	3849	Q100 =	Existin	14350	1993.91	2013.09		2013.11	0.000102	1.72	11461.11	2383.93	0.09
Creek	3849	Q100 =	Propose	14350	1993.91	2012.92		2012.95	0.000113	1.79	11059.37	2360.99	0.1
Creek	3815	Q25 =	Existin	6950	1992.94	2009.8		2009.82	0.000166	1.7	5948.29	1995.81	0.11
Creek	3815	Q25 =	Propose	6950	1992.94	2009.1		2009.15	0.000353	2.31	4583.71	1927.31	0.16
Creek	3815	Q100 =	Existin	14350	1992.94	2013.08		2013.1	0.000063	1.35	13676.58	2565.08	0.07
Creek	3815	Q100 =	Propose	14350	1992.94	2012.91		2012.93	0.000069	1.41	13241.03	2550.02	0.08
Creek	3778	Q25 =	Existin	6950	1992.67	2008.53	2004.44	2009.45	0.002787	7.71	901.32	490.09	0.48
Creek	3778	Q25 =	Propose	6950	1992.67	2007.97	2003.51	2008.77	0.001411	7.16	971.3	314.69	0.45
Creek	3778	Q100 =	Existin	14350	1992.67	2012.92	2008.44	2013.03	0.000421	3.38	5685.28	1398.69	0.19
Creek	3778	Q100 =	Propose	14350	1992.67	2010.25	2007.6	2012.28	0.002561	11.43	1263.4	1115.33	0.63
Creek	3738			Bridge									
Creek	3690	Q25 =	Existin	6950	1993.11	2008.01	2005.55	2008.69	0.002684	7.13	1241.63	1145.56	0.46
Creek	3690	Q25 =	Propose	6950	1993.11	2007.76	2003.97	2008.42	0.001263	6.73	1297.1	1054.98	0.43
Creek	3690	Q100 =	Existin	14350	1993.11	2009.66	2009.02	2010.45	0.002944	8.54	2393.59	1210.03	0.5
Creek	3690	Q100 =	Propose	14350	1993.11	2009.37	2008.46	2010.39	0.001843	9.22	2381.36	1197.82	0.53
Creek	3624	Q25 =	Existin	6950	1992.48	2007.25	2005.5	2007.91	0.003197	7.08	1310.1	607.65	0.49
Creek	3624	Q25 =	Propose	6950	1992.48	2007.25	2005.5	2007.91	0.003197	7.08	1310.1	607.65	0.49
Creek	3624	Q100 =	Existin	14350	1992.48	2008.9	2008.27	2009.62	0.003137	8.17	2478.74	741.76	0.51
Creek	3624	Q100 =	Propose	14350	1992.48	2008.9	2008.27	2009.62	0.003137	8.17	2478.74	741.76	0.51
Creek	3563	Q25 =	Existin	6950	1993.79	2006.71	2004.36	2007.16	0.002662	5.8	1472.82	598.01	0.44
Creek	3563	Q25 =	Propose	6950	1993.79	2006.71	2004.36	2007.16	0.002662	5.8	1472.82	598.01	0.44
Creek	3563	Q100 =	Existin	14350	1993.79	2008.31	2007.09	2008.87	0.002806	6.94	2678.74	797.93	0.47
Creek	3563	Q100 =	Propose	14350	1993.79	2008.31	2007.09	2008.87	0.002806	6.94	2678.74	797.93	0.47

Plotted on: 10/5/2022

Design Filename: ...\SH153-HYD-02.dgn

STATE OF TEXAS
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Texas Department of Transportation

SH 153 AT VALLEY CREEK

HYDRAULIC DATA SHEET

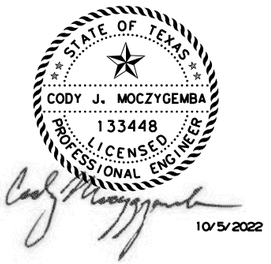
SHEET 2 OF 3

DGN: CM	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DG	6	TEXAS				SH 153
DWG: JT	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: CHECK	SJT	RUNNELS	0650	03	031	61

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Creek	2509	Q25 =	Existin	6950	1991.2	2004.53		2004.8	0.001822	4.83	2005.69	933.12	0.37
Creek	2509	Q25 =	Propose	6950	1991.2	2004.53		2004.8	0.001822	4.83	2005.69	933.12	0.37
Creek	2509	Q100 =	Existin	14350	1991.2	2005.93		2006.23	0.002119	5.62	3813.83	1681.96	0.4
Creek	2509	Q100 =	Propose	14350	1991.2	2005.93		2006.23	0.002119	5.62	3813.83	1681.96	0.4
Creek	2174	Q25 =	Existin	6950	1992.07	2003.54		2003.98	0.003266	6.16	1617.97	922.52	0.48
Creek	2174	Q25 =	Propose	6950	1992.07	2003.54		2003.98	0.003266	6.16	1617.97	922.52	0.48
Creek	2174	Q100 =	Existin	14350	1992.07	2005.18		2005.45	0.002511	5.24	3724.27	1636.24	0.42
Creek	2174	Q100 =	Propose	14350	1992.07	2005.18		2005.45	0.002511	5.24	3724.27	1636.24	0.42
Creek	1863	Q25 =	Existin	6950	1990.83	2002.72	2000.31	2003.12	0.002307	5.45	1553.78	881.5	0.41
Creek	1863	Q25 =	Propose	6950	1990.83	2002.72	2000.31	2003.12	0.002307	5.45	1553.78	881.5	0.41
Creek	1863	Q100 =	Existin	14350	1990.83	2004.27	2003.42	2004.69	0.002305	6.16	3289.83	1510.59	0.43
Creek	1863	Q100 =	Propose	14350	1990.83	2004.27	2003.42	2004.69	0.002305	6.16	3289.83	1510.59	0.43

Plotted on: 10/5/2022

Design Filename: ...\SH153-HYD-03.dgn



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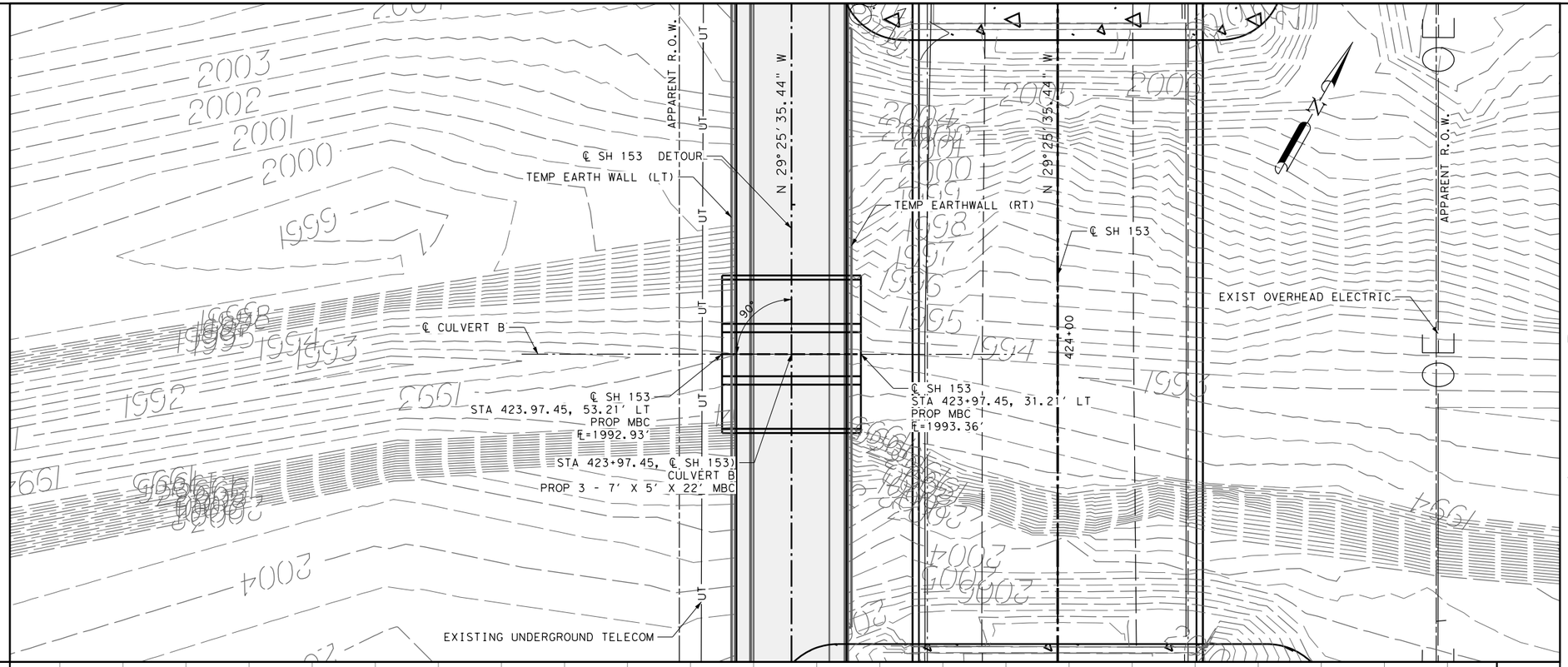
SH 153 AT VALLEY CREEK

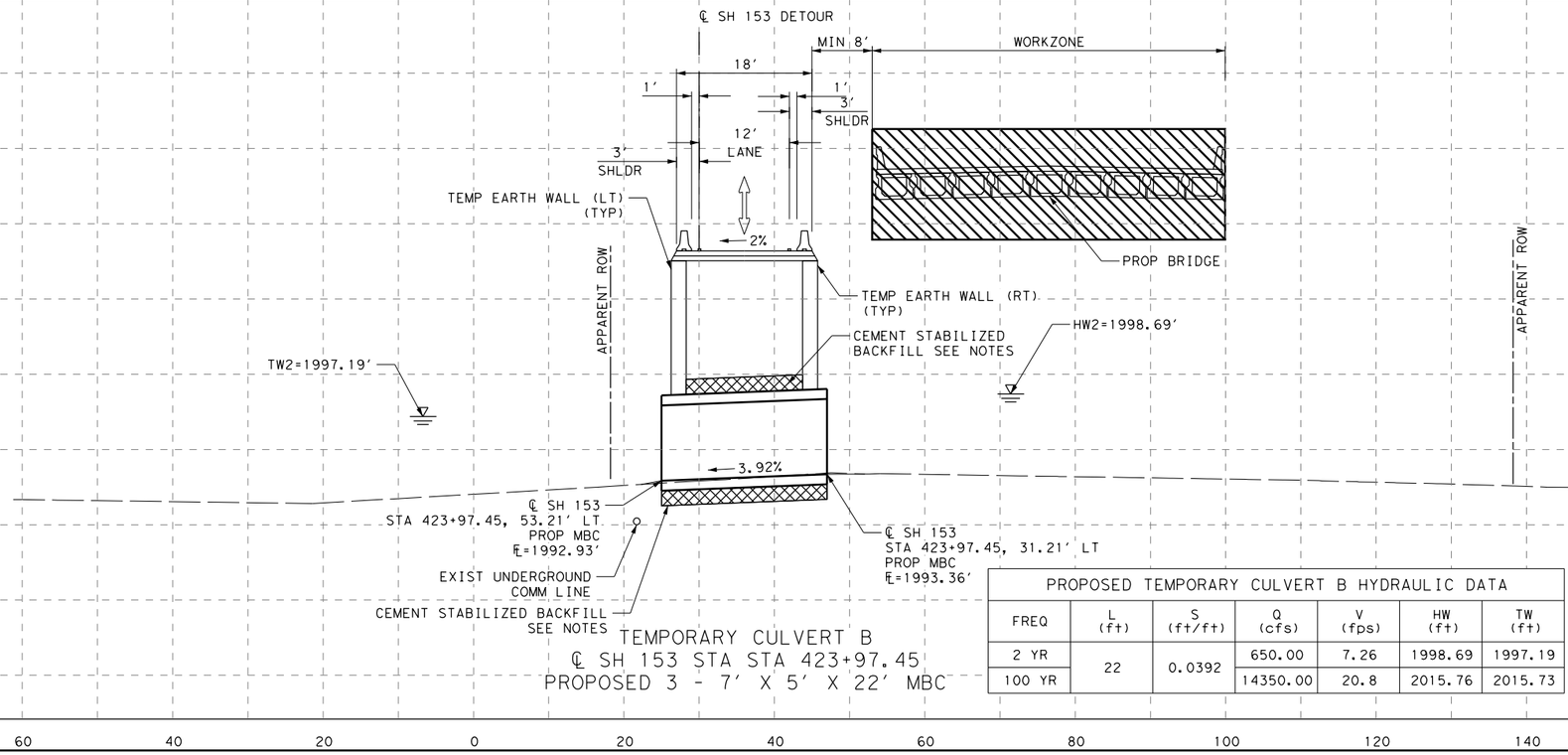
HYDRAULIC DATA SHEET

SHEET 3 OF 3

DGN: CM	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DG	6	TEXAS				SH 153
DWG: JT	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: CHECK	SJT	RUNNELS	0650	03	031	62

Plotted on: 10/5/2022





TEMPORARY CULVERT B
℄ SH 153 STA STA 423+97.45
PROPOSED 3 - 7' X 5' X 22' MBC

PROPOSED TEMPORARY CULVERT B HYDRAULIC DATA

FREQ	L (ft)	S (ft/ft)	Q (cfs)	V (fps)	HW (ft)	TW (ft)
2 YR	22	0.0392	650.00	7.26	1998.69	1997.19
100 YR			14350.00	20.8	2015.76	2015.73

LEGEND

- EXISTING R.O.W.
- EXISTING UTILITY
- EXISTING PLANIMETRICS
- DITCH FLOWLINE
- PROPOSED DRAINAGE
- TEMPORARY PAVEMENT

NOTES:

1. ANALYSIS PERFORMED USING HY-8 HYDRAULIC ANALYSIS PROGRAM VERSION 7.6 FOR CULVERT.
2. TW ELEVATION ESTABLISHED USING OUTFALL CHANNEL GEOMETRY.
3. EXISTING CONTOURS SHOWN.
4. SEE TEMPORARY EARTHWALL LAYOUTS, RW(TEW), AND TCP FOR TEMP WALL INFORMATION.
5. CONTRACTOR TO VERIFY LOCATION OF ALL UTILITIES PRIOR TO CONSTRUCTION.
6. BACKFILL TEMPORARY CULVERT WITH STABILIZED BACKFILL TO 1' ABOVE AND BELOW PIPE PER ITEM 400. SUBSIDIARY TO ITEM 462.

STATE OF TEXAS
CODY J. MOCZYGEMBA
133448
LICENSED
PROFESSIONAL ENGINEER
10/5/2022

HORZ 0' 10' 20'
VERT 0' 5' 10'
SCALE IN FEET

LJA Engineering, Inc.
FRN - F-1386

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

Texas Department of Transportation
©2022

SH 153 AT VALLEY CREEK

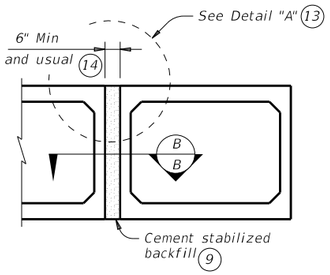
TEMPORARY CULVERT B LAYOUT

SHEET 1 OF 1

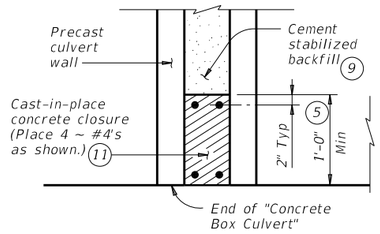
DGN: CM	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DG	6	TEXAS				SH 153
DWG: JT	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DG	SJT	RUNNELS	0650	03	031	63

Design Filename: ...\SH153-CULV-01.dgn

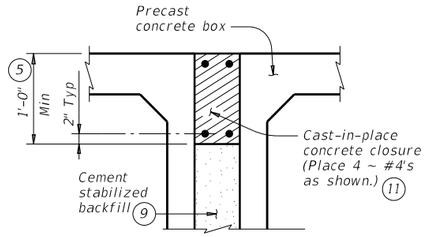
DATE:
FILE:



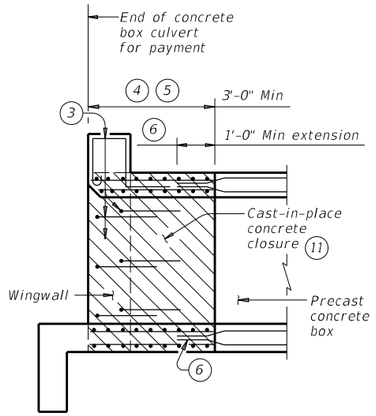
MULTIPLE UNIT PLACEMENT



SECTION B-B

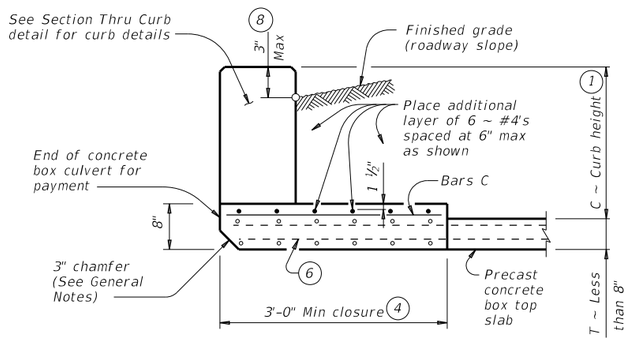


DETAIL "A" (13)

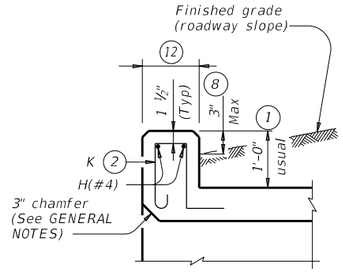


WINGWALL CONNECTION

(Also applies to safety end treatment.)

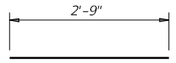


SECTION THRU TOP SLABS LESS THAN 8"

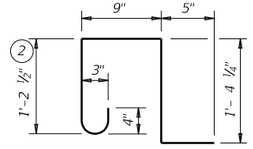


SECTION THRU CURB

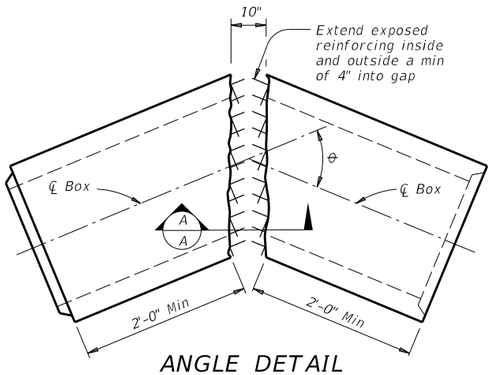
QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



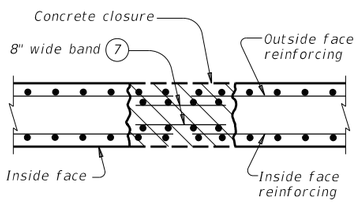
BARS C (#4)
(Spa = 1'–0" Max)



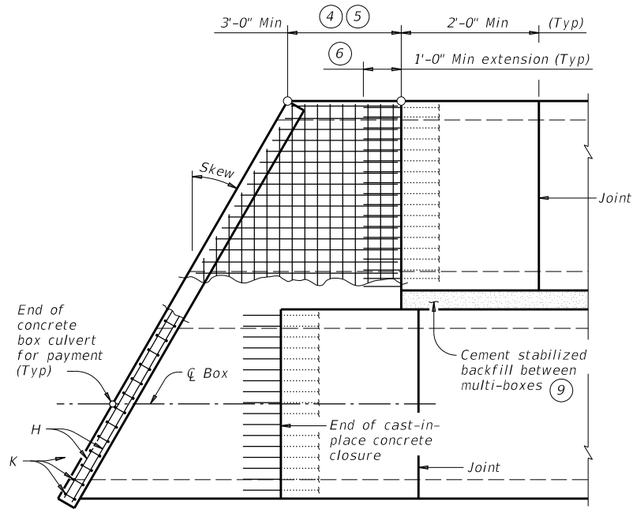
BARS K (#4)
(Spa = 1'–0" Max)
(Length = 4'–2")



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement.)

(1) 0" Min to 5'–0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'–0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631–CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

(2) For curbs less than 1'–0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

(3) Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.

(4) Provide a 3'–0" Min cast–in–place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast–in–place closure flush with the inside and outside faces of the precast box section.

(5) For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'–0" Min cast–in–place closure in the top slab, bottom slab, and exterior wall. See Section B–B detail when interior walls are cast full length.

(6) Extend precast box reinforcing a minimum of 1'–0" into concrete closure (Typ).

(7) Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.

(8) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(9) Cement stabilized backfill between boxes is considered part of the box culvert for payment.

(10) All curb concrete and reinforcing is considered part of the box culvert for payment.

(11) Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.

(12) 1'–0" typical. 2'–3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.

(13) For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".

(14) This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

FILE: scpmdsts-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		64

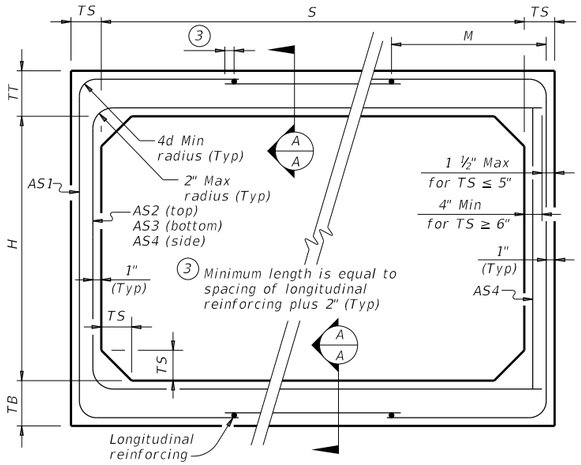
DATE:
FILE:

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
7	3	8	8	8	< 2	–	0.23	0.31	0.22	0.19	0.19	0.19	0.19	9.6
7	3	8	8	8	2 < 3	47	0.27	0.25	0.24	0.19	–	–	–	9.6
7	3	8	8	8	3 – 5	43	0.19	0.19	0.19	0.19	–	–	–	9.6
7	3	8	8	8	10	43	0.21	0.20	0.21	0.19	–	–	–	9.6
7	3	8	8	8	15	43	0.28	0.26	0.27	0.19	–	–	–	9.6
7	3	8	8	8	20	43	0.36	0.34	0.35	0.19	–	–	–	9.6
7	3	8	8	8	25	43	0.45	0.42	0.43	0.19	–	–	–	9.6
7	3	8	8	8	30	43	0.54	0.50	0.51	0.19	–	–	–	9.6
7	4	8	8	8	< 2	–	0.21	0.34	0.25	0.19	0.19	0.19	0.19	10.4
7	4	8	8	8	2 < 3	43	0.23	0.28	0.28	0.19	–	–	–	10.4
7	4	8	8	8	3 – 5	43	0.19	0.22	0.19	0.19	–	–	–	10.4
7	4	8	8	8	10	43	0.19	0.23	0.23	0.19	–	–	–	10.4
7	4	8	8	8	15	41	0.24	0.30	0.30	0.19	–	–	–	10.4
7	4	8	8	8	20	41	0.31	0.38	0.39	0.19	–	–	–	10.4
7	4	8	8	8	25	41	0.38	0.47	0.48	0.19	–	–	–	10.4
7	4	8	8	8	30	41	0.46	0.57	0.57	0.19	–	–	–	10.4
7	5	8	8	8	< 2	–	0.19	0.36	0.27	0.19	0.19	0.19	0.19	11.2
7	5	8	8	8	2 < 3	47	0.21	0.31	0.31	0.19	–	–	–	11.2
7	5	8	8	8	3 – 5	43	0.19	0.24	0.21	0.19	–	–	–	11.2
7	5	8	8	8	10	43	0.19	0.25	0.26	0.19	–	–	–	11.2
7	5	8	8	8	15	41	0.21	0.32	0.33	0.19	–	–	–	11.2
7	5	8	8	8	20	41	0.27	0.41	0.42	0.19	–	–	–	11.2
7	5	8	8	8	25	41	0.33	0.51	0.52	0.19	–	–	–	11.2
7	5	8	8	8	30	41	0.40	0.61	0.62	0.19	–	–	–	11.2
7	6	8	8	8	< 2	–	0.19	0.38	0.30	0.19	0.19	0.19	0.19	12.0
7	6	8	8	8	2 < 3	59	0.19	0.33	0.34	0.19	–	–	–	12.0
7	6	8	8	8	3 – 5	47	0.19	0.25	0.23	0.19	–	–	–	12.0
7	6	8	8	8	10	43	0.19	0.26	0.27	0.19	–	–	–	12.0
7	6	8	8	8	15	41	0.19	0.34	0.35	0.19	–	–	–	12.0
7	6	8	8	8	20	41	0.24	0.43	0.45	0.19	–	–	–	12.0
7	6	8	8	8	25	41	0.29	0.53	0.55	0.19	–	–	–	12.0
7	6	8	8	8	30	41	0.35	0.64	0.65	0.19	–	–	–	12.0
7	7	8	8	8	< 2	–	0.19	0.40	0.33	0.19	0.19	0.19	0.19	12.8
7	7	8	8	8	2 < 3	59	0.19	0.36	0.37	0.19	–	–	–	12.8
7	7	8	8	8	3 – 5	59	0.19	0.27	0.25	0.19	–	–	–	12.8
7	7	8	8	8	10	47	0.19	0.27	0.29	0.19	–	–	–	12.8
7	7	8	8	8	15	43	0.19	0.35	0.37	0.19	–	–	–	12.8
7	7	8	8	8	20	43	0.22	0.44	0.46	0.19	–	–	–	12.8
7	7	8	8	8	25	43	0.27	0.54	0.57	0.19	–	–	–	12.8
7	7	8	8	8	30	41	0.32	0.65	0.67	0.19	–	–	–	12.8

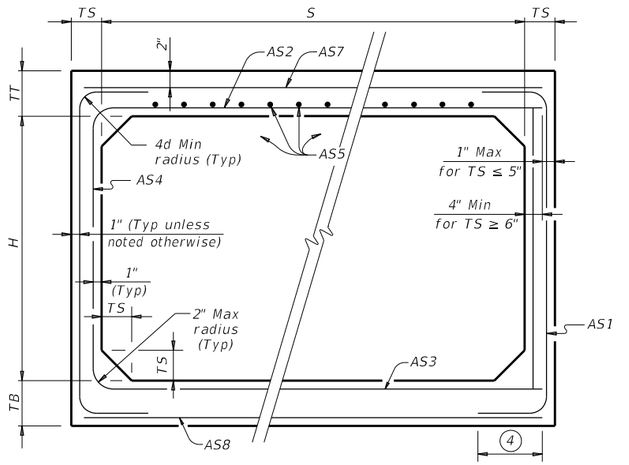
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

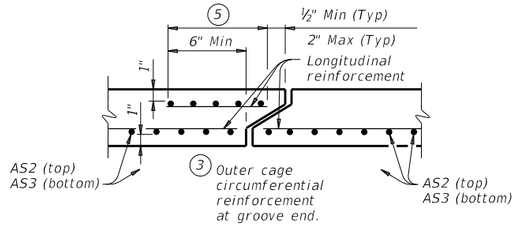
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

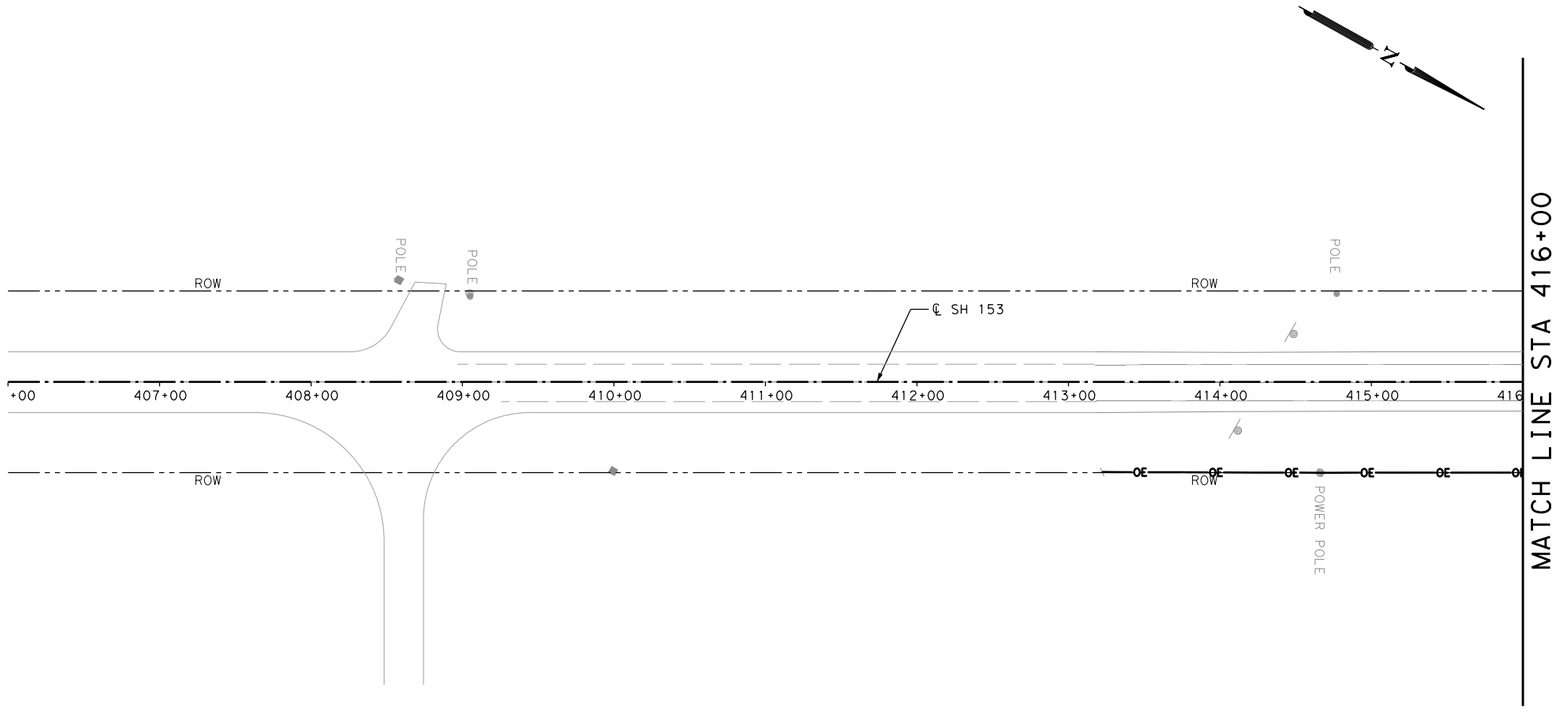
Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

7'-0" SPAN

SCP-7

FILE: scp07sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		65



LEGEND	
——— - - ———	EXISTING ROW
-- FO-QLC --	TAYLOR TELECOM FIBER OPTIC CABLE
—— OE ——	AEP TEXAS OVERHEAD ELECTRIC
—— UT ——	TAYLOR TELECOM UNDERGROUND TELEPHONE

NOTE:

CONTRACTOR TO HAVE ALL TAYLOR TELECOM LINES LOCATED. LOCATION AND DIRECTION OF FIBER OPTIC LINE IS UNKNOWN.

STATE OF TEXAS
D. DURGIN
99069
LICENSED
PROFESSIONAL ENGINEER

08/03/2022

0 50 100 150
SCALE: 1" = 100'

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-23290
6330 West Loop South, Suite 150 • Bellaire, Texas 77401 • 713.777.5337

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SH 153 AT VALLEY CREEK

EXISTING UTILITY LAYOUT

SH 153 AT VALLEY CREEK

SHEET 1 OF 4

DGN:	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN:	6	TEXAS				SH 153
DWG:	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG:	SJT	RUNNELS	0650	03	031	66

Plotted on: 8/1/2022
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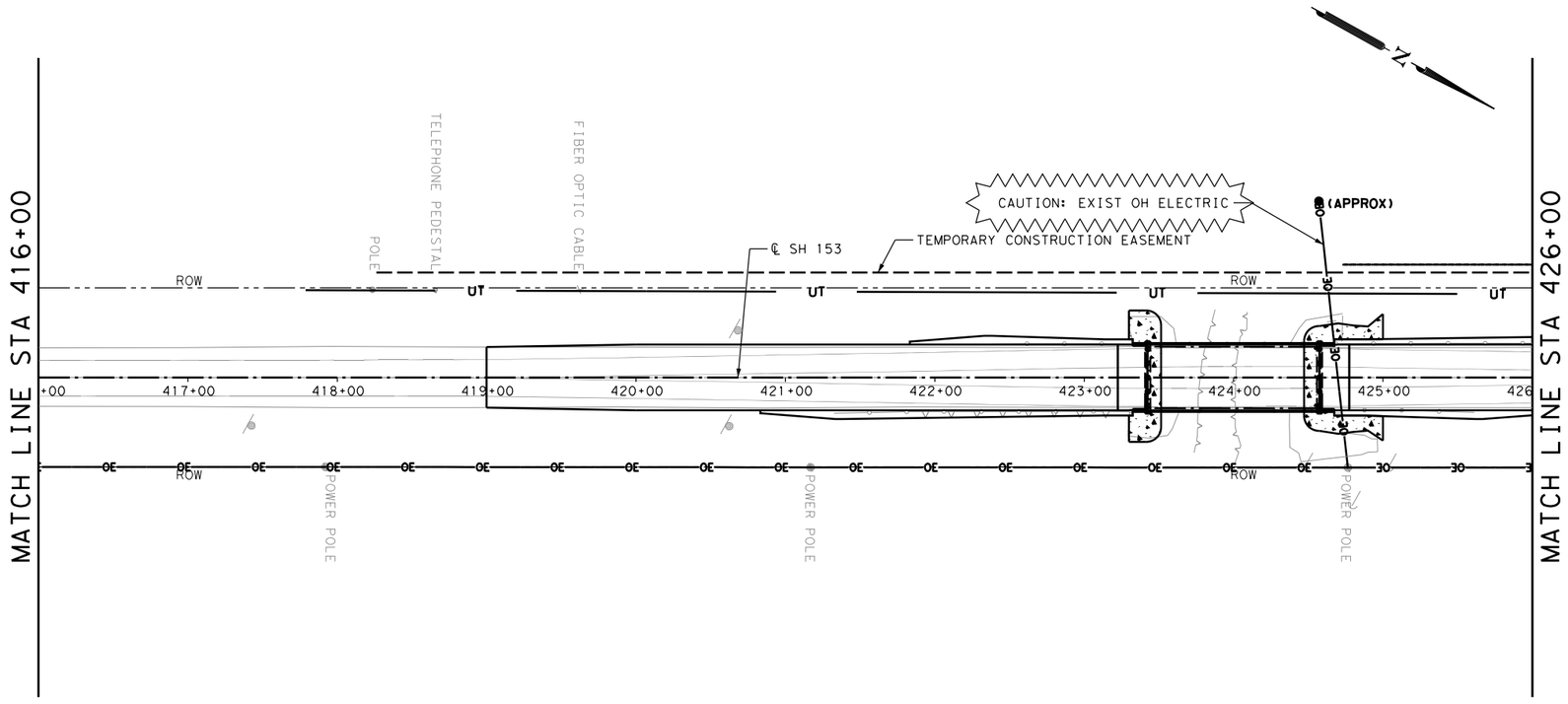

LEGEND

- EXISTING ROW
- FO-QLC — TAYLOR TELECOM FIBER OPTIC CABLE
- OE — AEP TEXAS OVERHEAD ELECTRIC
- UT — TAYLOR TELECOM UNDERGROUND TELEPHONE

NOTE:

CONTRACTOR TO HAVE ALL TAYLOR TELECOM LINES LOCATED. LOCATION AND DIRECTION OF FIBER OPTIC LINE IS UNKNOWN.

STATE OF TEXAS
D. DURGIN
99069
LICENSED
PROFESSIONAL ENGINEER

08/03/2022

0 50 100 150
SCALE: 1" = 100'

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SH 153 AT VALLEY CREEK

EXISTING UTILITY LAYOUT

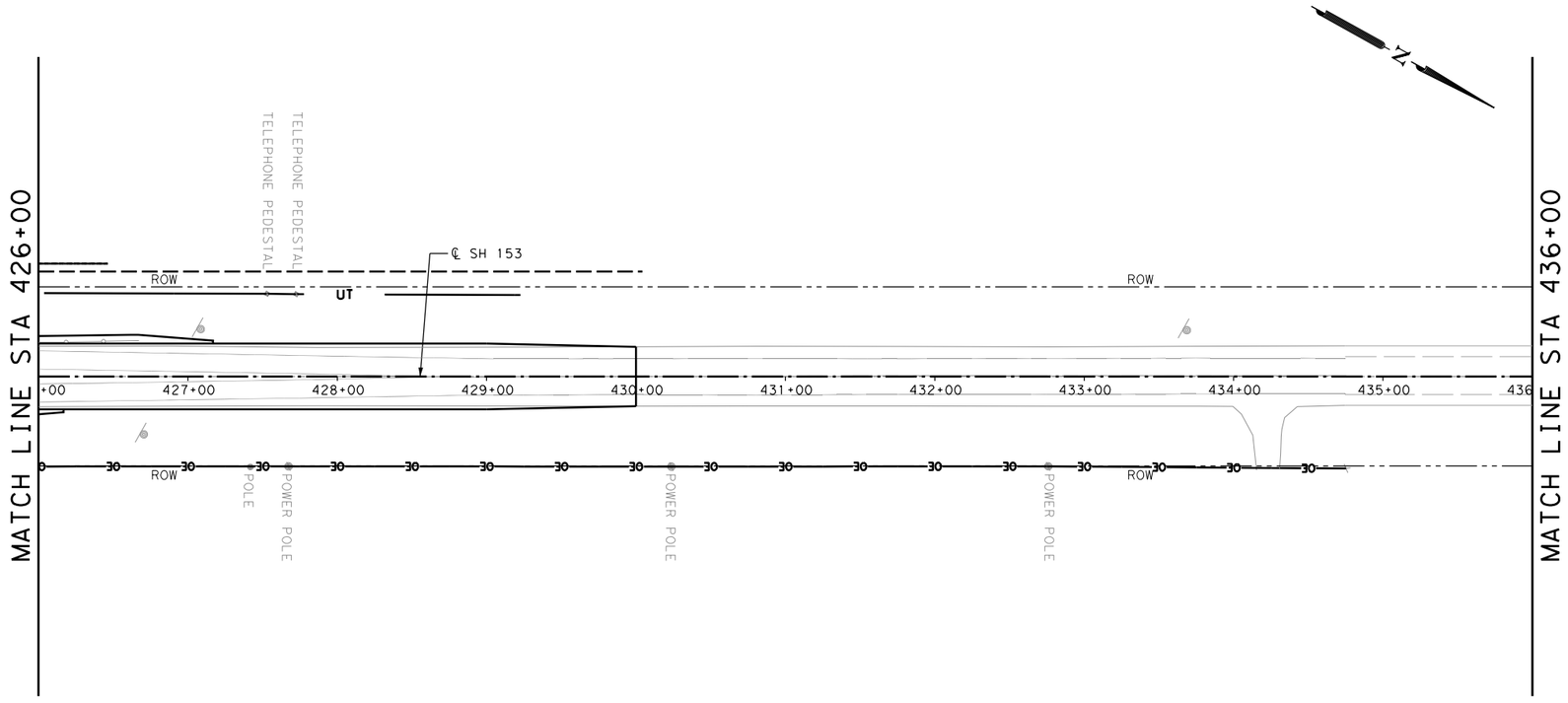
SH 153 AT VALLEY CREEK

SHEET 2 OF 4

DGN:	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN:	6	TEXAS				SH 153
DWG:	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG:	SJT	RUNNELS	0650	03	031	67

Plotted on: 8/1/2022

Design Filename: K:\11054\11054-0003-00 TxDOT San Angelo District Bridge Replace\10-Utilities\DGN\SH153-UTIL-02.dgn



LEGEND	
——— - - ———	EXISTING ROW
-- FO-QLC --	TAYLOR TELECOM FIBER OPTIC CABLE
—— OE ——	AEP TEXAS OVERHEAD ELECTRIC
—— UT ——	TAYLOR TELECOM UNDERGROUND TELEPHONE

NOTE:

CONTRACTOR TO HAVE ALL TAYLOR TELECOM LINES LOCATED. LOCATION AND DIRECTION OF FIBER OPTIC LINE IS UNKNOWN.

STATE OF TEXAS
D. DURGIN
99069
LICENSED
PROFESSIONAL ENGINEER

08/03/2022

0 50 100 150
SCALE: 1"= 100'

REV. NO.	DATE	DESCRIPTION	BY

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-23290
6330 West Loop South, Suite 150 • Bellaire, Texas 77401 • 713.777.5337

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SH 153 AT VALLEY CREEK

EXISTING UTILITY LAYOUT

SH 153 AT VALLEY CREEK

SHEET 3 OF 4

DGN:	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN:	6	TEXAS				SH 153
DWG:	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG:	SJT	RUNNELS	0650	03	031	68

Plotted on: 8/1/2022
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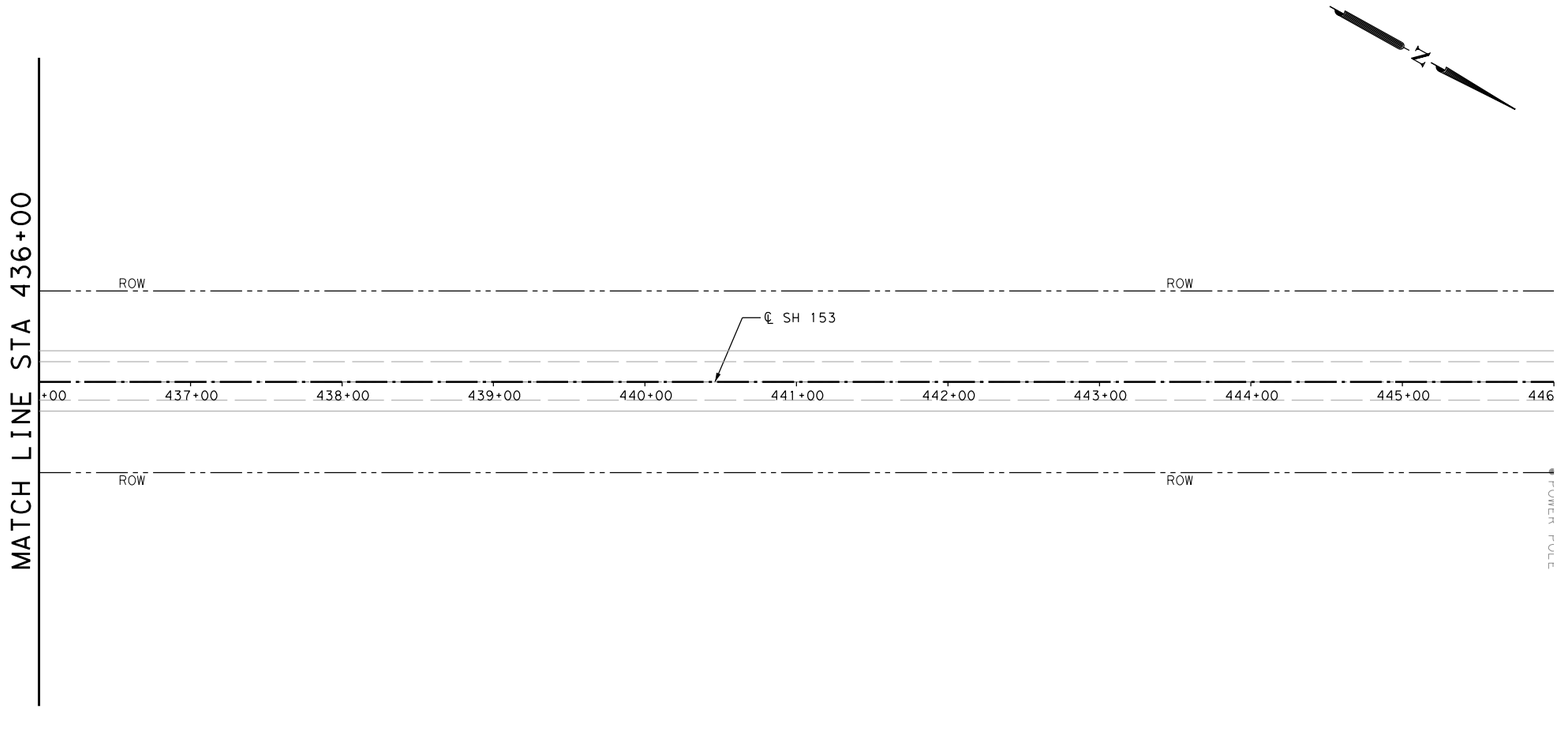
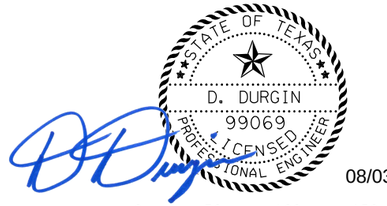


LEGEND	
——— - - ———	EXISTING ROW
-- FO-QLC --	TAYLOR TELECOM FIBER OPTIC CABLE
—— OE ——	AEP TEXAS OVERHEAD ELECTRIC
—— UT ——	TAYLOR TELECOM UNDERGROUND TELEPHONE

NOTE:

CONTRACTOR TO HAVE ALL TAYLOR TELECOM LINES LOCATED. LOCATION AND DIRECTION OF FIBER OPTIC LINE IS UNKNOWN.



08/03/2022

0 50 100 150

SCALE: 1" = 100'

JONES|CARTER
Texas Board of Professional Engineers Registration No. F-23290
6330 West Loop South, Suite 150 • Bellaire, Texas 77401 • 713.777.5337

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SH 153 AT VALLEY CREEK

EXISTING UTILITY LAYOUT

SH 153 AT VALLEY CREEK

SHEET 4 OF 4

DGN:	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN:	6	TEXAS				SH 153
DWG:	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG:	SJT	RUNNELS	0650	03	031	69

Plotted on: 8/1/2022
Design Filename: K:\11054\11054-0003-00 TxDOT San Angelo District Bridge Replace\10-Utilities\DGN\SH153-UTIL-04.dgn

* BRIDGE HYDRAULIC DATA TABLE

CONDITION	BRIDGE	FREQUENCY (YR)	Q TOTAL (CFS)	VEL CHNL (FPS)	W.S. ELEV (FT)
EXISTING	SH153	25 (YR)	6,950	8.67	2008.08
		100 (YR)	14,350	8.45	2011.80
PROPOSED	SH153	25 (YR)	6,950	7.54	2007.82
		100 (YR)	14,350	13.26	2009.26

* HYDRAULIC ANALYSIS PERFORMED USING HEC-RAS

1 RIPRAP SLOPE TRANSITIONS TO 3:1, SEE ROADWAY PLAN AND PROFILE SHEET.

APPARENT ROW

OHWM

EXISTING BRIDGE TO BE REMOVED
SIMPLE SPAN CONCRETE SLAB BRIDGE (FS SERIES), 4~25' SPANS
LENGTH = 100.00 FT
WIDTH = 46.00 FT

BEGIN BRIDGE
FACE OF BACKWALL
℄ ABUT NO.1
STA 423+42.50
EL= 2013.70'

END BRIDGE
FACE OF BACKWALL
℄ ABUT NO.2
STA 424+57.50
EL= 2013.98'

BORING B-1
℄ SH 153 STA 422+89.11
31.40' LT
EL = 2009.04

BORING B-2
℄ SH 153 STA 425+19.87
33.11' RT
EL = 2009.74

LIMITS OF CSAB (OPTION 1)

NOMINAL FACE OF SSTR RAIL (W/ DRAIN SLOTS)

℄ BEAM NO.1

℄ BEAM NO.9

℄ SH 153 & PGL

N 29° 25' 35.44" W

423+00

424+00

44'-0" APPROACH PAVEMENT (TYP)

90° (TYP)

SEJ-M (4")

2:1 SLOPE RR8

1'-0" SHLD | 10'-0" SHLD | 12'-0" LANE | 12'-0" LANE | 10'-0" SHLD | 1'-0"

46'-0" OVERALL

44'-0" ROADWAY

23'-0" | 23'-0"

2.00% | 2.00%

20'-0" BAS-A (TYP)

SLPT

N 60° 34' 24.56" E (TYP)

10'-0" WINGWALL (TYP)

VALLEY CREEK

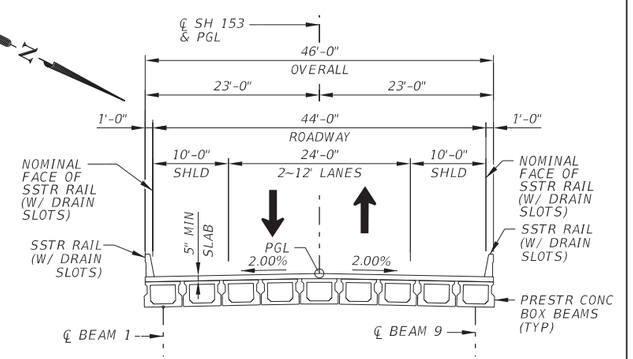
LEGEND

BORING LOCATION

HATCHED AREA INDICATES EXISTING STRUCTURE TO BE REMOVED

PLAN

6. SEE CSAB STANDARD FOR CEMENT STABILIZED BACKFILL DETAILS.
7. THE CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATION OF ALL UTILITIES, PRIOR TO CONSTRUCTION.
8. REMOVE EXISTING BRIDGE IN ACCORDANCE WITH ITEM 496, "REMOVING STRUCTURES". REMOVAL OF ABUTMENT HEADER WALL AND WINGWALLS ARE CONSIDERED SUBSIDAIRY TO ITEM 496.
9. SAW CUT GROOVING OF BRIDGE DECK AND APPROACH SLAB REQUIRED.
10. BORING LOGS ARE PROVIDED ELSEWHERE IN PLANS, SEE INDEX OF SHEETS.



TYPICAL TRANSVERSE SECTION

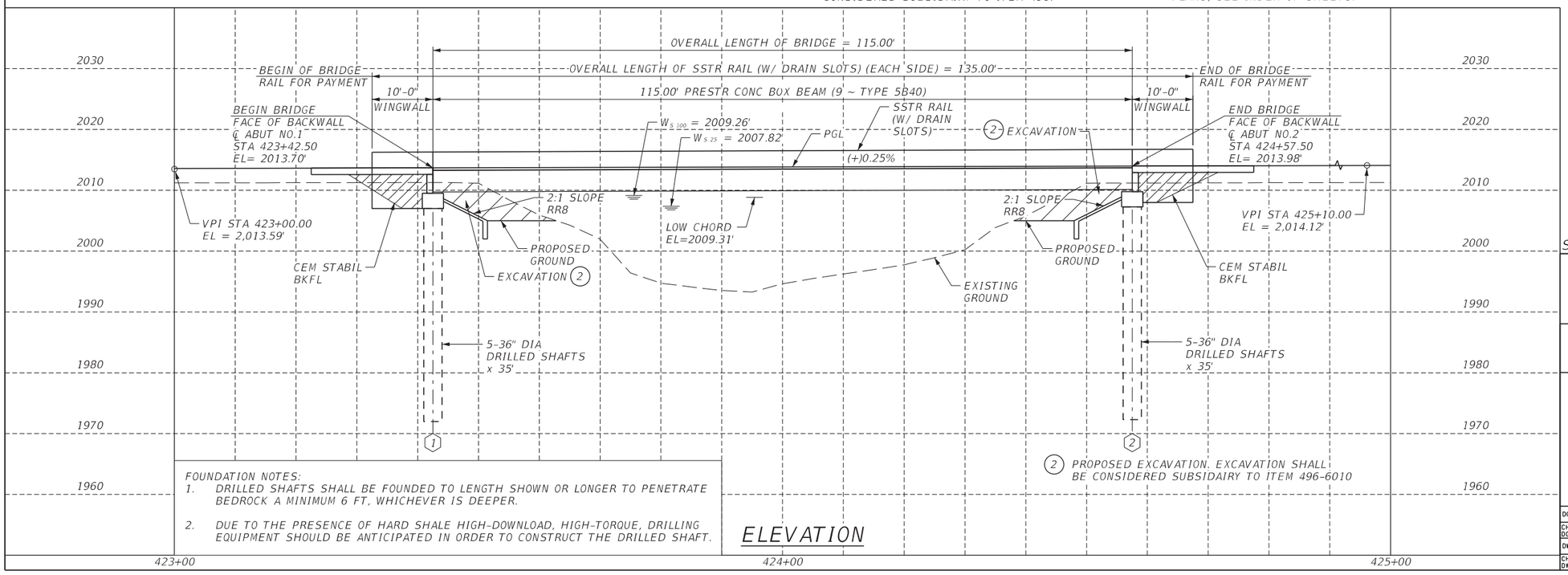
(NOT TO SCALE)

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 2017, 8TH EDITION.
2. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. THE CONTRACTOR IS RESPONIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDIDITONS
3. GIRDER END CONDITIONS: BLANK - DENOTES NO DOWEL
   D - DENOTES DOWELED END CONDITION AND SLOTTED HOLES AT END OF EXTERIOR GIRDERS ONLY
4. FUNCTIONAL CLASS OF ROADWAY = MAJOR COLLECTOR
   EXISTING ADT (2019) = 2,278
   PROJECTED ADT (2039) = 2,734
   DESIGN SPEED = 75 MPH
   EXIST NBI NO. 07-200-0-0650-03-007
   NEW NBI NO. 07-200-0-0650-03-025
5. ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN, AND/OR SUPERELEVATION.

0 10 20 30

SCALE: 1"= 20'



FOUNDATION NOTES:
1. DRILLED SHAFTS SHALL BE FOUNDED TO LENGTH SHOWN OR LONGER TO PENETRATE BEDROCK A MINIMUM 6 FT, WHICHEVER IS DEEPER.
2. DUE TO THE PRESENCE OF HARD SHALE HIGH-DOWNLOAD, HIGH-TORQUE, DRILLING EQUIPMENT SHOULD BE ANTICIPATED IN ORDER TO CONSTRUCT THE DRILLED SHAFT.

2 PROPOSED EXCAVATION. EXCAVATION SHALL BE CONSIDERED SUBSIDAIRY TO ITEM 496-6010

ELEVATION

STATE OF TEXAS
DANIEL B. RODRIGUEZ
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LICENSED PROFESSIONAL ENGINEER
06.29.23

FIRM REG. NO. F-199

HL 93 LOADING
SUPERSTRUCTURE INV/OPR RATING: 1.02/2.23

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

BRIDGE LAYOUT

SH 153 AT VALLEY CREEK

SHEET 1 OF 1

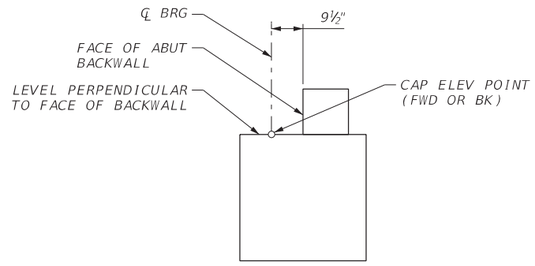
DGN: DBR	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DR	6	TEXAS				SH 153
DWG: PX	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DBR	SJT	RUNNELS	0650	03	031	70

Design Filename: S:\Transportation\20-157C TxDOT 88-91DP5026 WAI US67, SH153, SH163\CAD\01-Sheets\SH 153\SH153-BRG-LAY.dgn
Plotted on: 6/29/2023

SUMMARY OF ESTIMATED QUANTITIES (1)

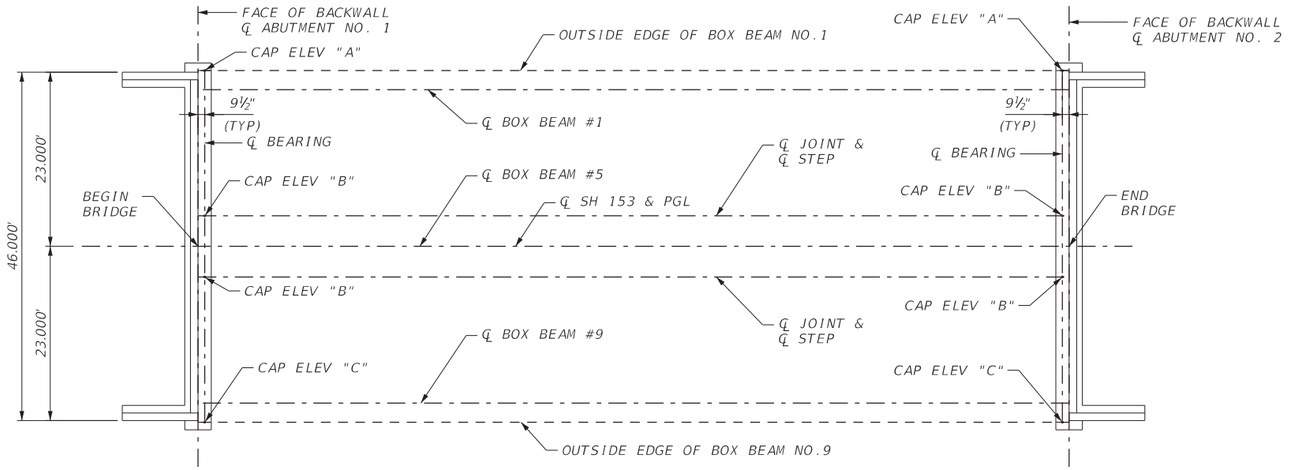
ITEM	0400-6005	0416-6004	0420-6013	0422-6005	0422-6015	0425-6008	0450-6054	0454-6018	0496-6010	4171-6001
BID ITEM DESCRIPTION / BRIDGE ELEMENT	CEM STABIL BKFL	DRILL SHAFT (36 IN)	CL C CONC (ABUT)	REINF CONC SLAB (BOX BEAM)	APPROACH SLAB	PRESTR CONC BOX BEAM (5B40)	RAIL (TY SSTR) (W/ DRAIN SLOTS)	SEALED EXPANSION JOINT (4 IN) (SEJ-M)	REMOV STR (BRIDGE 100-499 FT LENGTH) (2)	INSTALL BRIDGE IDENTIFICATION NUMBERS
	CY	LF	CY	SF	CY	LF	LF	LF	EA	EA
2 ~ ABUTMENTS	112	350	54.2		70.6		40.0			
1 ~ 115.00' PRESTR CONC BOX BEAM SPAN				5,290		1,030.50	230.0			
TOTAL	112	350	54.2	5,290	70.6	1,030.50	270.0	90	1	2

BENT		CAP ELEV "A"	CAP ELEV "B"	CAP ELEV "C"
ABUT NO. 1	(FWD)	2,009.090'	2,009.504'	2,009.090'
ABUT NO. 2	(BK)	2,009.376'	2,009.790'	2,009.376'



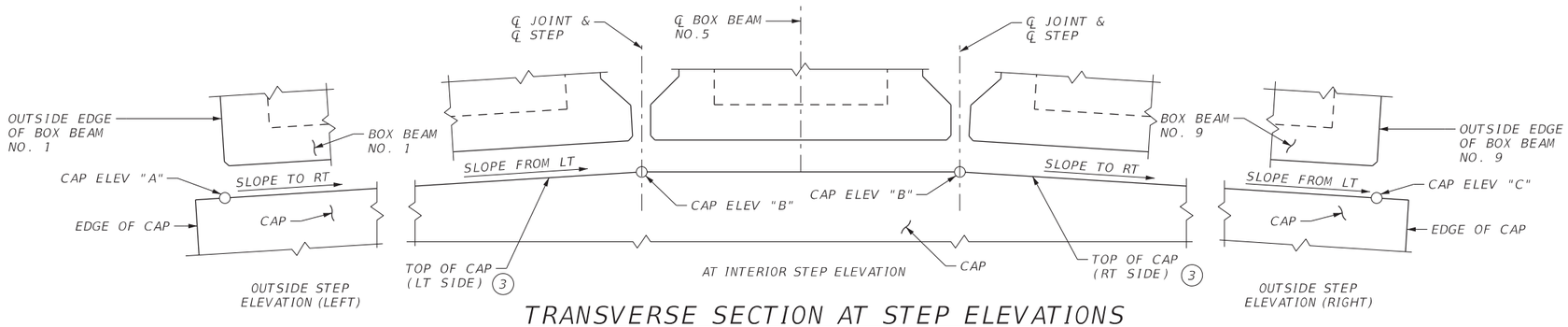
TYPICAL SECTION AT ABUTMENT

(1) SEE SUMMARY OF ROADWAY ITEMS FOR RIPRAP QUANTITIES
(2) EXISTING BRIDGE FOUDNATION ARE TO BE REMOVED AT LEAST 2'-0" BELOW FINISHED GRADE.



PLAN OF CAP ELEVATIONS

NOT TO SCALE



TRANSVERSE SECTION AT STEP ELEVATIONS

(3) LEFT SIDE AND RIGHT SIDE ARE REFERENCED FROM THE ROADWAY CENTERLINE LOOKING FORWARD STATION

STATE OF TEXAS
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10.31.22
FIRM REG. NO. F-199

HL 93 LOADING

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

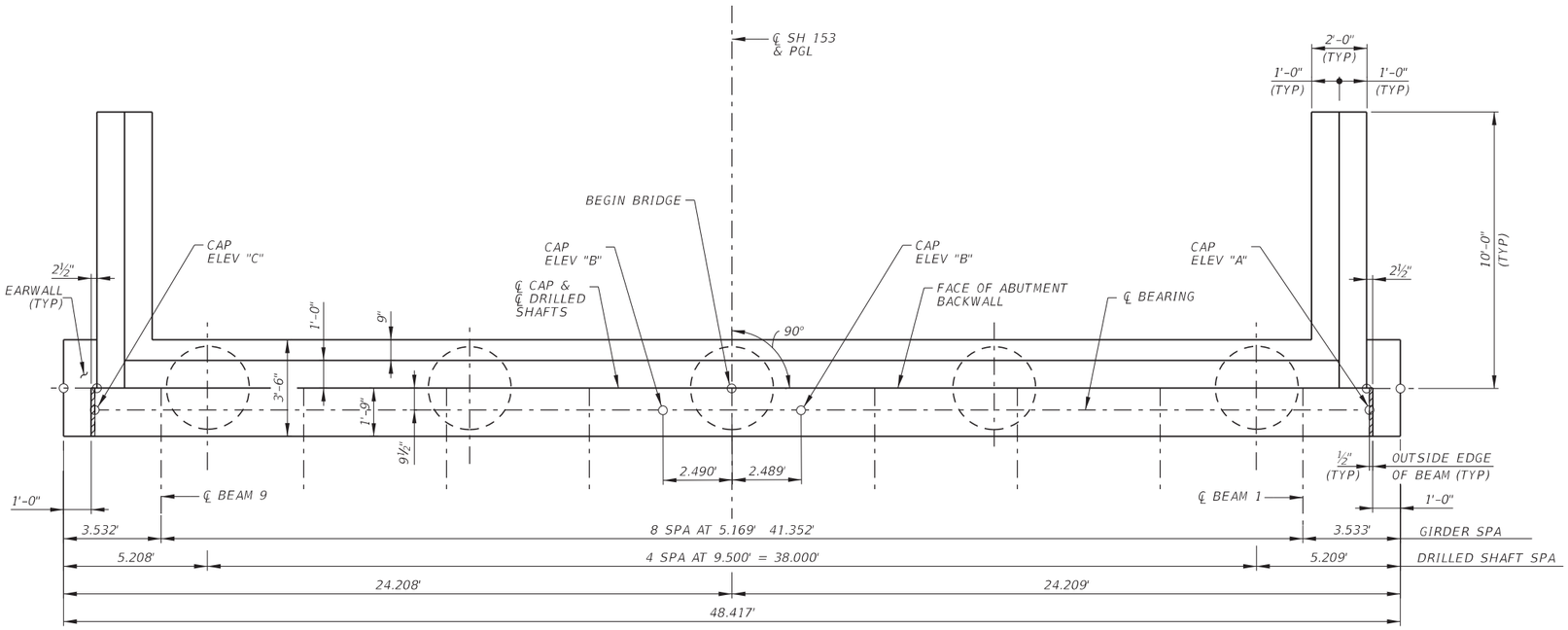
Texas Department of Transportation

ESTIMATED QUANTITIES AND CAP ELEVATIONS DETAILS

SH 153 AT VALLEY CREEK

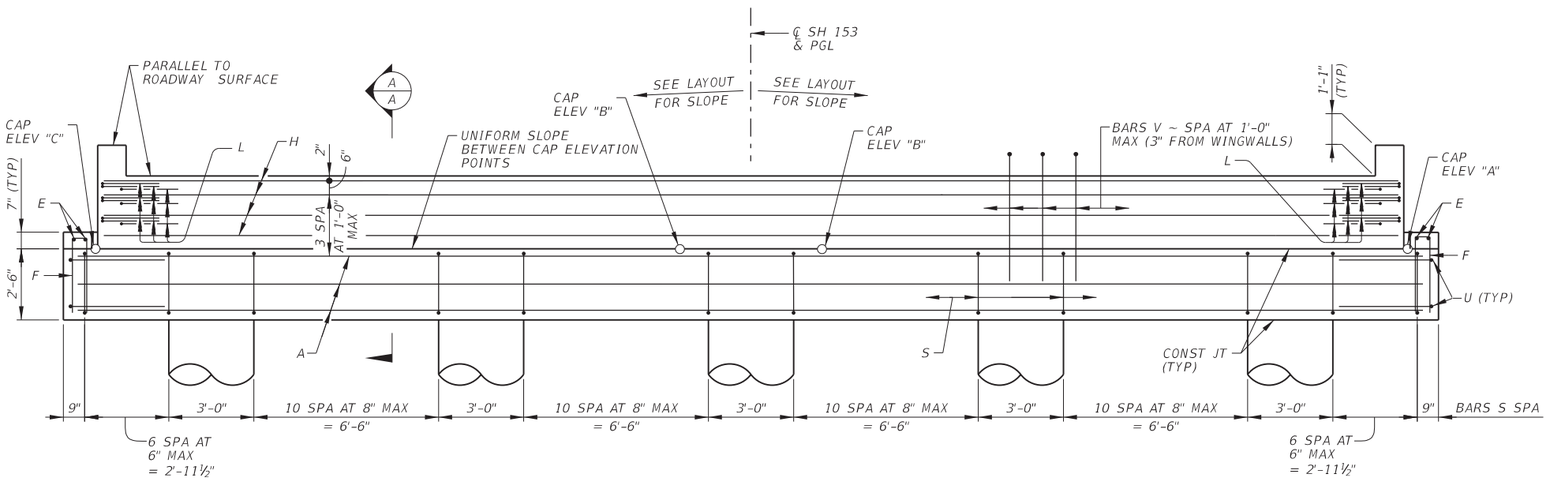
SHEET 1 OF 1

DGN: DBR	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DR	6	TEXAS				SH 153
DWG: PX	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DBR	SJT	RUNNELS	0650	03	031	71

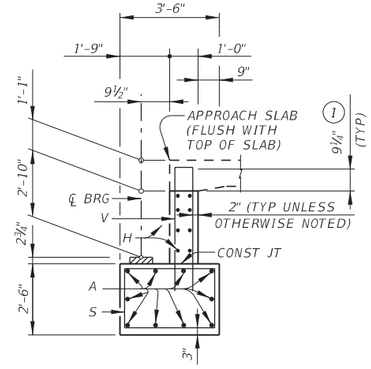


PLAN

(LOOKING BACK STATION)



ELEVATION



SECTION A-A

(1) INCREASE AS REQUIRED TO MAINTAIN 3" FROM FINISHED GRADE.

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 2017, 8TH EDITION.
2. SEE CONCRETE RIPRAP (CRR) STANDARD SHEET FOR RIPRAP ATTACHMENT DETAILS.
3. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET, FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.
4. SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE IN WINGWALLS.
5. SEE ESTIMATED QUANTITIES AND CAP ELEVATIONS DETAILS SHEET FOR CAP ELEVATIONS
6. CALCULATED FOUNDATION LOAD = 161 TONS/SHAFT

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.

MATERIAL NOTES:

PROVIDE CLASS "C" CONCRETE (f'c = 3,600 PSI).

PROVIDE EPOXY-COATED GRADE 60 REINFORCING STEEL FOR ABUTMENT AND WINGWALLS.

STATE OF TEXAS
DANIEL B. RODRIGUEZ
99991
LICENSED
PROFESSIONAL ENGINEER
10.31.22

FIRM REG. NO. F-199

HL 93 LOADING

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

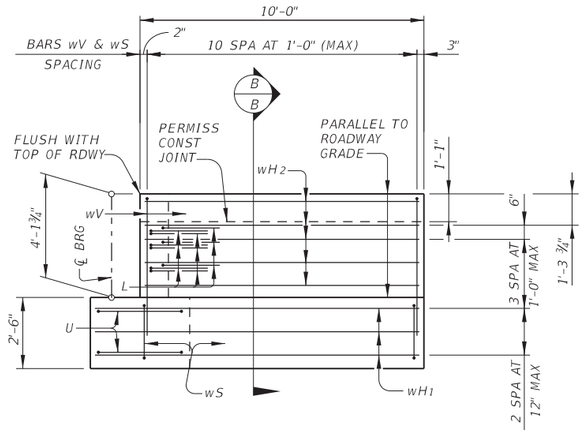
Texas Department of Transportation

ABUTMENT NO. 1

SH 153 AT VALLEY CREEK

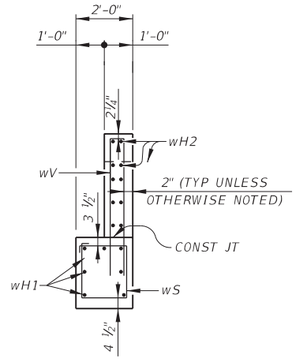
SHEET 1 OF 2

DGN: DBR	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DR	6	TEXAS				SH 153
DWG: PX	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DBR	SJT	RUNNELS	0650	03	031	72

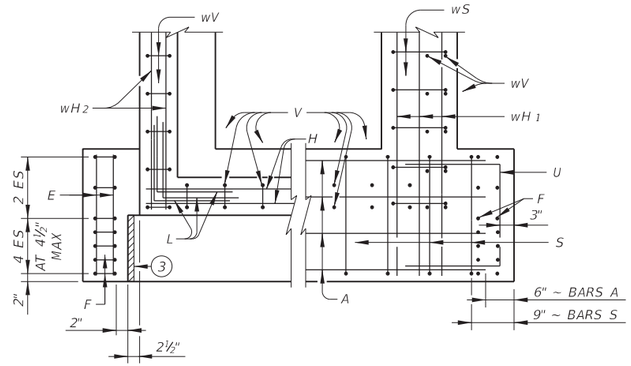


WINGWALL ELEVATION

(EARWALL OMITTED FOR CLARITY)

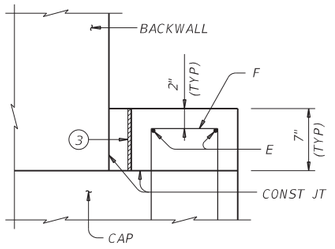


SECTION B-B



BACKWALL CAP

CORNER DETAILS



EARWALL ELEVATION DETAIL (4)

(SLOPE TOP OF EARWALL AWAY FROM BEAMS)

TABLE OF ESTIMATED QUANTITIES

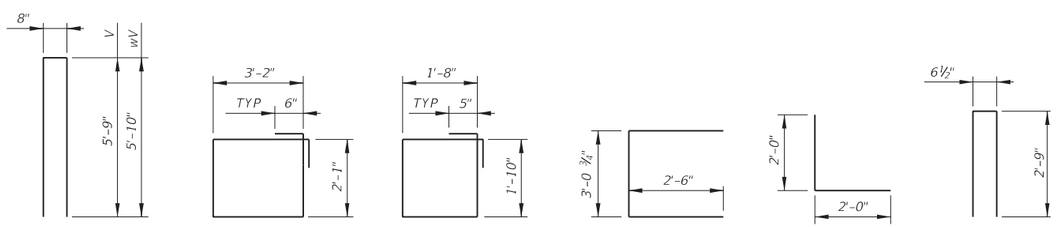
BAR	NO.	SIZE	LENGTH	WEIGHT
A	10	#11	47'-5"	2,519
E	4	#5	3'-2"	13
F	14	#5	6'-1"	89
H	8	#6	45'-8"	549
L	18	#6	4'-0"	108
S	58	#5	11'-6"	696
U	4	#6	8'-1"	49
V	45	#5	12'-2"	571
wH1	14	#6	11'-5"	240
wH2	20	#6	9'-8"	290
wS	22	#4	7'-10"	115
wV	22	#5	12'-4"	283
REINFORCING STEEL (2)			Lb	5,522
CLASS "C" CONCRETE (ABUT)			CY	27.1

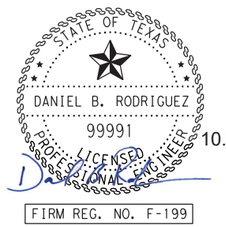
(2) FOR CONTRACTORS INFORMATION ONLY.

(3) ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. INSIDE FACE OF EARWALL TO BE CAST WITH VERTICAL SIDE OF BEAM

(4) DO NOT CAST EARWALL UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION

NOTE:
SEE SHEET 1 OF 2 FOR GENERAL NOTES AND MATERIAL NOTES.





FIRM REG. NO. F-199

HL 93 LOADING

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

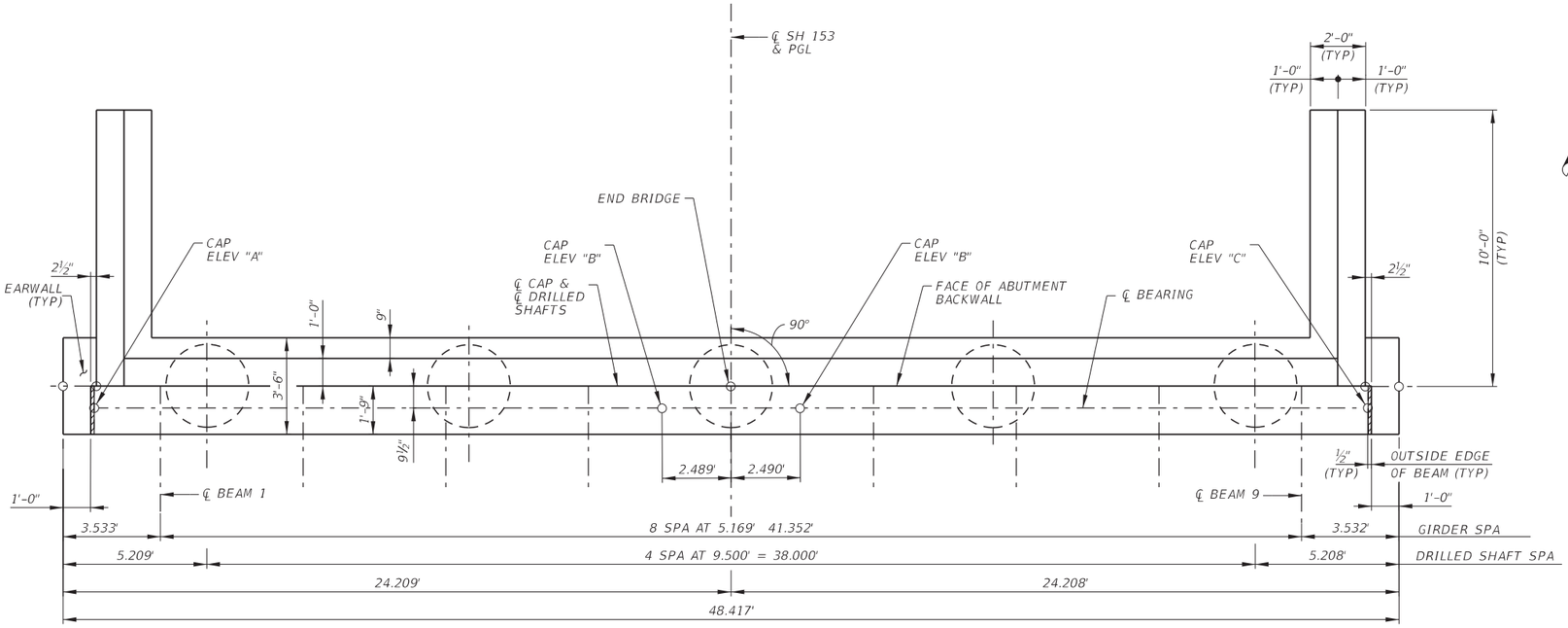
Texas Department of Transportation

ABUTMENT NO. 1

SH 153 AT VALLEY CREEK

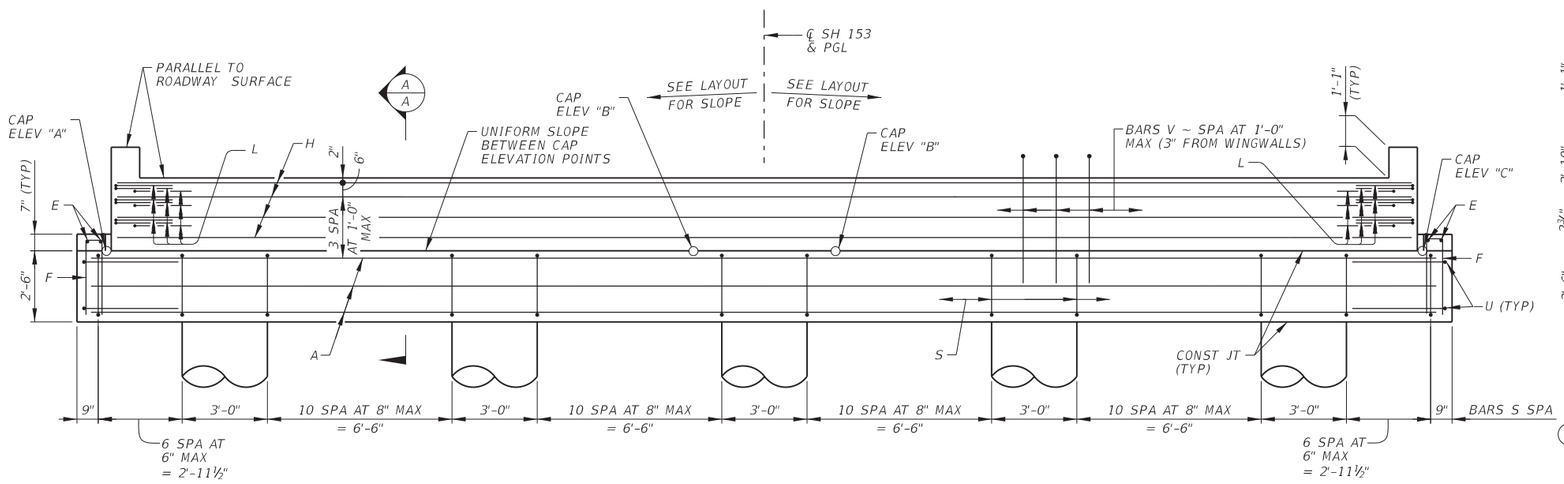
SHEET 2 OF 2

DGN: DBR	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DR	6	TEXAS				SH 153
DWG: PX	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DBR	SJT	RUNNELS	0650	03	031	73

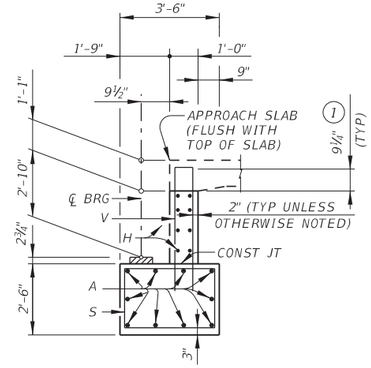


PLAN

(LOOKING FORWARD STATION)



ELEVATION



SECTION A-A

1 INCREASE AS REQUIRED TO MAINTAIN 3" FROM FINISHED GRADE.

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 2017, 8TH EDITION.
2. SEE CONCRETE RIPRAP (CRR) STANDARD SHEET FOR RIPRAP ATTACHMENT DETAILS.
3. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET, FOR ALL FOUNDATION DETAILS AND NOTES NOT SHOWN.
4. SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE IN WINGWALLS.
5. SEE ESTIMATED QUANTITIES AND CAP ELEVATIONS DETAILS SHEET FOR CAP ELEVATIONS.
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MATERIAL NOTES:

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PROVIDE EPOXY-COATED GRADE 60 REINFORCING STEEL FOR ABUTMENT AND WINGWALLS.

STATE OF TEXAS
DANIEL B. RODRIGUEZ
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11.10.22
FIRM REG. NO. F-199

HL 93 LOADING

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

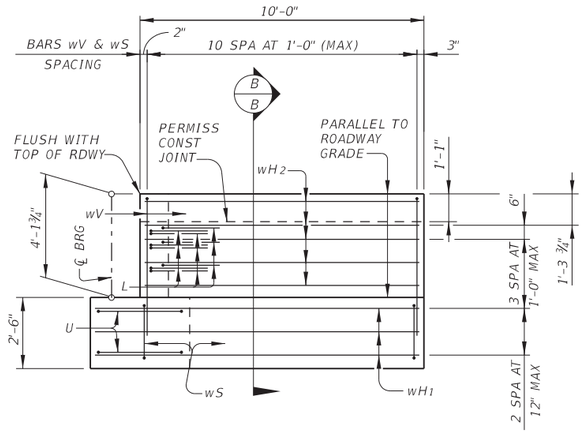
Texas Department of Transportation

ABUTMENT NO. 2

SH 153 AT VALLEY CREEK

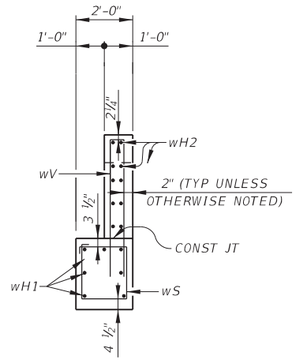
SHEET 1 OF 2

DGN: DBR	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DR	6	TEXAS				SH 153
DWG: PX	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DBR	SJT	RUNNELS	0650	03	031	74

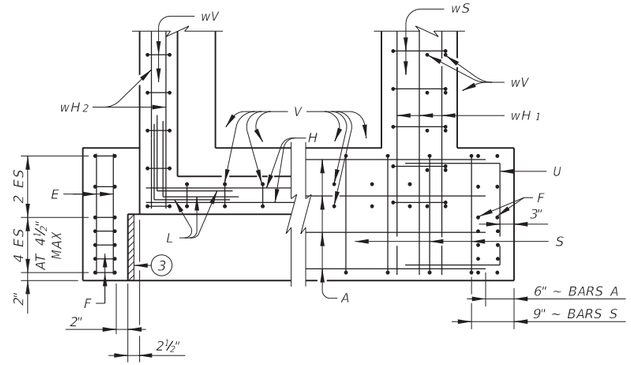


WINGWALL ELEVATION

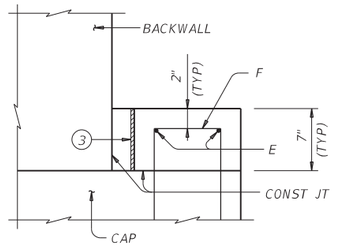
(EARWALL OMITTED FOR CLARITY)



SECTION B-B

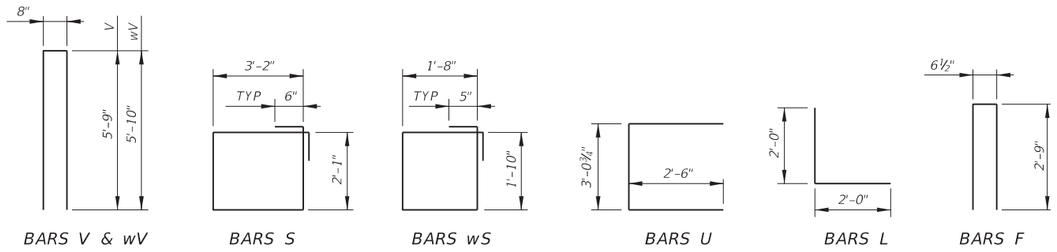


CORNER DETAILS



EARWALL ELEVATION DETAIL (4)

(SLOPE TOP OF EARWALL AWAY FROM BEAMS)



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F	14	#5	6'-1"	89
H	8	#6	45'-8"	549
L	18	#6	4'-0"	108
S	58	#5	11'-6"	696
U	4	#6	8'-1"	49
V	45	#5	12'-2"	571
wH1	14	#6	11'-5"	240
wH2	20	#6	9'-8"	290
wS	22	#4	7'-10"	115
wV	22	#5	12'-4"	283
REINFORCING STEEL (2)			Lb	5,522
CLASS "C" CONCRETE (ABUT)			CY	27.1

(2) FOR CONTRACTORS INFORMATION ONLY.

(3) ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. INSIDE FACE OF EARWALL TO BE CAST WITH VERTICAL SIDE OF BEAM

(4) DO NOT CAST EARWALL UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION

NOTE:
SEE SHEET 1 OF 2 FOR GENERAL NOTES AND MATERIAL NOTES.

STATE OF TEXAS
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LICENSED PROFESSIONAL ENGINEER
10.31.22

FIRM REG. NO. F-199

HL 93 LOADING

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

Texas Department of Transportation

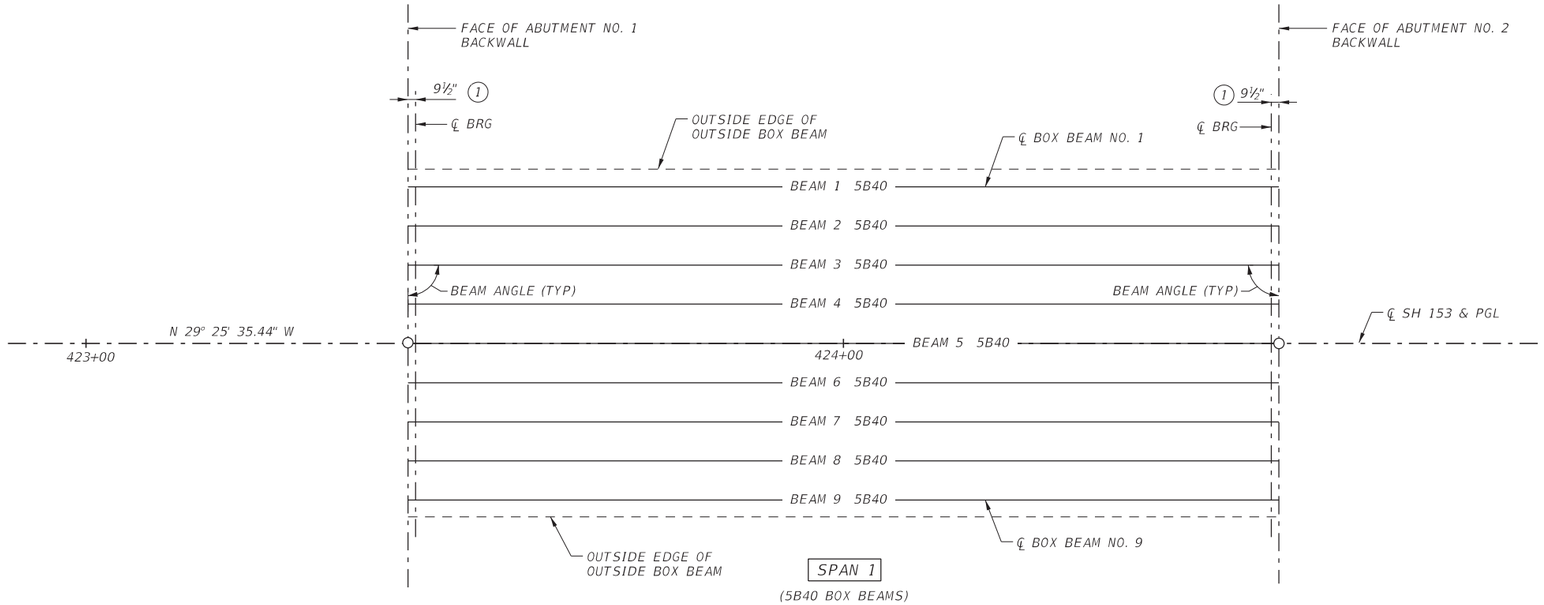
ABUTMENT NO. 2

SH 153 AT VALLEY CREEK

SHEET 2 OF 2

DGN: DBR	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DR	6	TEXAS				SH 153
DWG: PX	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DBR	SJT	RUNNELS	0650	03	031	75

Design Filename: S:\Transportation\20-157C TxDOT 88-91DP5026 WA1 US67, SH153, SH163\CAD\01-Sheets\SH 153\SH153-BRG-ABUT04.dgn
Plotted on: 10/27/2022



BEAM LAYOUT

(1) MEASURED PERPENDICULAR TO FACE OF ABUTMENT BACKWALL.

(2) BEAM LENGTHS SHOWN ARE BOTTOM BEAM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.

BENT REPORT

ABUTMENT NO. 1 (N 60° 34' 24.56" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.676 L

		BEAM SPAC. (FACE OF BKWL)	BEAM ANGLE D M S
SPAN 1	BEAM 1	0.000	90 00 00
	BEAM 2	5.169	90 00 00
	BEAM 3	5.169	90 00 00
	BEAM 4	5.169	90 00 00
	BEAM 5	5.169	90 00 00
	BEAM 6	5.169	90 00 00
	BEAM 7	5.169	90 00 00
	BEAM 8	5.169	90 00 00
	BEAM 9	5.169	90 00 00
	TOTAL	41.352	

ABUTMENT NO. 2 (N 60° 34' 24.56" E)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 20.676 L

		BEAM SPAC. (FACE OF BKWL)	BEAM ANGLE D M S
SPAN 1	BEAM 1	0.000	90 00 00
	BEAM 2	5.169	90 00 00
	BEAM 3	5.169	90 00 00
	BEAM 4	5.169	90 00 00
	BEAM 5	5.169	90 00 00
	BEAM 6	5.169	90 00 00
	BEAM 7	5.169	90 00 00
	BEAM 8	5.169	90 00 00
	BEAM 9	5.169	90 00 00
	TOTAL	41.352	

BEAM REPORT

BEAM REPORT, SPAN 1

	HORIZONTAL DISTANCE C-C BENT	C-C BRG.	TRUE DISTANCE BOT. FLG. (2)	BEAM SLOPE
BEAM 1	115.000	113.417	114.50	0.0025
BEAM 2	115.000	113.417	114.50	0.0025
BEAM 3	115.000	113.417	114.50	0.0025
BEAM 4	115.000	113.417	114.50	0.0025
BEAM 5	115.000	113.417	114.50	0.0025
BEAM 6	115.000	113.417	114.50	0.0025
BEAM 7	115.000	113.417	114.50	0.0025
BEAM 8	115.000	113.417	114.50	0.0025
BEAM 9	115.000	113.417	114.50	0.0025

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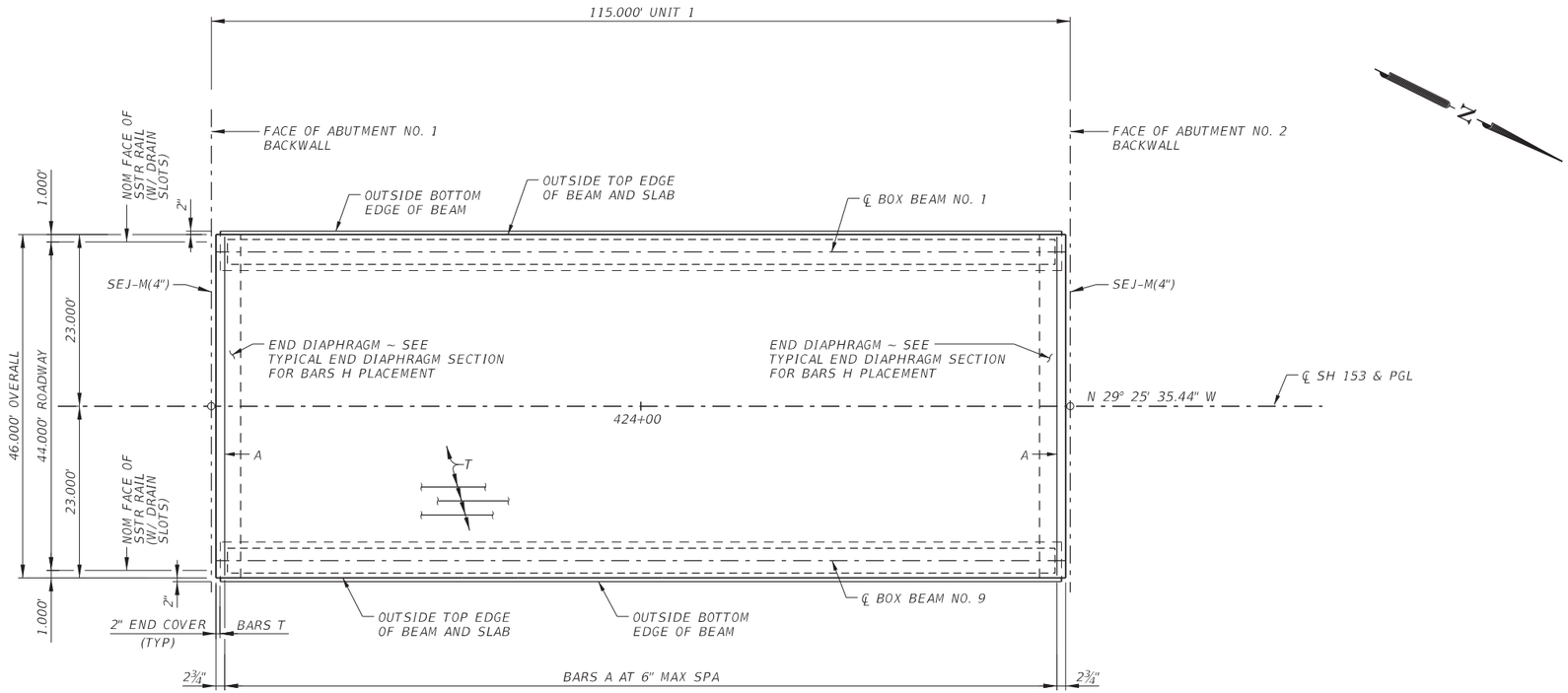
FRAMING PLAN

SH 153 AT VALLEY CREEK

SHEET 1 OF 1

DGN: DBR	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DR	6	TEXAS				SH 153
DWG: PX	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DBR	SJT	RUNNELS	0650	03	031	76

Plotted on: 10/27/2022
Design Filename: S:\Transportation\20-157C TxDOT 88-91DP5026 WA1 US67, SH153, SH163\CAD\01-Sheets\SH 153\SH153-BRG-FRM01.dgn



SPAN 1

(5B40 BOX BEAMS)

PLAN

BAR TABLE	
BAR	SIZE
A	#4
H	#5
T	#4

TABLE OF ESTIMATED QUANTITIES

SPAN	SHEAR KEY	REINF CONC SLAB (BOX BEAM)	PRESTR CONC BOX BEAM (5B40) ②	REINF STEEL ①③
NO.	CY	SF	LF	LB
1	51.4	5,290	1,030.50	10,580
TOTAL	51.4	5,290	1,030.50	10,580

① FOR CONTRACTOR'S INFORMATION ONLY.

② LENGTHS SHOWN ARE BOTTOM SOFFIT LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE. SEB FRAMING PLAN FOR BEAM LENGTHS.

③ REINFORCING STEEL WEIGHT IS CALCULATED USING AN APPROXIMATE FACTOR OF 2.0 lb/SF. (NOT INCLUDING RAIL REINFORCING)

GENERAL NOTES:

1. DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 2017, 8TH EDITION.
2. SEE BOX BEAM RAIL ANCHORAGE DETAILS W/SLAB (BBRAS) STANDARD SHEET FOR RAIL ANCHORAGE IN SLAB.
3. IT IS RECOMMENDED TO ERECT BEAMS ADJACENT TO THE HIGH SIDE OF CROSS SLOPE FIRST AND PROGRESS TO THE LOW SIDE.
4. CHAMFER ALL EXPOSED EDGES 3/4" UNLESS NOTED OTHERWISE.

COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.

MATERIAL NOTES:

PROVIDE CLASS S CONCRETE (f'c = 4,000 PSI).

PROVIDE EPOXY COATED GRADE 60 REINFORCING STEEL.

PROVIDE BAR LAPS, WHERE REQUIRED, AS FOLLOWS:

EPOXY COATED ~ #4 = 2'-5"

EPOXY COATED ~ #5 = 3'-0"

EPOXY COATED DEFORMED WELDED WIRE REINFORCEMENT (WWR) (ASTM A884 CLASS A OR B) OF EQUAL SIZE AND SPACING MAY BE SUBSTITUED FOR BARS A AND T UNLESS NOTED OTHERWISE. PROVIDE THE SAME LAPS AS REQUIRED FOR EPOXY-COATED REINFORCING BARS.

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TBPE FIRM REG. NO. F-199

Texas Department of Transportation

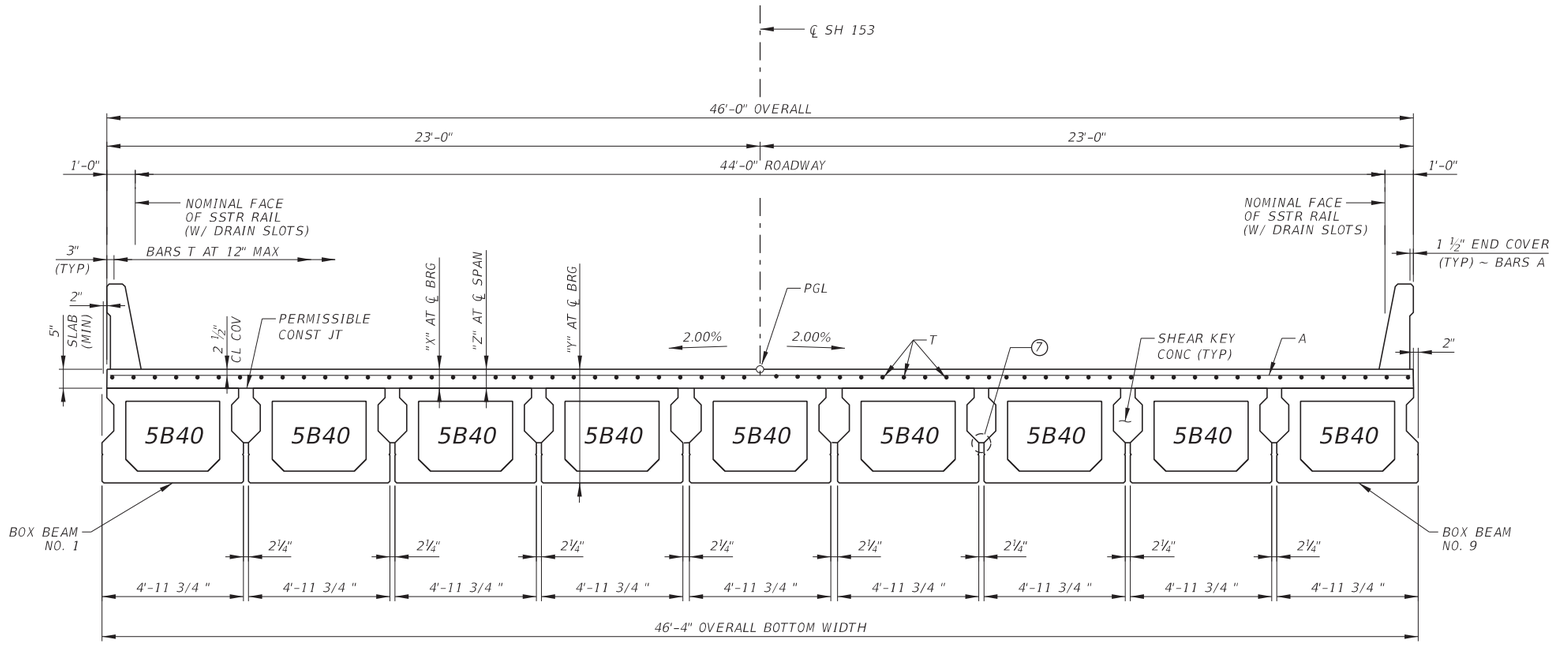
115.00' PRESTRESSED CONCRETE BOX BEAM SPAN

SH 153 AT VALLEY CREEK

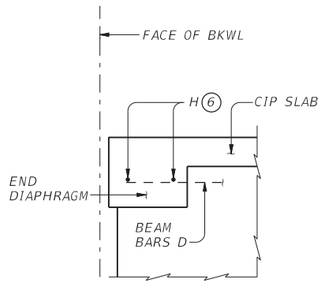
SHEET 1 OF 2

DGN: DBR	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DR	6	TEXAS				SH 153
DWG: PX	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DBR	SJT	RUNNELS	0650	03	031	77

Design Filename: S:\Transportation\20-157C TxDOT 88-91DP5026 WA1 US67, SH153, SH163\CAD\01-Sheets\SH 153\SH153-BRG-GSU01.dgn Plotted on: 10/27/2022



TYPICAL TRANSVERSE SECTION



ABUTMENT
(WITH EXPANSION JOINT) ⑤

TYPICAL END DIAPHRAGM SECTION

(ALONG CENTERLINE OF BOX BEAM)

TABLE OF SECTION DEPTHS

SPAN NO.	BEAM NO.	"X" AT ℄ BRG	"Y" AT ℄ BRG	"Z" AT ℄ SPAN ④
1	1 & 9	7"	3'-11"	5½"
1	2-8	7"	3'-11"	6¼"

④ THEORETICAL DIMENSION.

NOTE:
SEE SHEET 1 OF 2 FOR GENERAL NOTES AND MATERIAL NOTES.

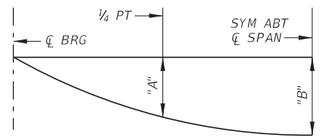
⑤ SEE BRIDGE LAYOUT SHEET FOR JOINT TYPE.

⑥ PROVIDE 1½" END COVER TO BARS H. AFTER ALL BEAMS HAVE BEN PLACED, WELD ONE BAR H TO TWO BARS D AT EACH END OF ALL BEAMS.

⑦ FORM BOTTOM OF SHEAR KEYS WITH FOAM BACKER ROD OR OTHER MATERIAL ACCEPTABLE TO THE ENGINEER.

TABLE OF DEAD LOAD DEFLECTIONS

SPAN NO.	BEAM NO.	"A" FT	"B" FT
1	1 & 9	-0.090	-0.126
1	2-8	-0.120	-0.169



DEAD LOAD DEFLECTION DIAGRAM

CALCULATED DEFLECTIONS SHOWN ARE DUE TO THE SHEAR KEY AND CONCRETE SLAB ONLY ON INTERIOR/ EXTERIOR GIRDERS (Ec = 5000 KSI). THESE VALUES MAY BE ADJUSTED BASED ON FIELD OBSERVATION.

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Texas Department of Transportation

115.00' PRESTRESSED CONCRETE BOX BEAM SPAN

SH 153 AT VALLEY CREEK

SHEET 2 OF 2

DGN: DBR	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DR	6	TEXAS				SH 153
DWG: PX	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DBR	SJT	RUNNELS	0650	03	031	78

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DESIGNED BEAMS (STRAIGHT STRANDS)

STRUCTURE	SPAN NO.	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	PRESTRESSING STRANDS: TOTAL NO.	PRESTRESSING STRANDS: SIZE (in)	PRESTRESSING STRANDS: STRGTH fpu (ksi)	PRESTRESSING STRANDS: "e" ℄ (in)	PRESTRESSING STRANDS: "e" END (in)	PRESTRESSING STRANDS: TOT NO. DEB	DEBONDED STRAND PATTERN PER ROW: DIST FROM BOTTOM (in)	DEBONDED STRAND PATTERN PER ROW: NO.OF STRANDS: TOTAL	DEBONDED STRAND PATTERN PER ROW: NO.OF STRANDS: DE-BONDED	DEBONDED STRAND PATTERN PER ROW: NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH ① f'ci (ksi)	CONCRETE: MINIMUM 28 DAY COMP STRGTH f'c (ksi)
SH 153 AT VALLEY CREEK	1	1-9	5B40		42	0.6	270	15.00	14.73	8	2.50	28	8	2	2	2	0	2	4.400	5.900

OPTIONAL DESIGN

DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-kips)	LIVE LOAD DISTRIBUTION FACTOR ② Moment	LIVE LOAD DISTRIBUTION FACTOR ② Shear
3.981	-3.735	5,665	0.322	0.617

LOAD RATING FACTORS

STRENGTH I Inv	STRENGTH I Opr	SERVICE III Inv
1.68	2.23	1.02

① Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

② Portion of full HL93.

③ Bottom corner chamfer required for 4B40 and 5B40 boxes when beam lengths are greater than 100 ft.

DESIGN NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel bars.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

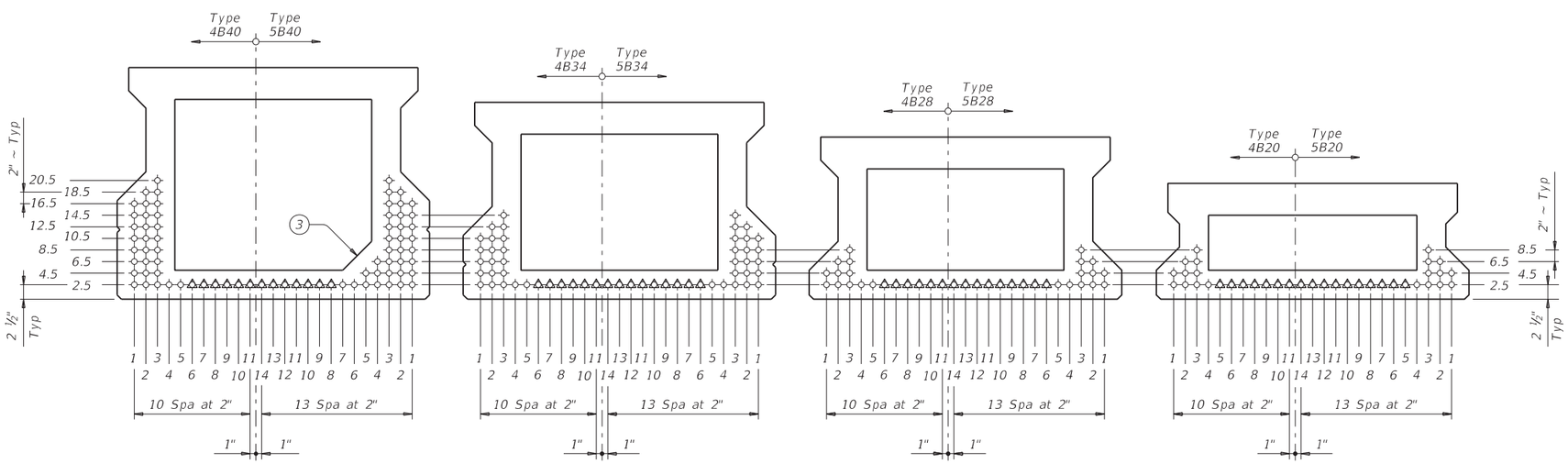
Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:

1) Locate a strand in each "1" position.
2) Place strand symmetrically about vertical centerline of box.
3) Space strands as equally as possible across the entire width.

Strand debonding must comply with Item 424.4.2.2.2.4.

Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.

Full-length debonded strands are only permitted in positions marked △.



TxDOT B40 BOX BEAMS | TxDOT B34 BOX BEAMS | TxDOT B28 BOX BEAMS | TxDOT B20 BOX BEAMS

10.31.22

FIRM REG. NO. F-199

HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DESIGNS
(NON-STANDARD SPANS)

BBND

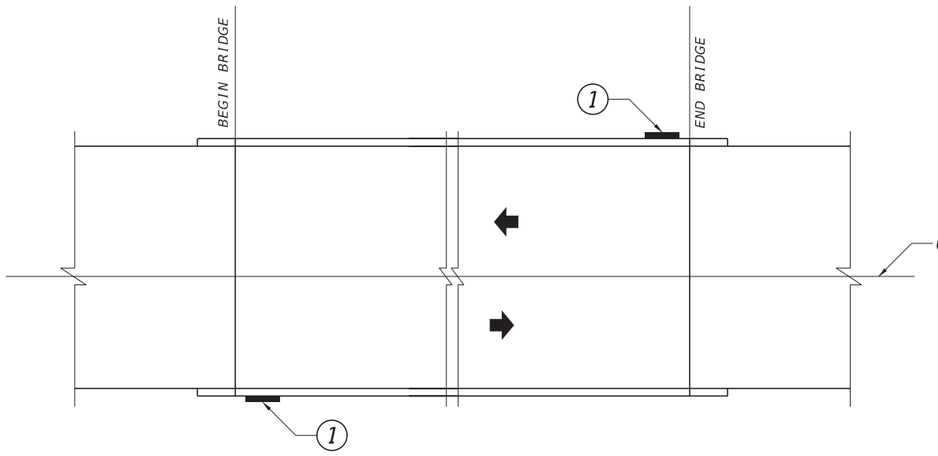
FILE: bbstds07.dgn	DN: TxDOT	CK: TxDOT	DW: SFS	CK: SDB
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
04-11; f'ci and LLDF. 01-16; Notes. 06-22; Load rating table.	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		79

KEYED NOTES

(1) Proposed painted bridge identification number.

BRIDGE IDENTIFICATION NUMBER DETAILS

Bridge Identification Number sizing details shown above.
See Bridge Layout for actual bridge number (New NBI Number) to display.



BRIDGE STRUCTURE PLAN

The bridge will have a new Bridge Identification Number (New NBI Number).

See Bridge Layout for the New NBI Number.

GENERAL NOTES

1. Obtain approval of proposed materials and work methods before commencing work.
2. Remove existing adhered bridge identification numbers by scraping, water blasting, chemical cleaning, or other approved methods. Clean the surface thoroughly. Existing adhered bridge identification numbers may be attached to steel or concrete surfaces. Existing painted bridge identification numbers do not require removal. Dispose of removed materials properly. Cleaning, removal, and disposal are not pay items.
3. Paints shall be waterproof, weather resistant, and quick drying when used on concrete without smearing, smudging or rippling.
4. Metal stencil set shall have 3 in. interlocking characters, shall include numbers, letters and dashes, and shall have font as approved. C H Hanson stencil set model 10153 or equal.
5. Bridge identification numbers vary. See plans for numbers and locations. Painted bridge identification numbers shall have white background with black letters. Borders shall be 1 in. minimum. Mask to prevent overspray.
6. For bridge structures, apply painted bridge identification numbers on both sides of structure, except for parallel structures which are only separated by an expansion joint. Apply to each outside edge of concrete deck close to abutment on the upstream traffic side unless otherwise approved.
7. For culvert structures, apply painted bridge identification numbers on both sides of structure. Apply to each headwall adjacent to wingwall on the upstream traffic side unless otherwise approved.
8. The Engineer will provide guidance in cases where painted bridge identification numbers cannot be installed in standard locations.
9. Unless identified in the contract as bid items, painted bridge identification numbers will not be measured and paid for directly, but will be considered as subsidiary to the various bid items of the contract. When used as a bid item, submit digital photographs of each new painted bridge identification number and the area of the removed bridge identification number. Include the following information visible within the digital photographs: time, date, latitude, longitude, and direction.

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BRIDGE IDENTIFICATION NUMBER DETAILS

SH 153 AT VALLEY CREEK

DGN: DBR	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DR	6	TEXAS				SH 153
DWG: PX	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DBR	SJT	RUNNELS	0650	03	031	80

Design Filename: S:\Transportation\20-157C TxDOT 88-91DP5026 WA1 US67, SH153, SH163\CAD\01-Sheets\SH 153\SH153-BRG-BIND01.dgn Plotted on: 10/27/2022

DRILLING LOG

WinCore Version 3.3

County	Runnels	Hole	B-1	District	San Angelo
Highway	SH 153	Structure	Bridge	Date	05/17/20
CSJ	0650-03-031	Station	422+89.11	Grnd. Elev.	2009.04 ft
		Offset	31.40 ft LT	GW Elev.	1992.04 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			FILL: SAND, Clayey to Clayey with Gravel, dry, light brown to 0.5', br. thereafter, fi.-co. gra. (SC)			3				SSS@0', N=38 (13, 16, 22, 22), -#200=32.1% -#200=45.2% @0.5' few Gravel below 0.5'
2006.5						5				
			CLAY, Lean with Sand, stiff, moist, brown (CL)			10				SSS@3', N=8
5		9 (6) 11 (6)								
						12	33	16		SSS@6.5', N=8, -#200=74.3%
						6				PTS@8', PP=4.5+
2000.										Push Refusal at 9'
10		10 (6) 14 (6)	GRAVEL, Poorly Graded with Clay and Sand, slightly compact, dry, light brown, fine to coarse grained (GP-GC)			1				SSS@11.5', N=18, -#200=8.2%
1996.						15				SSS@13.5', N=5, -#200=41.0%
15		4 (6) 9 (6)	SAND, Clayey, loose, moist to wet, brown, fine grained (SC)							SSS@16.5', N=3, 2, WOH/6"
1990.										
20		7 (6) 16 (6)	CLAY, Lean, stiff, moist, reddish brown (CL)			16	47	30		SSS@21.5', N=47, -#200=98.6%
1984.		50 (2) 50 (1.5)								
25			SHALE, hard, reddish brown, weathered							SSS@25.4', N=50/5.5
1982.			SHALE, soft, reddish brown, weathered							
30		50 (3.5) 50 (2.25)				11	46	27		SSS@30.6', N=50/6
1974.		50 (0.75) 50 (0.75)								
35			SHALE, very hard, brown and gray to 35.4', reddish brown below 40.2', weathered							SSS@35.2', N=50/2
40		50 (1) 50 (0.125)								

Remarks: Drill Rig: CME 55 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); WOH: Weight of Hammer; Drilling Method: CFA to 15', then Mud Rotary; Northing: 10713341.34, Easting: 2364152.29

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Angus Richer **Logger:** Logan Gordon **Organization:** Corsair Consulting LLC

\\192.168.1.9\elc\Shared\Projects\2019\1900594 US67 & SH153 & SH163 Bridges SEA\2 SH 153 Bridge\Logs\Draft\99%\WinCore\B-1.CLG

DRILLING LOG

WinCore Version 3.3

County	Runnels	Hole	B-1	District	San Angelo
Highway	SH 153	Structure	Bridge	Date	05/17/20
CSJ	0650-03-031	Station	422+89.11	Grnd. Elev.	2009.04 ft
		Offset	31.40 ft LT	GW Elev.	1992.04 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
1967.			SHALE, very hard, brown and gray to 35.4', reddish brown below 40.2', weathered			14				SSS@40.2', N=50/4
			SHALE, hard, reddish brown, weathered							
45		50 (1.5) 50 (1)				17				SSS@45.3', N=50/4 Sulfate Content=274 ppm
50		50 (2) 50 (1.5)				16	43	25		SSS@50.4', N=50/5
1954.5		50 (1) 50 (0.25)								
55			SHALE, very hard, reddish brown, weathered			18				SSS@55.2', N=50/4.5
60		50 (0.5) 50 (0.125)				20				SSS@60.1', N=50/5.5
1943.8		50 (1) 50 (0.5)								
65										Boring Terminated at 65.2'
70										
75										
80										

Remarks: Drill Rig: CME 55 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); WOH: Weight of Hammer; Drilling Method: CFA to 15', then Mud Rotary; Northing: 10713341.34, Easting: 2364152.29

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Driller: Angus Richer **Logger:** Logan Gordon **Organization:** Corsair Consulting LLC

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BORING LOGS

SH 153 AT VALLEY CREEK

SHEET 1 OF 2

DGN: DBR	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DR	6	TEXAS				SH 153
DWG: PX	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DBR	SJT	RUNNELS	0650	03	031	81

Design Filename: S:\Transportation\20-157C TxDOT 88-9IDP5026 WA1 US67, SH153, SH163\CAD\01-Sheets\SH 153\SH153-Boring Log02.dgn Plotted on: 10/27/2022

DRILLING LOG

WinCore Version 3.3

County	Runnels	Hole	B-2	District	San Angelo
Highway	SH 153	Structure	Bridge	Date	05/17/20
CSJ	0650-03-031	Station	425+19.87	Grnd. Elev.	2009.74 ft
		Offset	33.11 ft RT	GW Elev.	1996.24 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			CLAY, Lean with Sand, moist, brown, trace calcareous deposits; light brown SC with Gravel Fill to 1', fine to coarse grained (CL)			4				SSS@0', N=21 (14, 13, 8, 6), -#200=39.3%
						9				
						9	35	18		SSS@2', N=10
						10				SSS@3.5', N=18, -#200=75.5%
2004.75		30 (6) 28 (6)								
			CLAY, Lean with Sand, very stiff, moist, brown, trace calcareous deposits (CL)			11	38	21		SSS@6.3', N=29, -#200=78.8%
						10				SSS@8', N=16, -#200=76.5% Sulfate Content<100 ppm
1999.710		50 (5) 50 (3.5)								
			GRAVEL, Poorly Graded with Clay and Sand, dense, moist to wet, light brown to 12.5', reddish brown below 13', fine to coarse grained (GP-GC)			3				SSS@11', N=47, -#200=8.3%
						7				SSS@13', N=13, 42, 50/2
1994.715		50 (1) 50 (1)				17				SSS@15.2', N=50/4
1993.2			SHALE, hard, reddish brown, weathered							
			SHALE, soft, reddish brown, weathered							
20		50 (2.5) 50 (2)				18	46	28		SSS@20.5', N=30, 50/3.25, -#200=99.6%
1985.2		50 (1) 50 (0.75)	SHALE, very hard, reddish brown and gray, weathered							SSS@25.2', N=50/4.5
25			SHALE, soft, reddish brown, weathered							
1983.2										
30		50 (2.75) 50 (1.75)				16				SSS@30.5', N=47, 50/2
1975.2		50 (1) 50 (0.5)	SHALE, very hard, reddish brown and gray to 35.6', reddish brown below 40.1', weathered			13				SSS@35.2', N=50/5
40		50 (0.75) 50 (0.25)								

Remarks: Drill Rig: CME 55 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 15', then Mud Rotary; Northing: 10713574.03, Easting: 2364095.10

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Angus Richer **Logger:** Logan Gordon **Organization:** Corsair Consulting LLC

\\192.168.1.9\elc\Shared\Projects\2019\1900594 US67 & SH153 & SH163 Bridges SEA\2 SH 153 Bridge\Logs\Draft\99%\WinCore\B-2.CLG

DRILLING LOG

WinCore Version 3.3

County	Runnels	Hole	B-2	District	San Angelo
Highway	SH 153	Structure	Bridge	Date	05/17/20
CSJ	0650-03-031	Station	425+19.87	Grnd. Elev.	2009.74 ft
		Offset	33.11 ft RT	GW Elev.	1996.24 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SHALE, very hard, reddish brown and gray to 35.6', reddish brown below 40.1', weathered			18				SSS@40.1', N=50/3.5 Sulfate Content<100 ppm
45		50 (0.25) 50 (0.25)				19				SSS@45.1', N=50/3.5
1962.7			SHALE, hard, reddish brown to 51', gray and brown below 55.3', weathered							
50		50 (1) 50 (1)				16	47	28		SSS@50.2', N=43, 50/3, -#200=99.9%
55		50 (1.75) 50 (1)				16				SSS@55.3', N=50/5
1950.7			SHALE, very hard, reddish brown to 60.6', reddish brown, brown, and gray below 65.2', weathered							
60		50 (1) 50 (0.5)				17				SSS@60.2', N=50/4.5
65		50 (1) 50 (0.25)								SSS@65.2', N=50/2
70		50 (1) 50 (1)				17				SSS@70.3', N=50/5 Sulfate Content=1,600 ppm
1934.675		50 (0.5) 50 (0.125)								Boring Terminated at 75.1'
80										

Remarks: Drill Rig: CME 55 with TxDOT 170-pound Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 15, then Mud Rotary; Northing: 10713574.03, Easting: 2364095.10

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Angus Richer **Logger:** Logan Gordon **Organization:** Corsair Consulting LLC

\\192.168.1.9\elc\Shared\Projects\2019\1900594 US67 & SH153 & SH163 Bridges SEA\2 SH 153 Bridge\Logs\Draft\99%\WinCore\B-2.CLG

This sheet is a reproduction of drilling logs obtained by Corsair Consulting LLC, under TxDOT Contract Number 88-9IDP5026, WA No.1 and performed under the supervision of Mr. Hem Raj Pant, P.E. Texas Seal No. 126206

STATE OF TEXAS
DANIEL B. RODRIGUEZ
99991
LICENSED
PROFESSIONAL ENGINEER
10.31.22

FIRM REG. NO. F-199

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

BORING LOGS

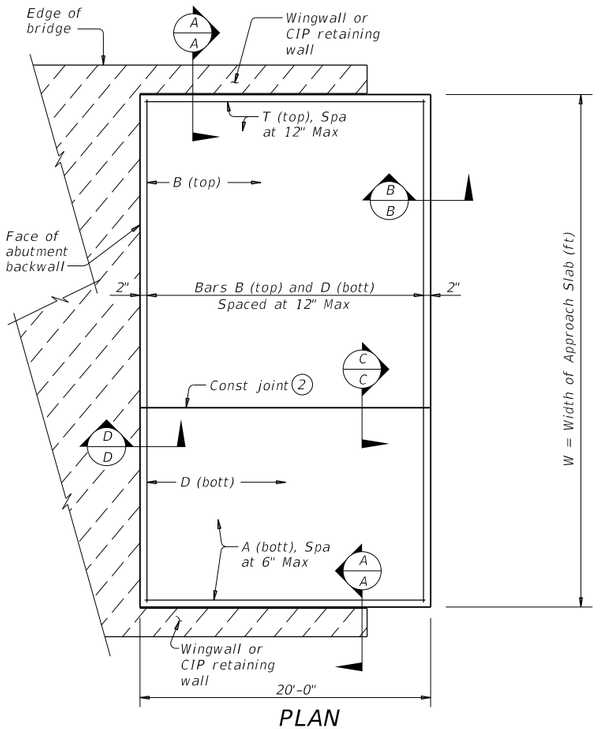
SH 153 AT VALLEY CREEK

SHEET 2 OF 2

DGN: DBR	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DR	6	TEXAS				SH 153
DWG: PX	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DBR	SJT	RUNNELS	0650	03	031	82

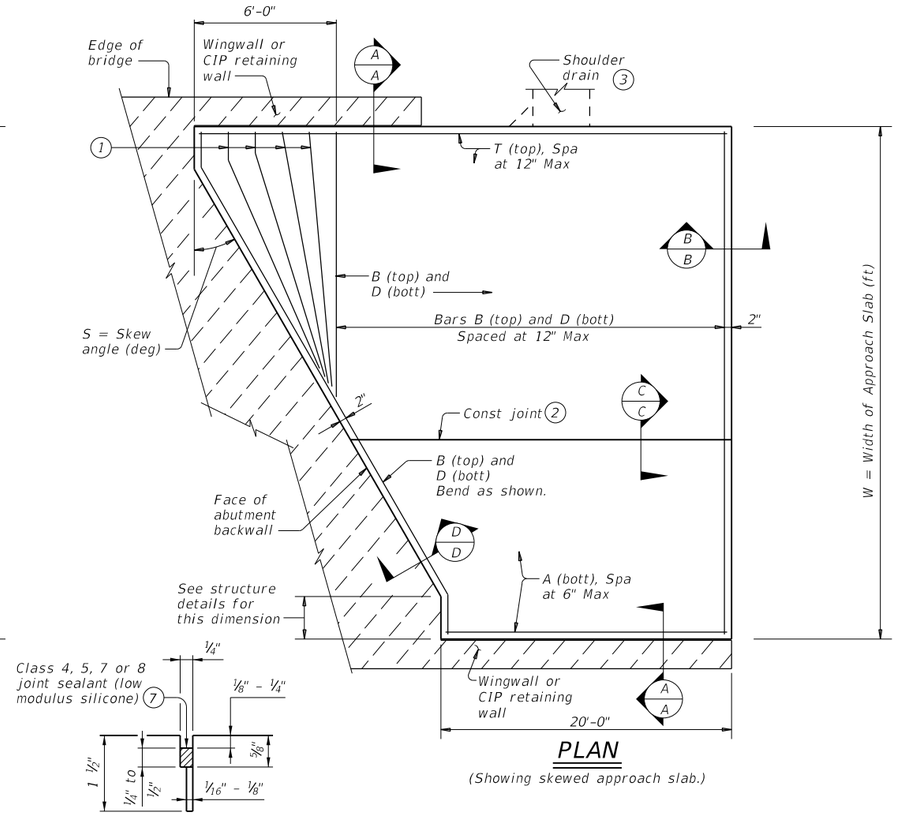
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

LONGITUDINAL SAW CUT JOINT DETAIL

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = 0.802W + 0.02W² Tan S

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310, "Joint Sealants and Fillers."

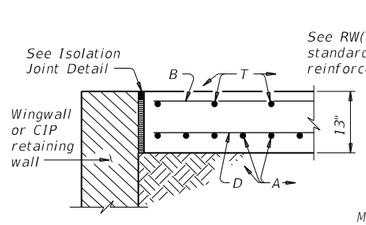
Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

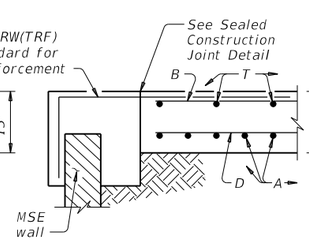
Cure for 4 days using water or membrane curing per Item 422.

All details shown herein are subsidiary to bridge approach slab.

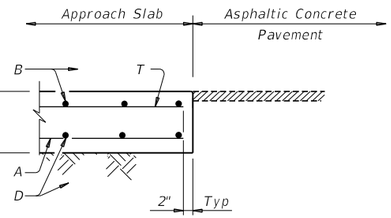
Cover dimensions are clear dimensions, unless noted otherwise.

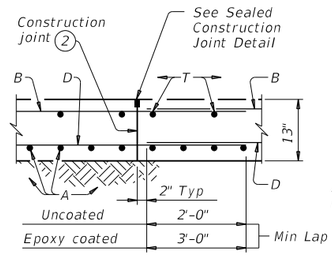


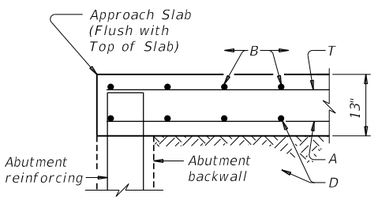
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL





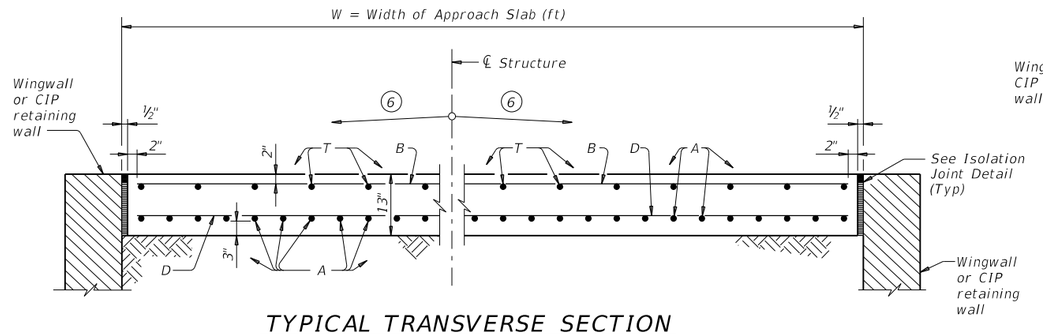


SECTION A-A

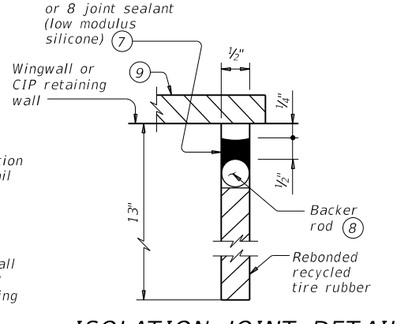
SECTION B-B

SECTION C-C (5)

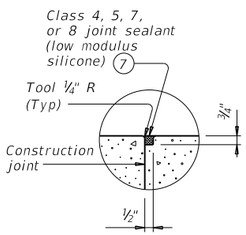
SECTION D-D



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

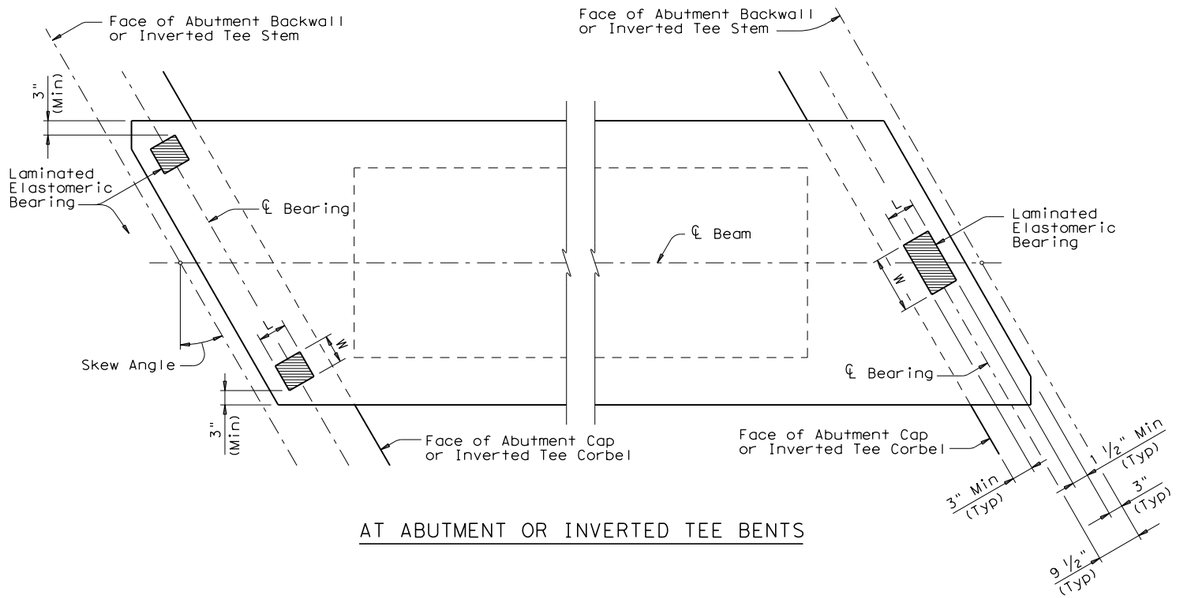
BRIDGE APPROACH SLAB

ASPHALTIC CONCRETE PAVEMENT

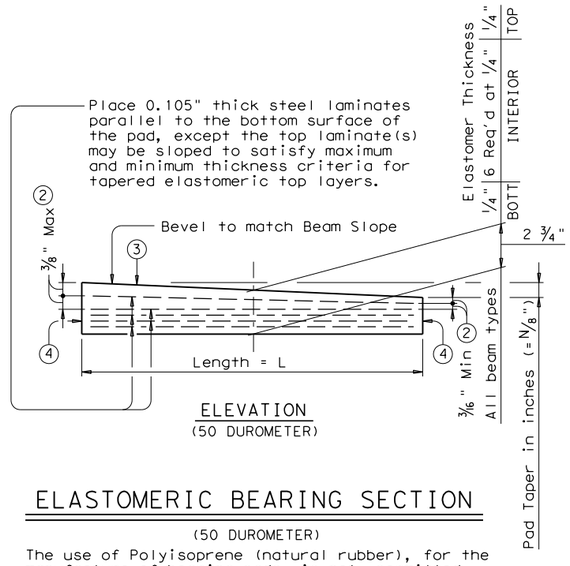
BAS-A

FILE: basaste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		83

DATE:
FILE:



AT ABUTMENT OR INVERTED TEE BENTS



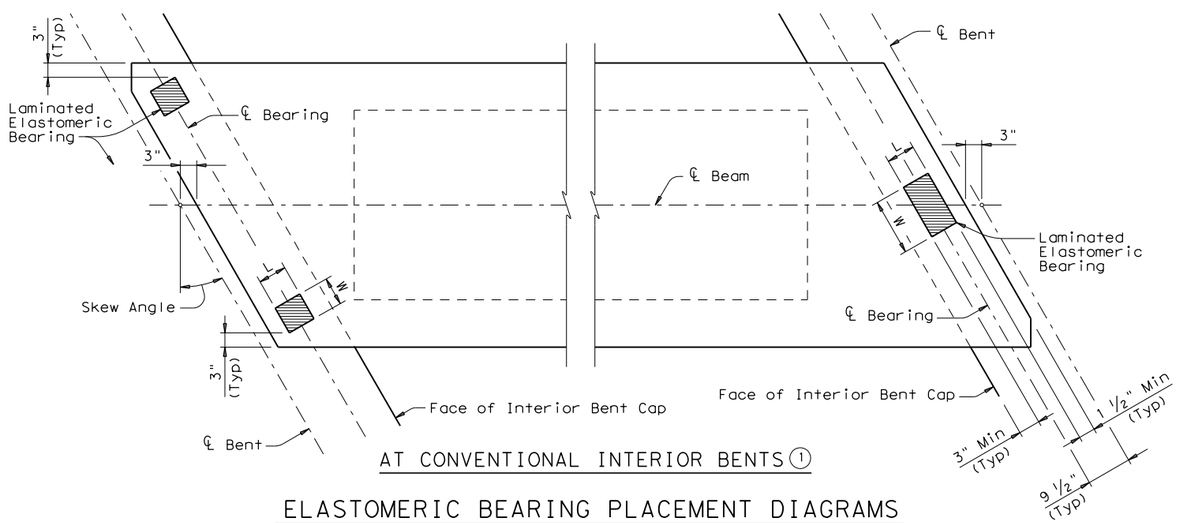
ELEVATION
(50 DUROMETER)

ELASTOMERIC BEARING SECTION

(50 DUROMETER)

The use of Polyisoprene (natural rubber), for the manufacture of bearing pads, is not permitted.

ELASTOMERIC BEARING PLACEMENT DIAGRAMS



AT CONVENTIONAL INTERIOR BENTS ①

The Forward Station Beam End will have one bearing and the Back Station Beam End will have two bearings.

ELASTOMETRIC BEARING DIMENSIONS					
BEARING TYPE	BEAM TYPE	ONE BEARING		TWO BEARINGS	
		L	W	L	W
B20-"N"	4B20	6"	12"	6"	6"
	5B20	6"	12"	6"	6"
B28-"N"	4B28	6"	14"	6"	7"
	5B28	6"	14"	6"	7"
B34-"N"	4B34	6"	16"	6"	8"
	5B34	6"	16"	6"	8"
B40-"N"	4B40	6"	20"	6"	10"
	5B40	6"	20"	6"	10"

① For Transition Bents with backwall, beams and elastomeric bearings will receive the same treatment as shown for Abutment Bents.

② Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

③ Indicate BEARING TYPE on all pads. For tapered pads, BEARING TYPE will be located on the high side. The Fabricator will include the value of "N" (amount of taper in 1/8" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for 1/8" taper)
N=2, (for 1/4" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan beam slope by more than $\left(\frac{0.0625"}{\text{Length}}\right)$ IN/IN.

④ Locate Permanent Mark here.

GENERAL NOTES:

Set beams on elastomeric bearings of the dimensions shown. Center bearings as near nominal ℄ bearing as possible within limits shown.

Constant thickness bearings may be used for moderate beam slopes up to 0.0113 ft/ft.

For skewed supports, Bearings beveled for beam slope may not provide uniform contact. However, predicted contact is considered within allowable tolerances.

Shop drawings for approval are required.

A bearing layout which identifies location and orientation of all bearings will be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer.

Cost of furnishing and installing elastomeric bearings is to be included in unit price bid for "Prestressed Concrete Box Beams".

Details are drawn showing right forward skew. See Bridge Layout for actual direction.

These details are applicable for skews up to 30 degrees only.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

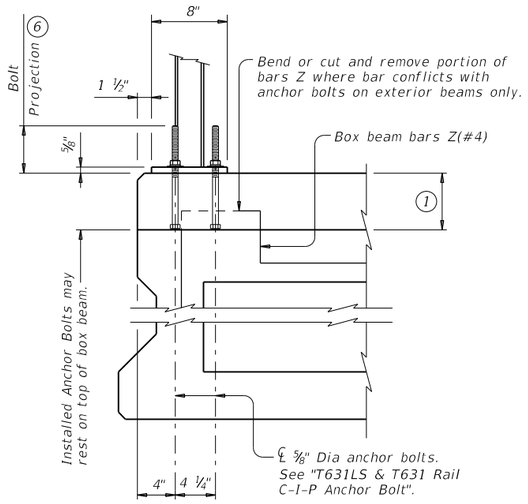
ELASTOMERIC BEARING DETAILS

PRESTR CONC BOX BEAMS

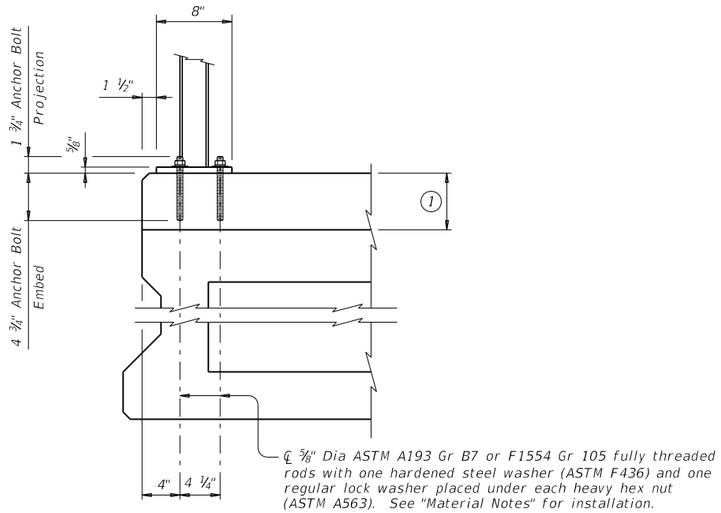
BBEB

FILE: bbstde08.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		84

DATE:
FILE:

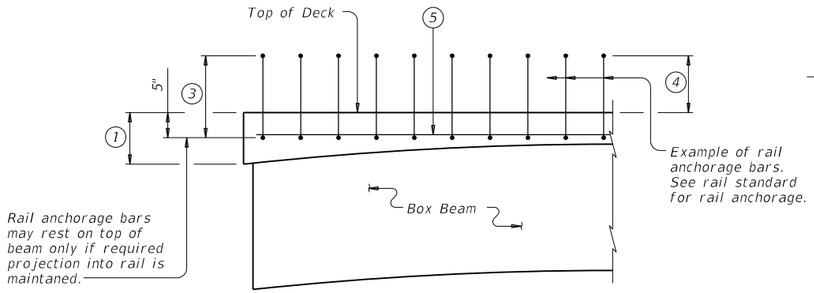


CAST-IN-PLACE ANCHORAGE OPTION

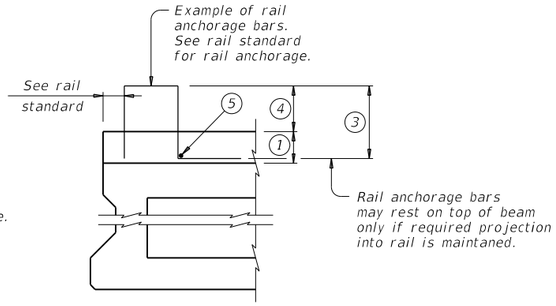


ADHESIVE ANCHORAGE OPTION

T631LS & T631 RAIL ANCHORAGE PLACEMENT (2)(7)



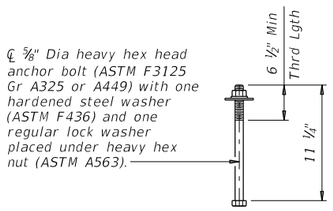
PART SPAN ELEVATION



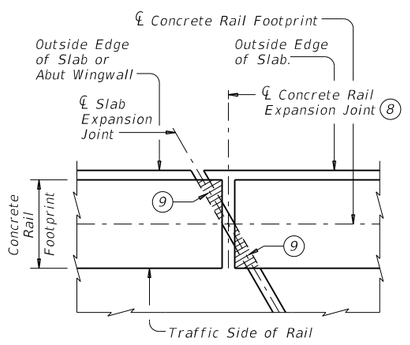
SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)



T631LS & T631 RAIL C-I-P ANCHOR BOLT



PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

(1) Cast-in-place slab thickness varies due to beam camber (5" minimum).

(2) Replace cast-in-place anchor bolts shown on T631LS or T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.

(3) Bar length shown on rail standard, minus 1 ¼". Adjust bar length for a raised sidewalk.

(4) See Rail standard for projection from finished grade or top of sidewalk.

(5) Place additional (#5) longitudinal bar.

(6) Excess bolt length has been provided to accommodate a variable slab thickness due to beam camber. If slab thickness on span details exceed 10", bolt length must be increased accordingly. 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 of zinc-rich paint conforming to the Item 445 "Galvanizing".

(7) Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only)
30° Skew: 1'-3" (acute corner only)

(8) Location of Rail Expansion Joint must be at the intersection of ℄ Slab Expansion Joint, ℄ Rail Footprint and perpendicular to slab outside edge.

(9) Cross-hatched area must have ½" Preformed Bitumuminous Fiber Material under concrete rail, as shown.

CONSTRUCTION NOTES:

Rail anchorage bars may be field bent as required to clear rail reinforcing or 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 steel.

Cast-in-place anchorage system for T631LS and T631 Rail must be ⅝" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 ½" minimum.

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.

This standard is for use with structures with a 5" minimum cast-in-place concrete slab.

This standard may require modification for interior rails. This standard does not apply to median barriers.

This standard does not provide details for Type T221P, T224, T80HT, T80SS, C412, PR11, PR22 and PR3 rails on box beam bridges.

See rail standards for approved speed restrictions, notes and details not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

Bridge Division Standard

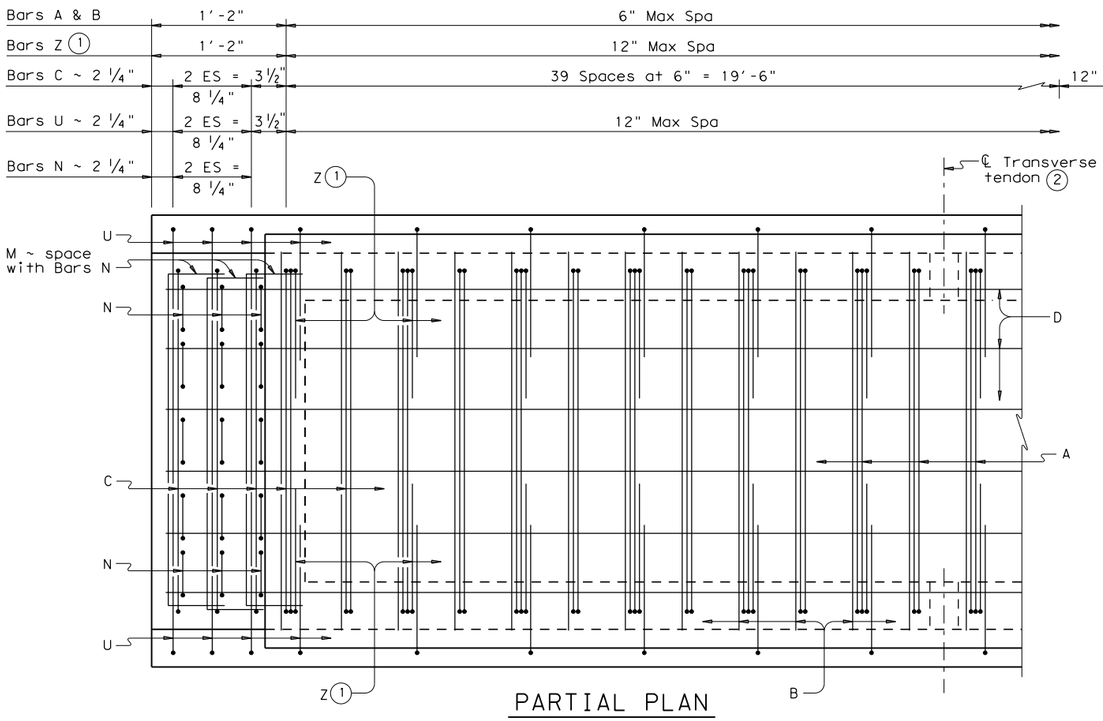
RAIL ANCHORAGE DETAILS

PRESTR CONC BOX BEAMS (WITH SLAB)

BBRAS

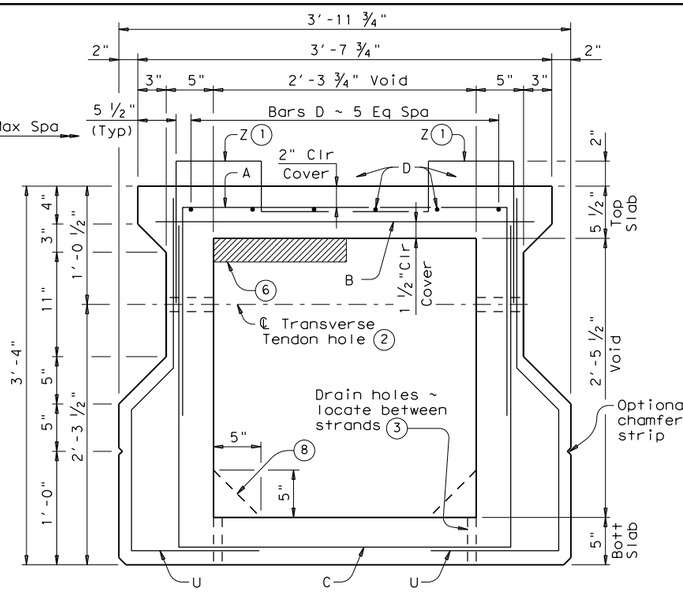
FILE: bbstde09-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
04-90: Updated for new rails. 01-12: Rails anchor bars. 07-14: Removed T101 & T6. Added T631. 03-16: Class D, E, or F epoxy in material notes. T221P & T224 in general notes. 03-18: Updated adhesive anchor notes.	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		85

DATE:
FILE:

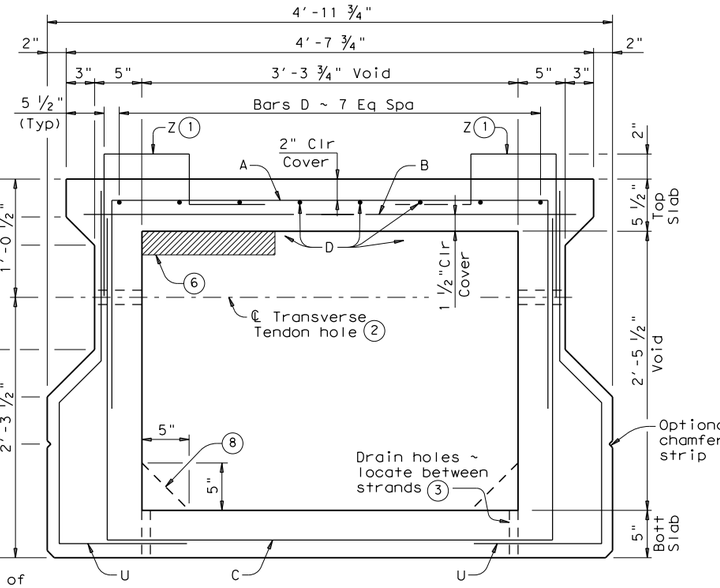


PARTIAL PLAN

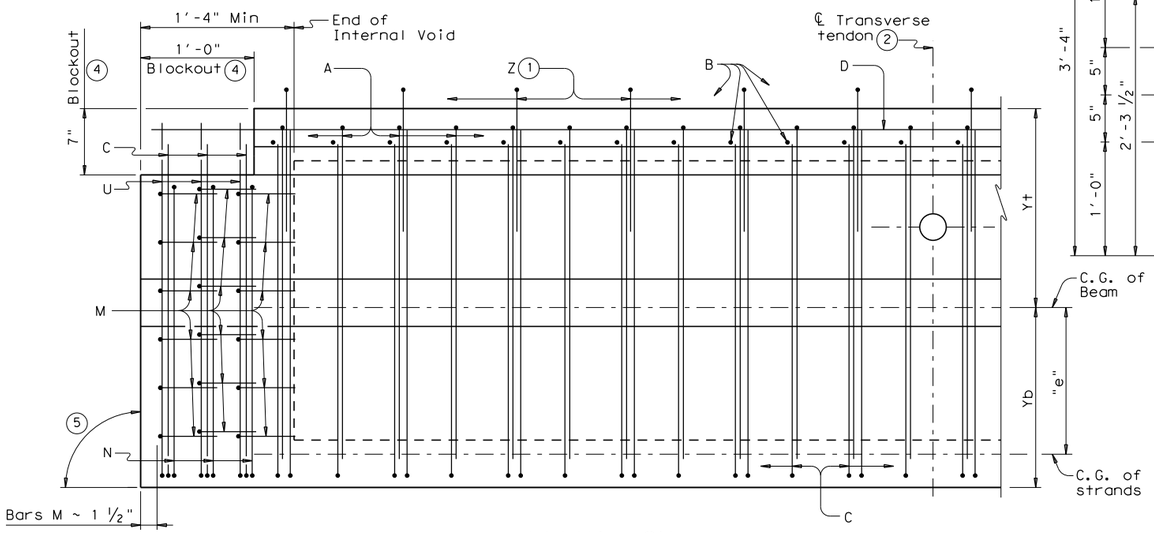
(Showing Type 4B40)



TYPICAL SECTION ~ TYPE 4B40



TYPICAL SECTION ~ TYPE 5B40



ELEVATION

BEAM PROPERTIES					
		Type 4B40		Type 5B40	
		100 feet or less	over 100 feet (8)	100 feet or less	over 100 feet (8)
Area	in^2	918.8	943.8	1044.8	1069.8
Y top	in	21.31	21.63	21.07	21.36
Y bott	in	18.69	18.37	18.93	18.64
I	in^4	176,607	180,159	215,300	219,007
Weight (7)	lb/ft	957	983	1,088	1,114

(1) Bars Z are required for beams topped with a cast-in-place concrete slab only.

(2) Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. See "Blockout, Interior Diaphragm, and Drain Details". Form 3" Dia holes in interior beams. See standard BBPT for details.

(3) Place drain holes (1" Dia PVC Sch 40 Pipe) as shown in all beam void corners including each side of interior diaphragms. See "Blockout, Interior Diaphragm, and Drain Details".

(4) Blockouts required at ends of all beams. Extend beam reinforcement into blockouts.

(5) 90° at conventional Interior Bents. Ends of beams shall be vertical at Abutment backwall and Inverted Tee Bent Stems.

(6) Showing void modification required in exterior beams not topped with a Min 5" cast-in-place concrete slab. See standard BBRAO for void modification dimensions.

(7) Based on 150 pcf weight density of concrete. Weight of end blocks and interior diaphragms is not included.

(8) Add chamfers as shown when beam length is over 100 ft. Locate drain holes at toe of chamfers.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

Use Class H concrete. Use Class H (HPC) if required elsewhere in plans. All reinforcing steel must be Grade 60.

Two-stage monolithic casting is required. The concrete in the first stage cast (bottom beam flange) must remain plastic until the second stage cast (webs and top beam flange) is placed. Vibrate as required to ensure consolidation between the two casts.

1 1/4" clear cover to reinforcement is required unless noted otherwise.

See standard BBRAS or BBRAO for railing anchorage at bridge edges to be cast in beams.

An equal area of welded wire reinforcement (WWR) meeting the requirements of ASTM A1064 may be substituted for Bars A, B, C, and D.

These details are applicable for skews up to 30 degrees only.

Chamfer bottom beam corners 3/4" or round to a 3/4" radius.

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Texas Department of Transportation

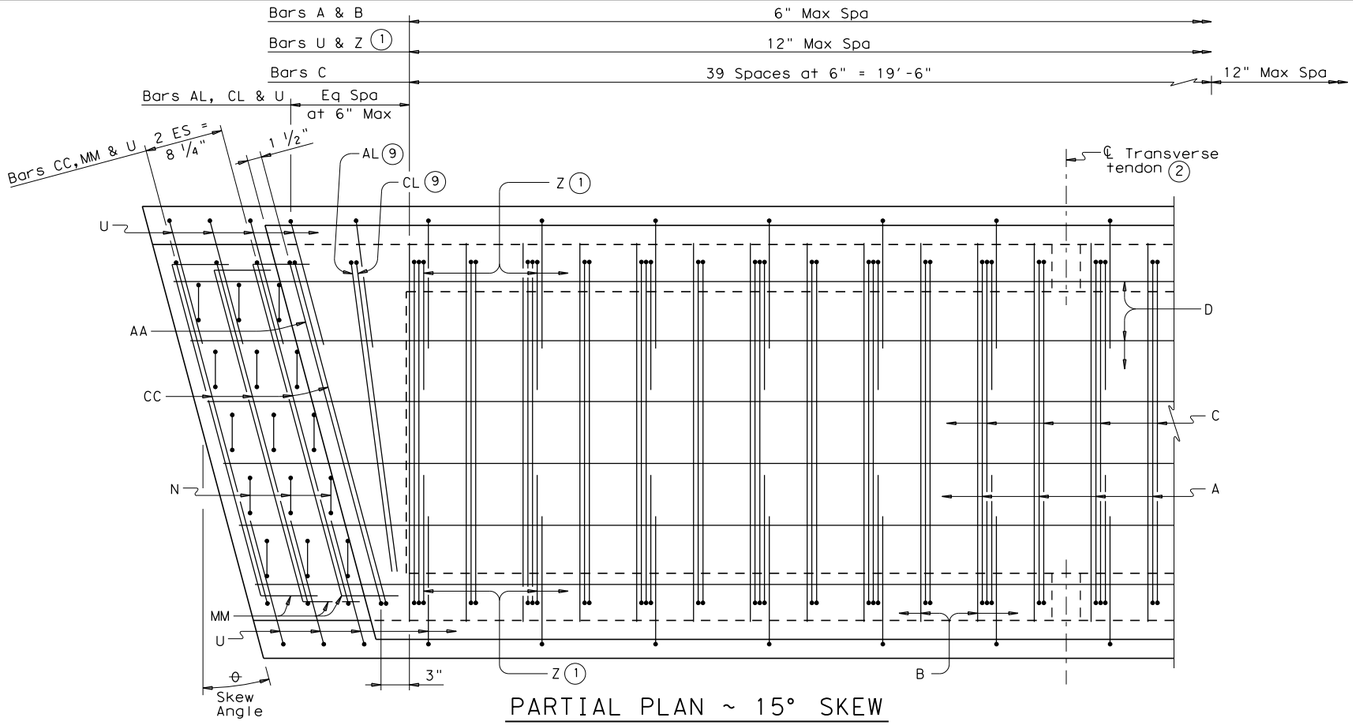
Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B40)

BB-B40

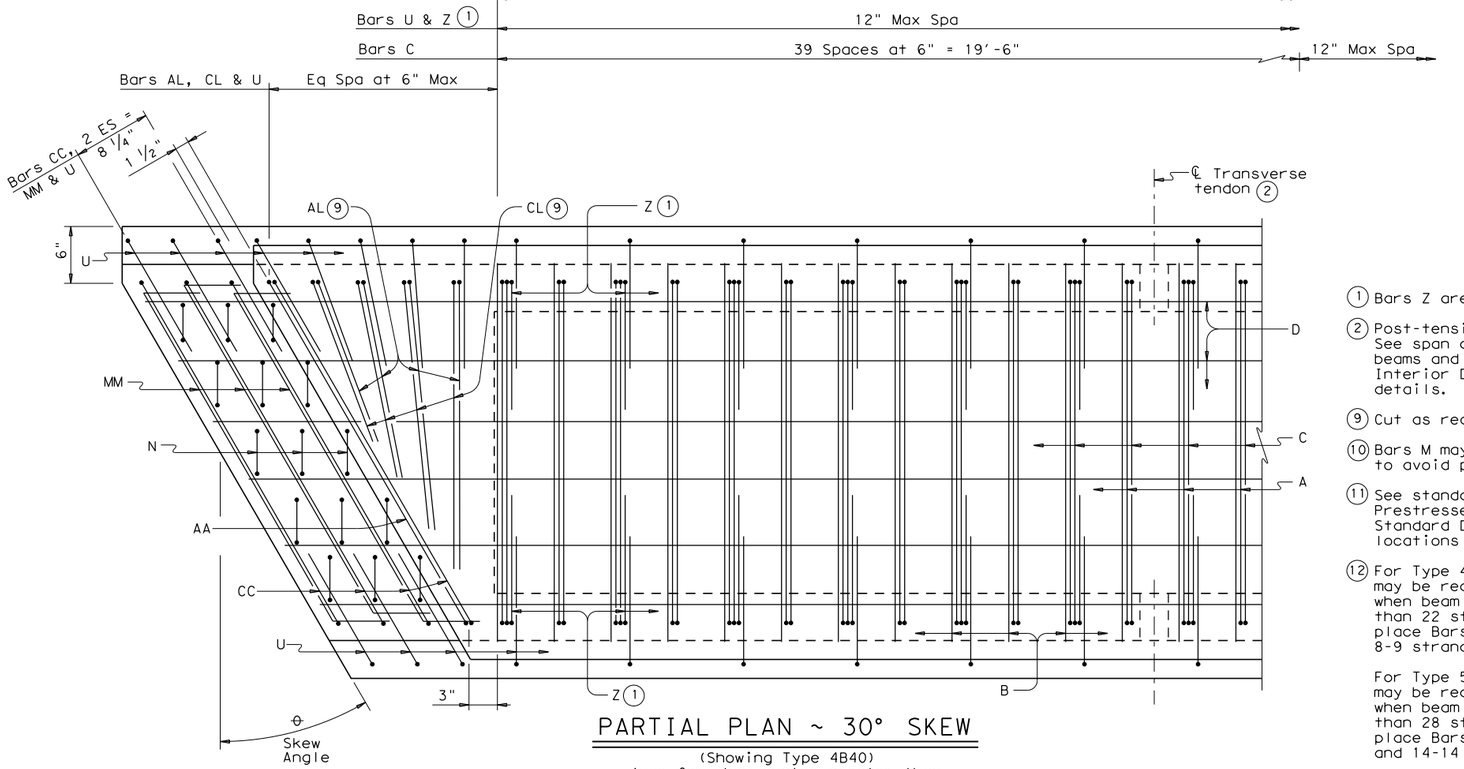
FILE: bbstds04.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
01-12: Bars Z.	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		86

DATE:
FILE:



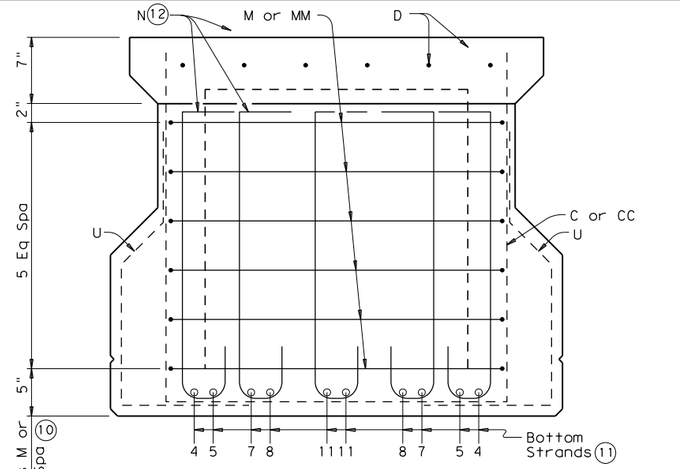
PARTIAL PLAN ~ 15° SKEW

(Showing Type 4B40)
(use for skew angles of 15° or less)



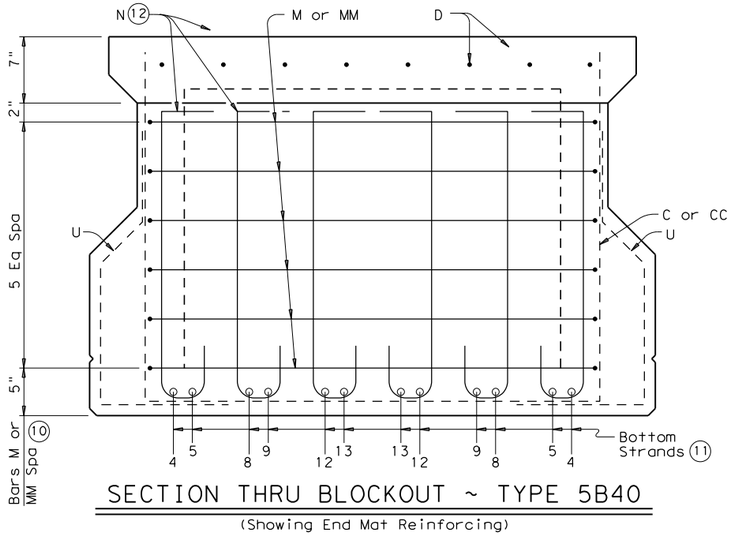
PARTIAL PLAN ~ 30° SKEW

(Showing Type 4B40)
(use for skew angles greater than 15° and less than or equal to 30°)



SECTION THRU BLOCKOUT ~ TYPE 4B40

(Showing End Mat Reinforcing)



SECTION THRU BLOCKOUT ~ TYPE 5B40

(Showing End Mat Reinforcing)

(1) Bars Z are required for beams topped with a cast-in-place concrete slab only.

(2) Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. See "Blockout, Interior Diaphragm, and Drain Details". Form 3" Dia holes in interior beams. See Standard BBPT for details.

(9) Cut as required to maintain one inch clear between bars.

(10) Bars M may be adjusted vertically as required to avoid pretensioning strands in web.

(11) See standard BBND or appropriate Prestressed Concrete Box Beam Standard Designs sheet for locations of pretensioning strands.

(12) For Type 4B40 Box Beams: Bars N may be reduced to 4 bars per row when beam design contains fewer than 22 strands. In this case, place Bars N at the 5-6 and 8-9 strand locations.

For Type 5B40 Box Beams: Bars N may be reduced to 5 bars per row when beam design contains fewer than 28 strands. In this case, place Bars N at the 4-5, 9-10 and 14-14 strand locations.

HL93 LOADING

Texas Department of Transportation

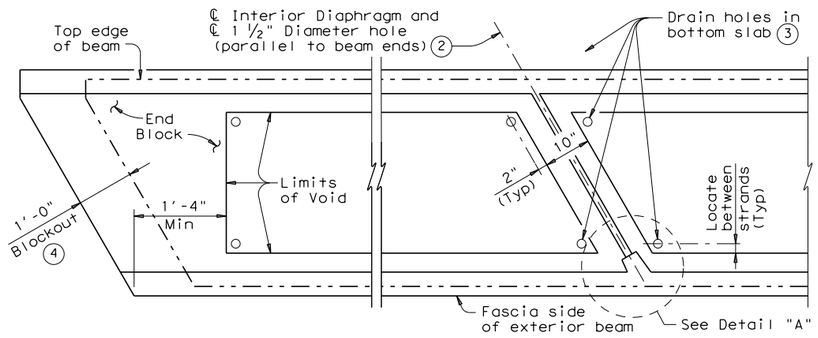
Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B40)

BB-B40

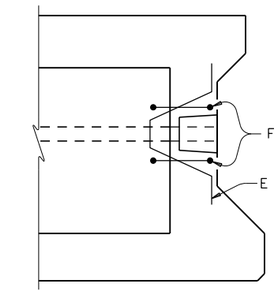
FILE: bbstds04.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
01-12: Bars Z.	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		87

DATE:
FILE:

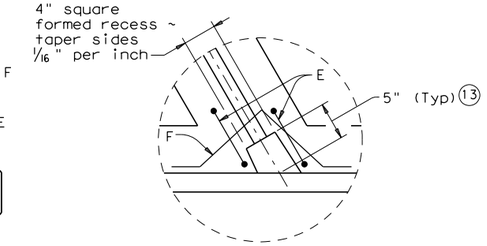


BLOCKOUT, INTERIOR DIAPHRAGM AND DRAIN DETAILS

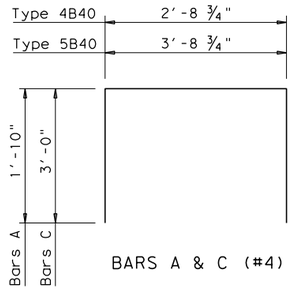
(Showing 30° skew)



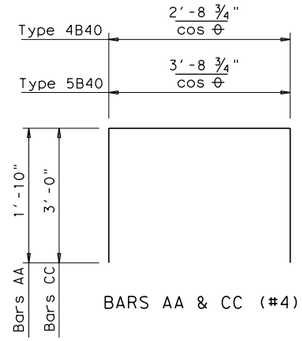
POST-TENSION ANCHORAGE DETAIL



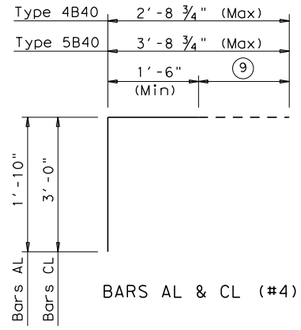
DETAIL A



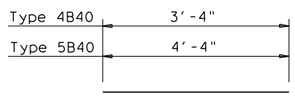
BARS A & C (#4)



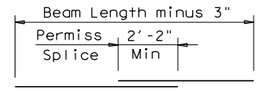
BARS AA & CC (#4)



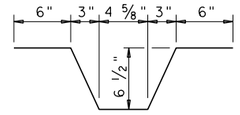
BARS AL & CL (#4)



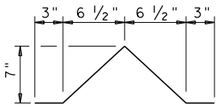
BARS B (#4)



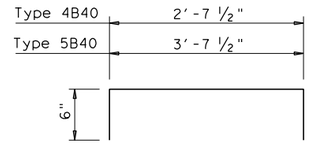
BARS D (#5)
Permissible splices to be placed in middle third of span



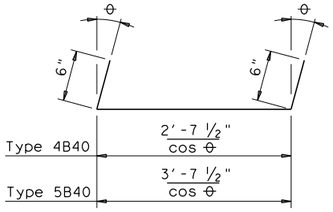
BARS E (#4)



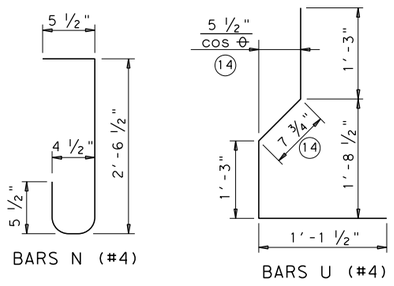
BARS F (#4)



BARS M (#4)

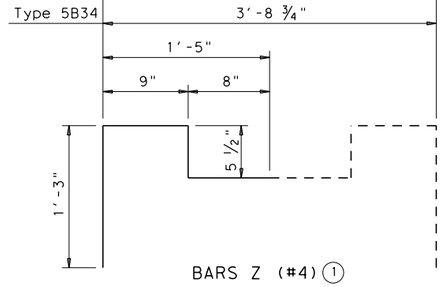


BARS MM (#4)



BARS N (#4)

BARS U (#4)



BARS Z (#4) (1)

At fabricator's option, Bars Z pairs may be fabricated using one continuous bar. If this option is used, Bars B at Bar Z locations (only) may be omitted.

(1) Bars Z are required for beams topped with a cast-in-place concrete slab only.

(2) Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. Form 3" Dia holes in interior beams. See "Blockout, Interior Diaphragm, and Drain Details". See standard BBPT for details.

(3) Place drain holes (1" Dia PVC Sch 40 Pipe) as shown in all beam void corners including each side of interior diaphragms. See "Blockout, Interior Diaphragm, and Drain Details".

(4) Blockouts required at ends of all beams. Extend beam reinforcement into blockouts.

(9) Cut as required to maintain one inch clear between bars.

(13) 5" (Typ) or sufficient depth to provide 1" Cover on cut-off tendon. See BBPT for details.

(14) Dimension will vary slightly with skew. Adjust as necessary.

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Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B40)

BB-B40

FILE: bbstds04.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
01-12: Bars Z.	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		88

DATE:
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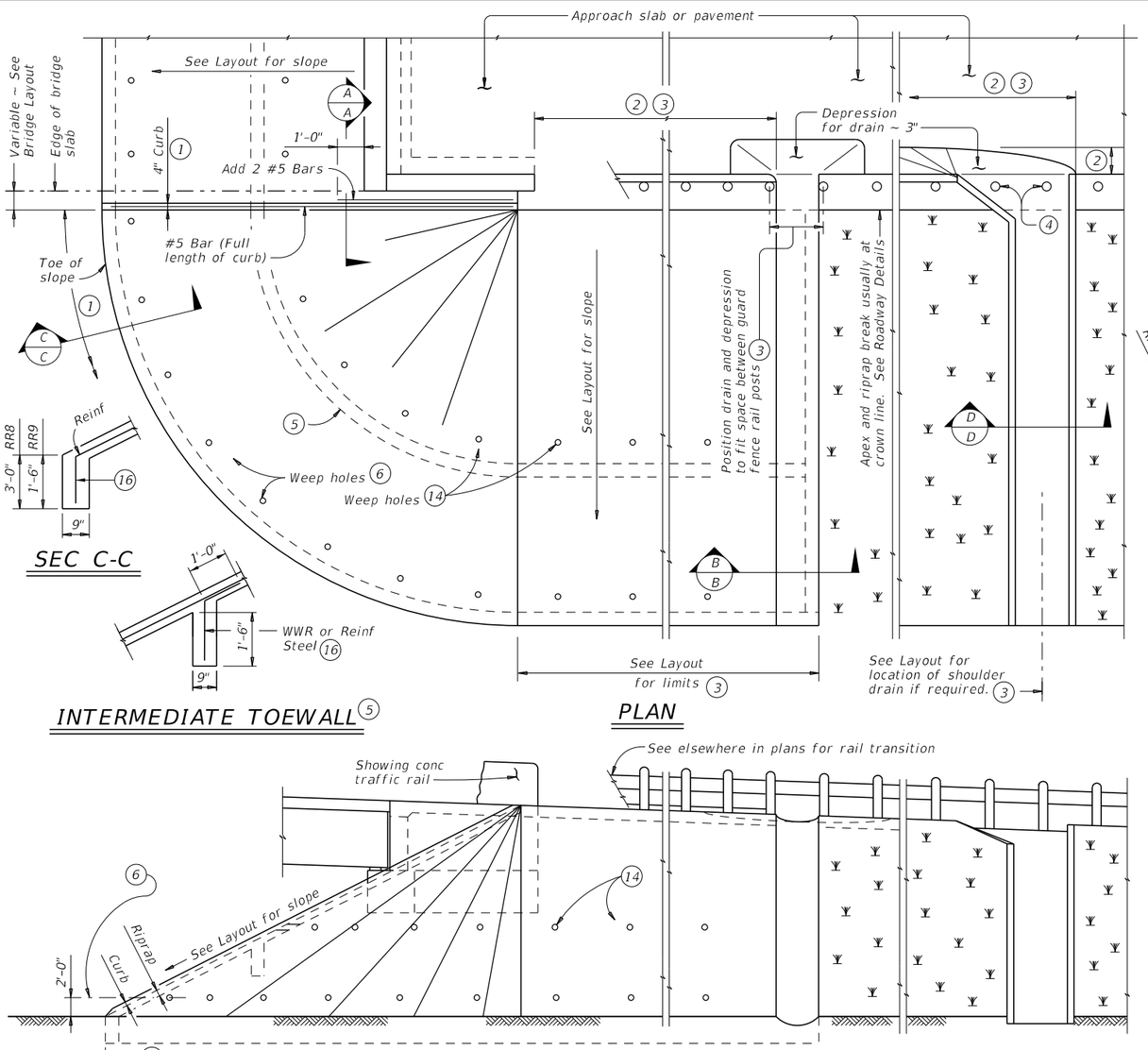
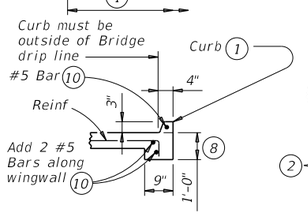


PLAN

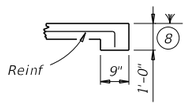
SEC C-C

INTERMEDIATE TOEWALL

ELEVATION

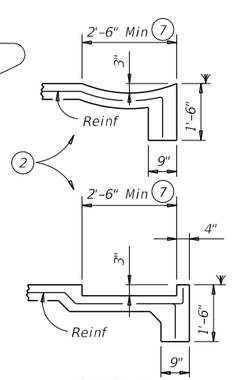


SEC A-A



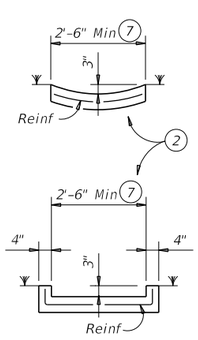
SEC B-B

(No drain)



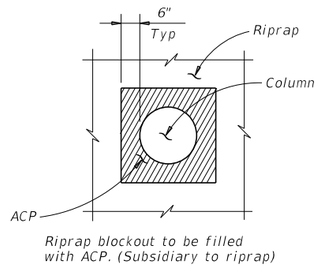
SEC B-B

(Shoulder drain integral with riprap)



SEC D-D

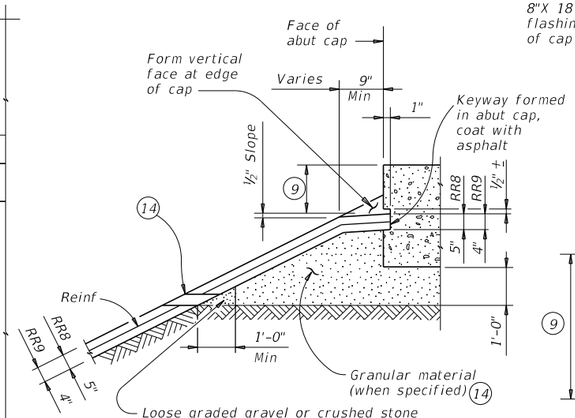
(Shoulder drain)



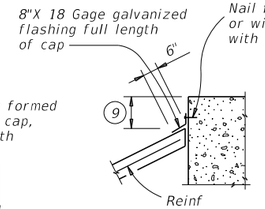
Riprap blockout to be filled with ACP. (Subsidiary to riprap)

RIPRAP DETAIL AT COLUMNS

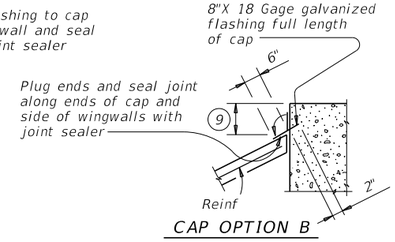
(As directed by the Engineer)



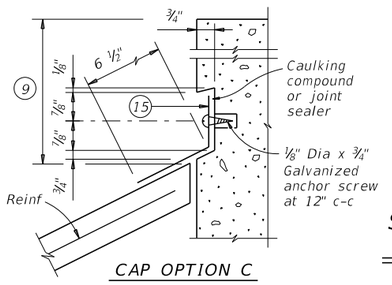
SHOWING KEYWAY OPTION



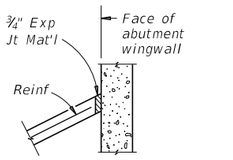
CAP OPTION A



CAP OPTION B

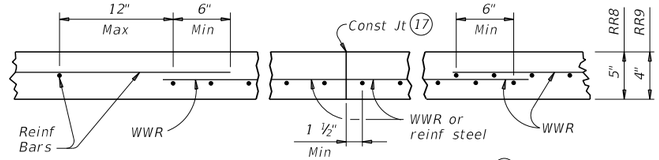


CAP OPTION C



SECT THRU RIPRAP AT WINGWALL (12)

SECTIONS THRU RIPRAP AT CAP (11)



REINFORCEMENT DETAILS (13)

See General Notes for optional synthetic fiber reinforcement.

1. When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.
2. Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.
3. Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.
4. See details elsewhere in plans for installation of guard fence posts through concrete riprap.
5. Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.
6. Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.
7. Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.
8. Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.
9. Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.
10. #5 bars shown are required even when synthetic fiber reinforcing option is selected.
11. Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.
12. Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.
13. Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D2.9xD2.9 or D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.
14. If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.
15. 8" x 18 Gage Galv Sheet Metal
16. Provide WWR or #3 bars, with 1'-0" extension into slope.
17. WWR or reinforcing steel is continuous through riprap construction joints. Provide WWR or reinforcing steel that extends 1'-1" minimum into adjacent riprap on each side of construction joint even if synthetic reinforcing fiber is utilized.

FOR CONTRACTOR'S INFORMATION ONLY:
5" of RR8 = 0.015 CY/SF
4" of RR9 = 0.012 CY/SF
#3 Reinf at 18" c-c = 0.501 Lbs/SF
6x6-D3xD3 = 0.408 Lbs/SF

GENERAL NOTES:

Provide Class "B" concrete (f'c = 2,000 psi) unless noted elsewhere in plans.

Provide Grade 60 reinforcing steel.

Provide deformed welded wire reinforcement (WWR) meeting ASTM A1064, unless otherwise shown.

Provide reinforcing bars, deformed WWR, or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.

Optionally synthetic fibers may be used if approved by the Engineer. Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete.

Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.

Hardware cloth, loose grade stone behind weep holes, flashing, or other sealing material are subsidiary to the bid item "Riprap".

See Layout for limits of riprap.

RR8 is to be used on stream crossings.

RR9 is to be used on other embankments.

Texas Department of Transportation

Bridge Division Standard

CONCRETE RIPRAP AND SHOULDER DRAINS
EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)

CRR

FILE: crrstde1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		89

DATE:
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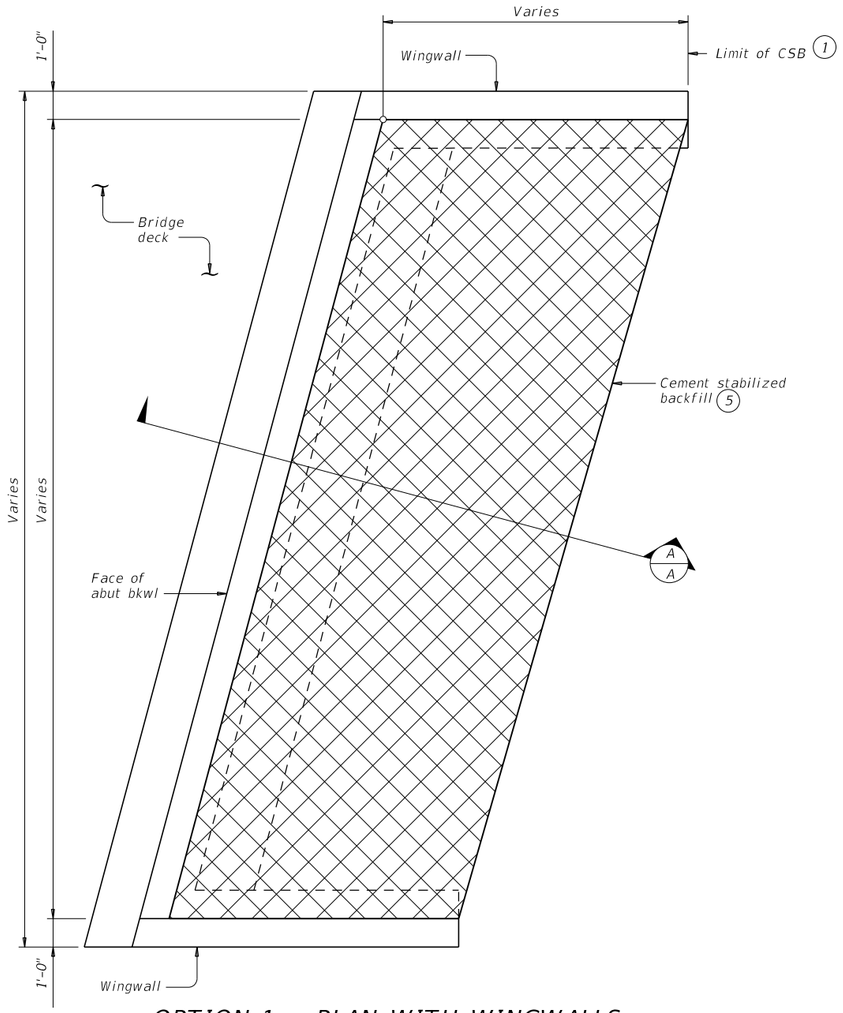
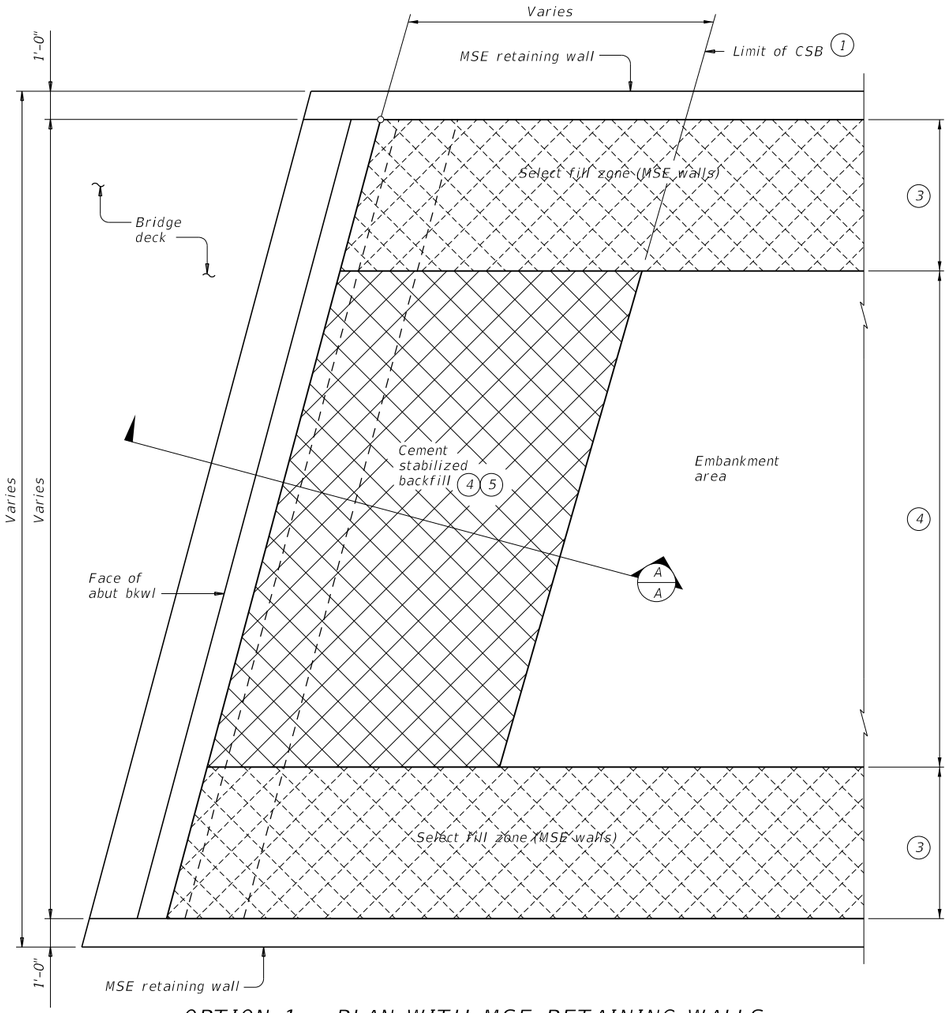
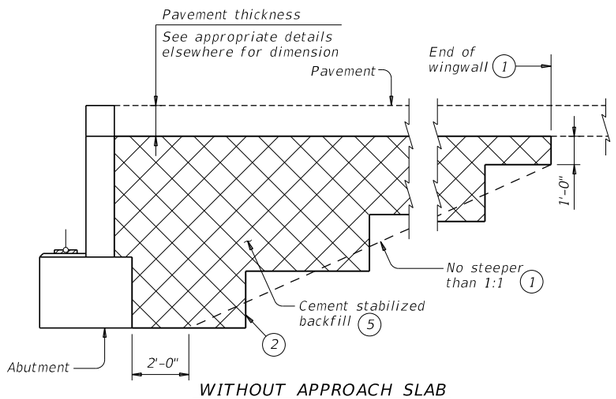


OPTION 1 ~ PLAN WITH WINGWALLS

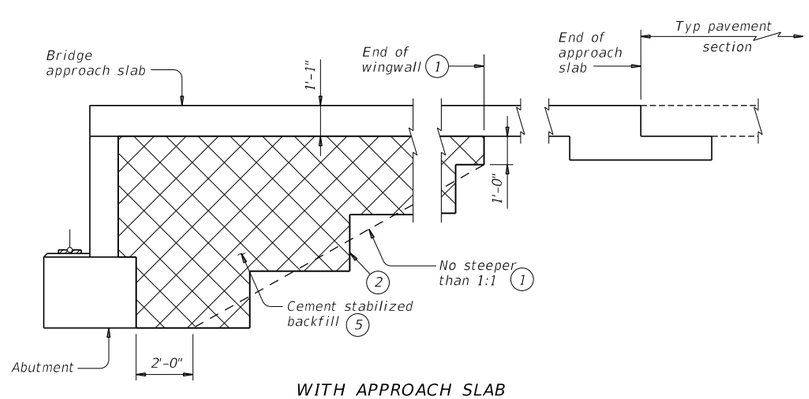
Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



WITHOUT APPROACH SLAB



WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

(1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.

(2) Bench backfill as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.

(4) When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.

(5) If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 2 is intended for new construction requiring high plasticity embankment fill with a plasticity index (PI) greater than 30 or pavement built in poor native soil. Poor soils are defined as high plasticity clays or expansive clays. Option 1 is intended for construction only requiring PI controlled embankment fill or excavation in competent soils/rocks in order to construct the abutment.

Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Backfill meeting the requirements of Item 401, "Flowable Backfill", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

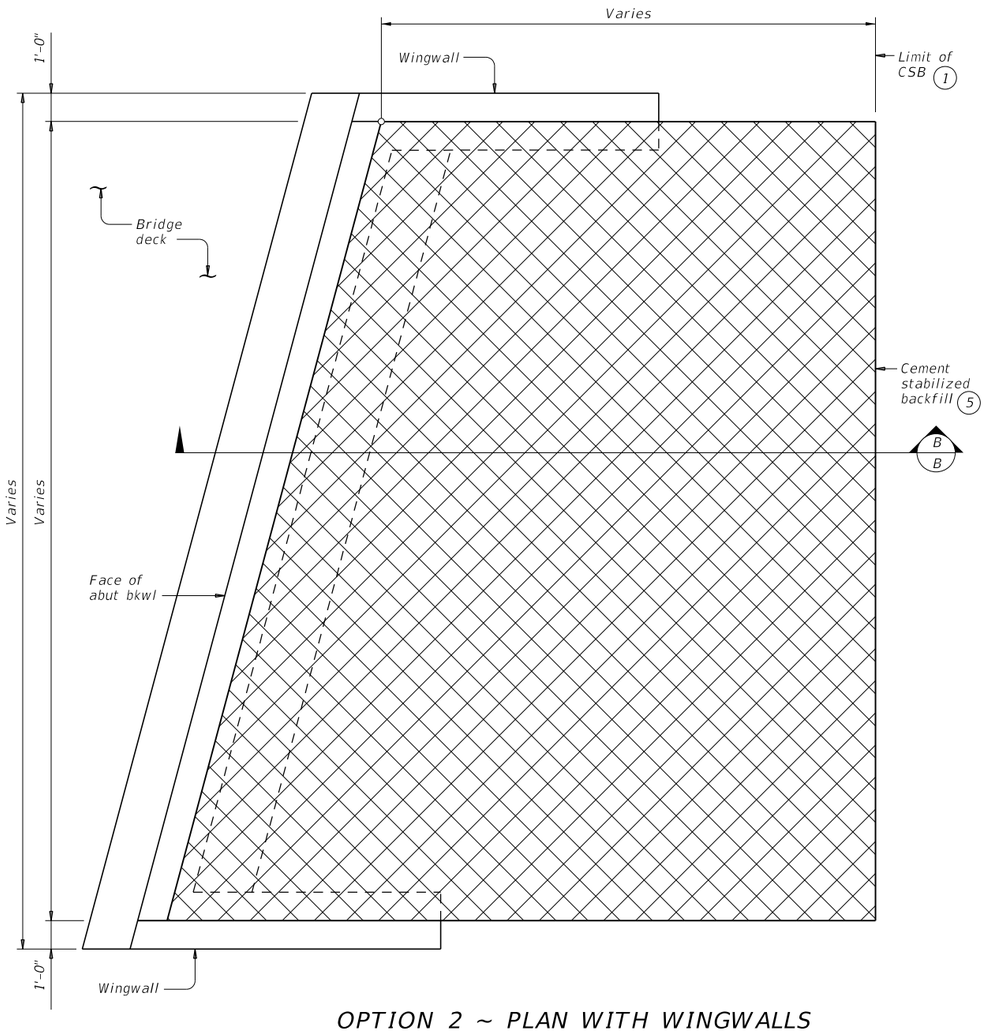
CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

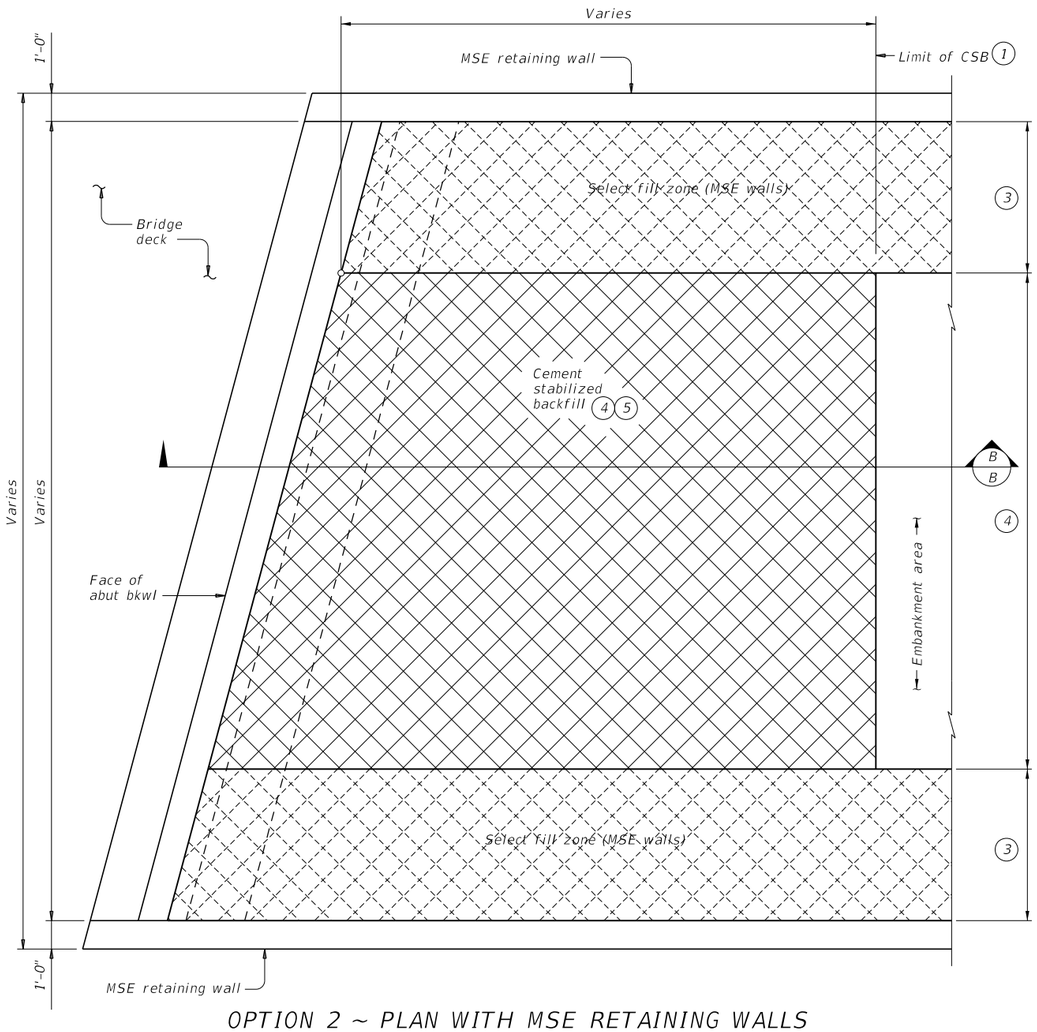
FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		90

DATE:
FILE:



OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

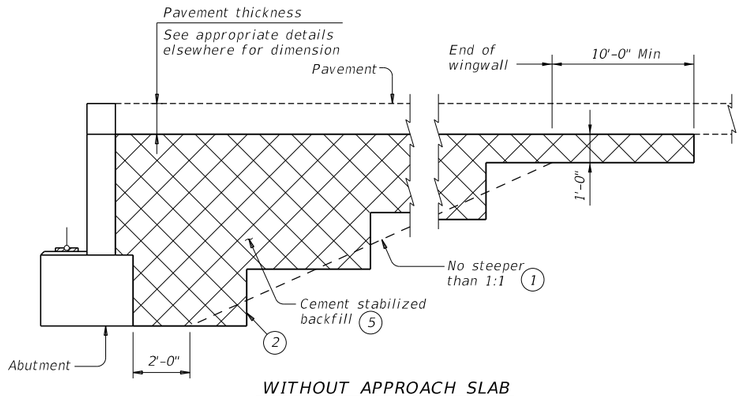
(1) *Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.*

(2) *Bench backfill as shown with 12" (approximate) bench depths.*

(3) *Where MSE retaining walls are present, adjust CSB limits to accommodate the select fill zone. See retaining wall details for additional information.*

(4) *When distance between select fill zones is less than 5'-0", MSE select fill may be substituted for cement stabilized backfill with approval from the Engineer.*

(5) *If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:*
a). If flowable backfill is to be placed over MSE backfill then a filter fabric will be placed over the MSE backfill prior to placement of the flowable fill; and
b). Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).



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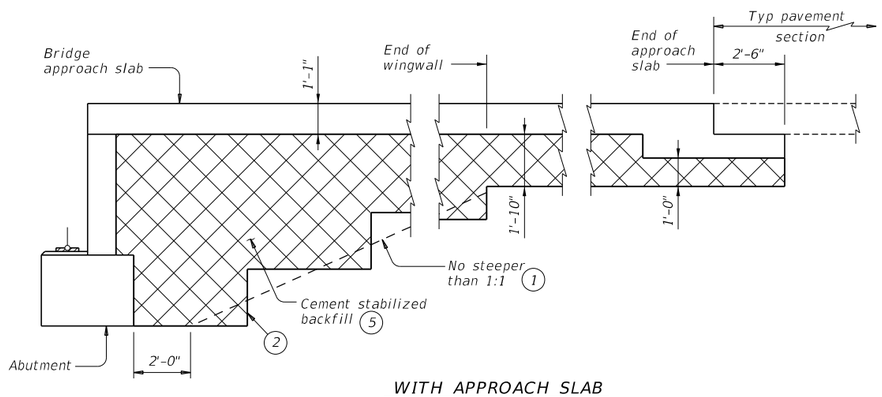


WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

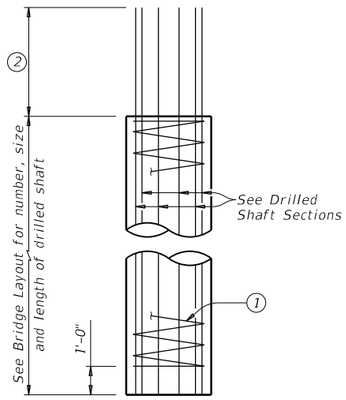
CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

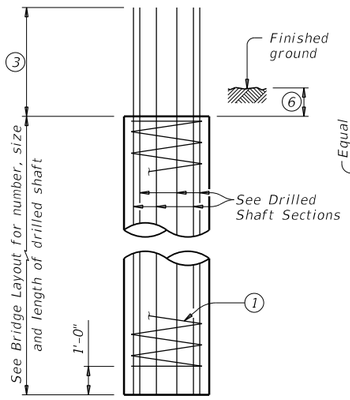
CSAB

FILE: csabste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
02-20: Added Option 2.	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		91

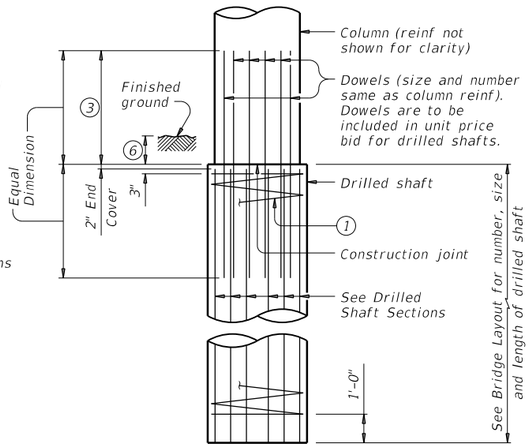
DATE:
FILE:



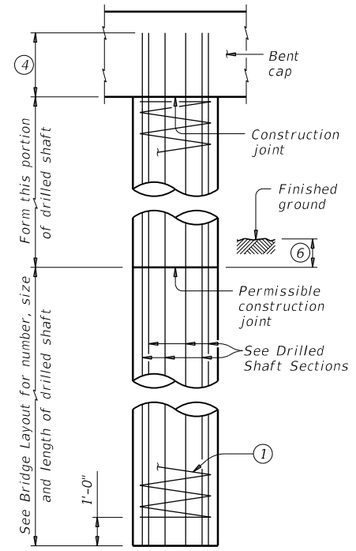
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



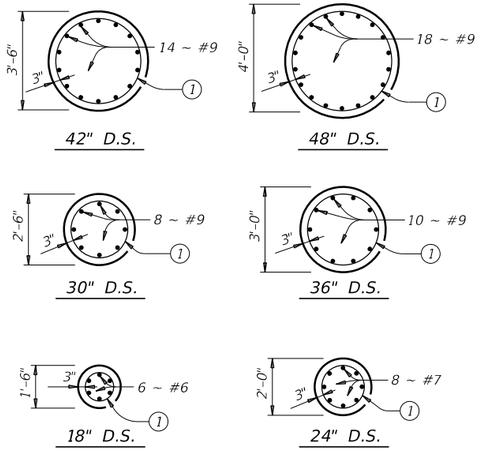
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

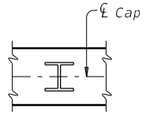


DRILLED SHAFT SECTIONS

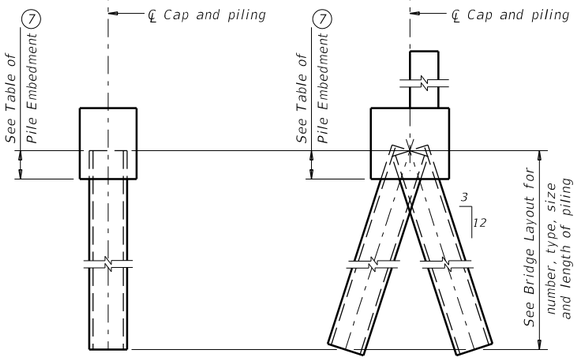
DRILLED SHAFT DETAILS

TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



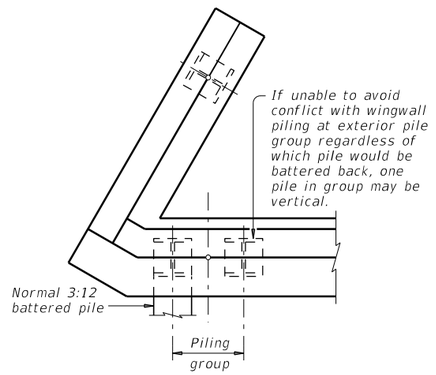
ORIENTATION OF STEEL H-PILING



VERTICAL PILE BATTERED PILE

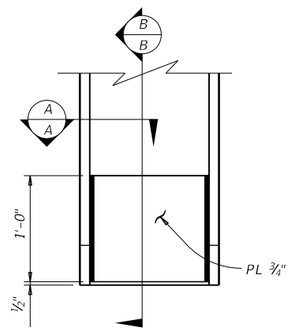
PILING DETAILS

(Concrete or steel H)

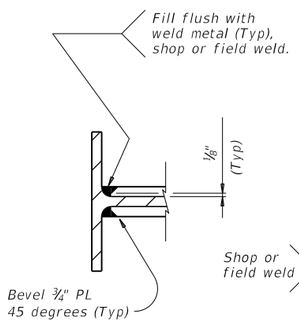


DETAIL "A"

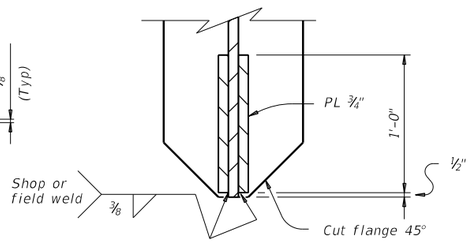
(Showing plan view of a 30° skewed abutment)



ELEVATION



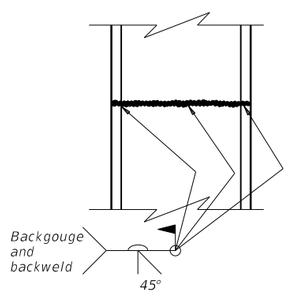
SECTION A-A

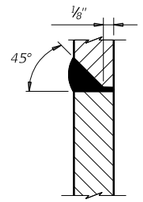


SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.





SECTION THRU FLANGE OR WEB

STEEL H-PILE SPLICE DETAIL

Use when required.

(1) #3 spiral at 6" pitch (one and a half flat turns top and bottom).

(2) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"

(3) Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(4) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"

(5) Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

Texas Department of Transportation

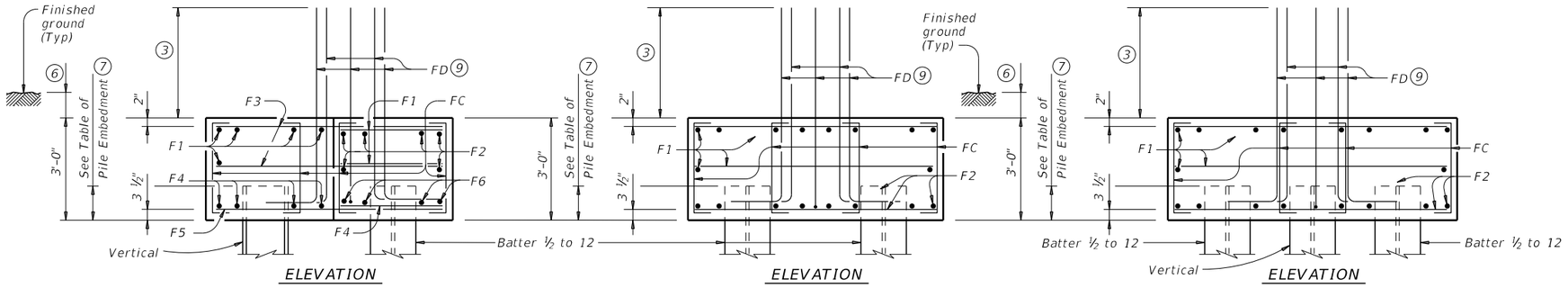
Bridge Division Standard

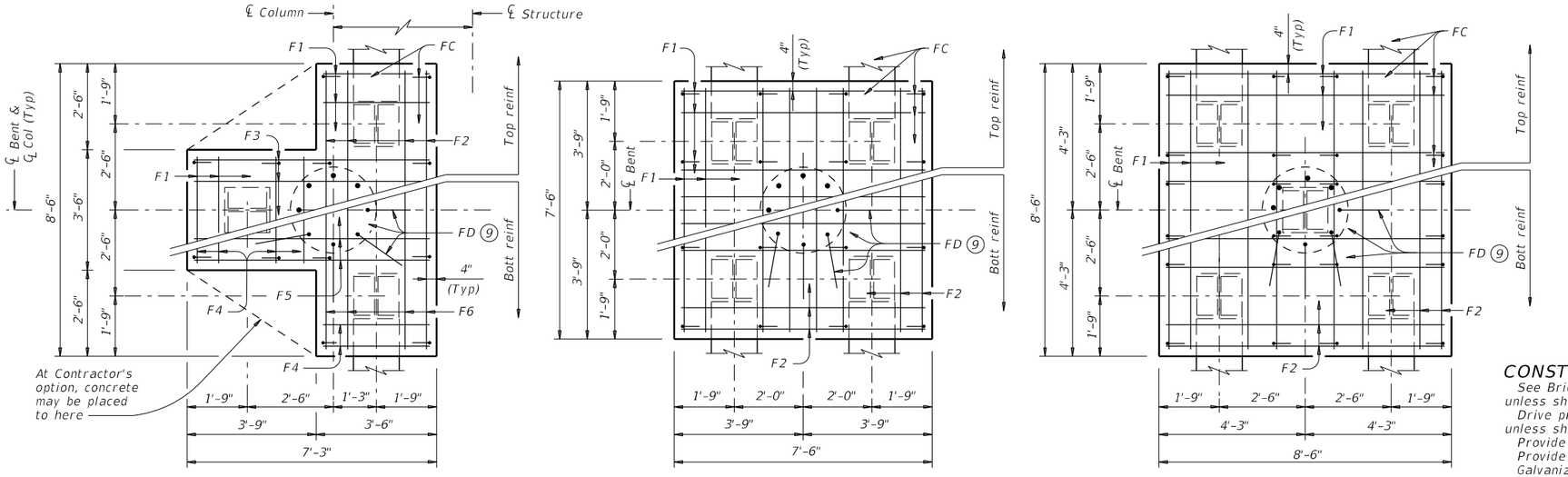
COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		92

DATE:
FILE:





THREE PILE FOOTING (8)

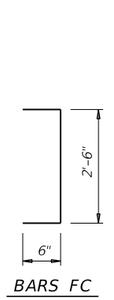
For 36" Dia and smaller columns.

FOUR PILE FOOTING (8)

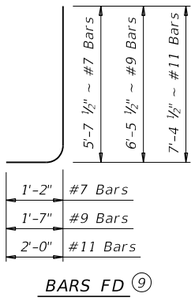
For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.



BARS FC



BARS FD (9)

(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

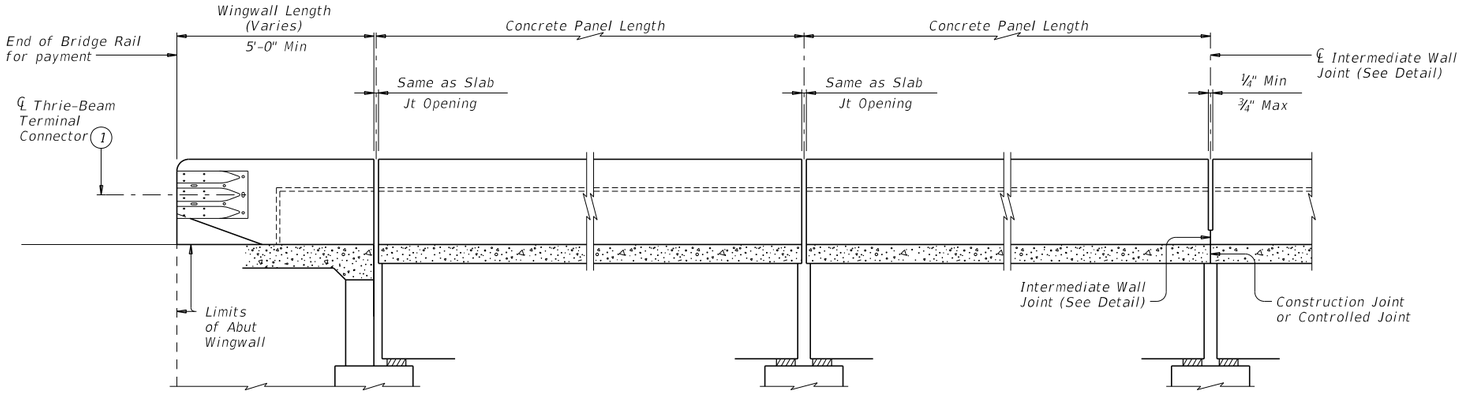
Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

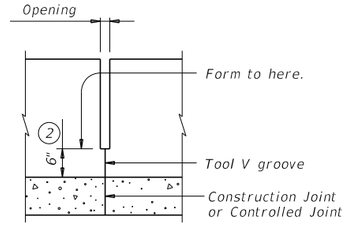
FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		93

DATE:
FILE:



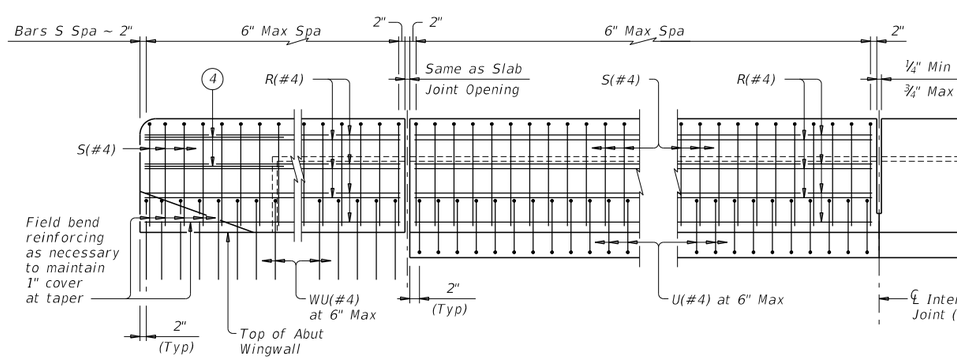
AT ABUTMENTS | AT BENTS WITH SLAB EXP JOINTS | AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL

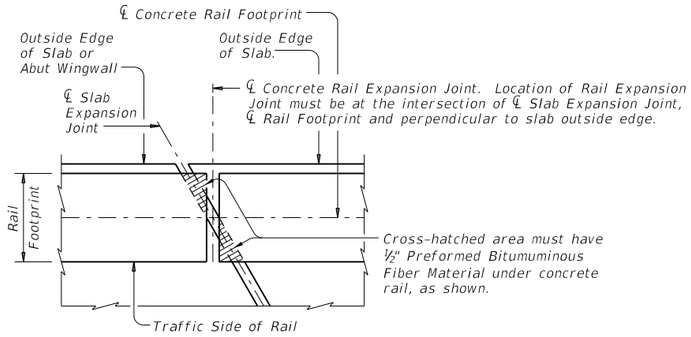


INTERMEDIATE WALL JOINT DETAIL

Provide at all interior bents without slab expansion joints.



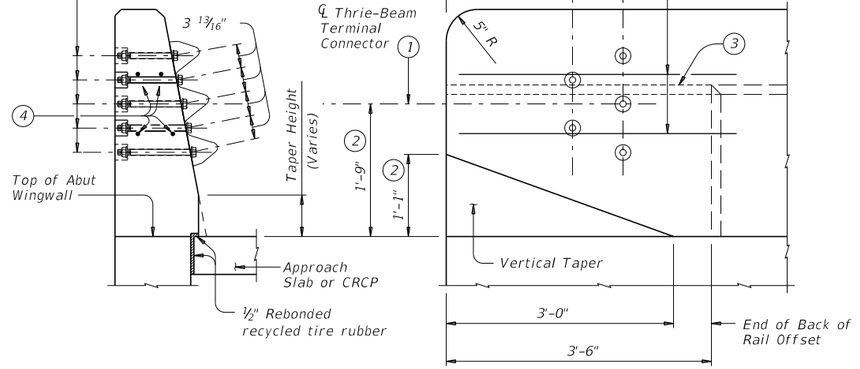
ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT



PLAN OF RAIL AT EXPANSION JOINTS

Example showing Slab Expansion Joints without breakbacks.

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



SECTION | ELEVATION

TERMINAL CONNECTION DETAILS

1. Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
2. Increase 2" for structures with Overlay.
3. Back of rail offset may, with Engineer's approval, be continued to the end of the railing.
4. Place 4 additional Bars R(#4) 3'-8" in length inside Bars S(#4) and centered 2'-0" from end of rail when Terminal Connections are required.

Texas Department of Transportation | Bridge Division Standard

TRAFFIC RAIL
SINGLE SLOPE

TYPE SSTR

FILE: rlstd014-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		94

DATE:
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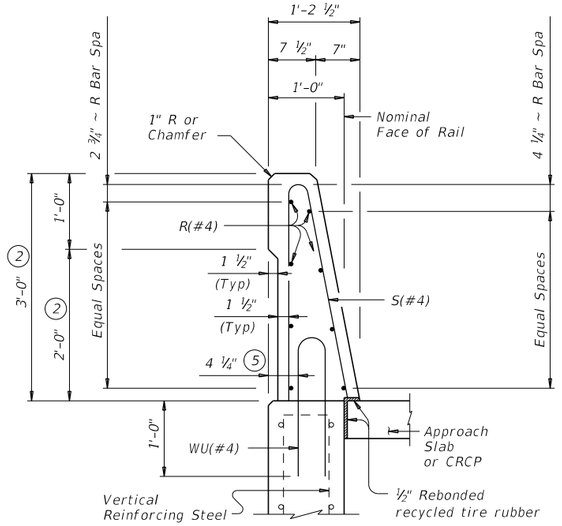
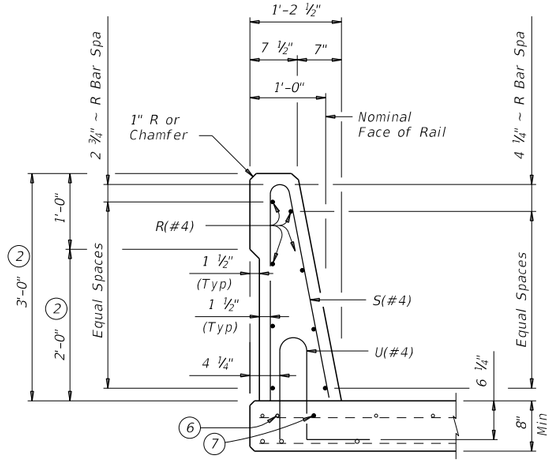


ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



ON BRIDGE SLAB

SECTIONS THRU RAIL

(2) Increase 2" for structures with Overlay.

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

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

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

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

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

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

CONSTRUCTION NOTES:

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

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

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

MATERIAL NOTES:

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

Provide Grade 60 reinforcing steel.

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

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

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #4 = 1'-7"

Epoxy coated ~ #4 = 2'-5"

GENERAL NOTES:

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

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

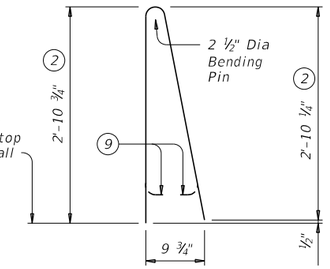
Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Shop drawings will not be required for this rail.

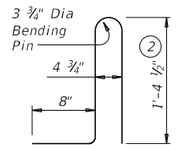
Average weight of railing with no overlay is 376 plf.

Cover dimensions are clear dimensions, unless noted otherwise.

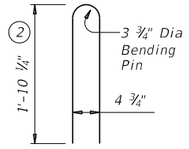
Reinforcing bar dimensions shown are out-to-out of bar.



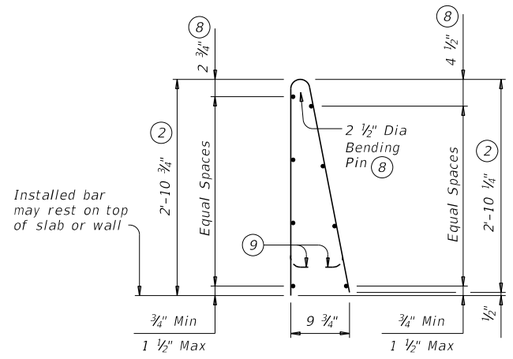
BARS S (#4)



BARS U (#4)

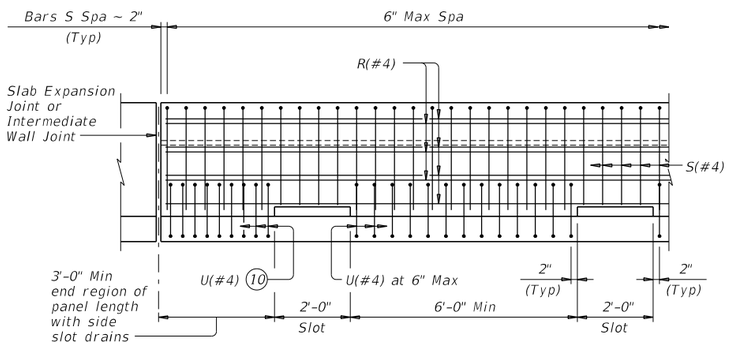


BARS WU (#4)



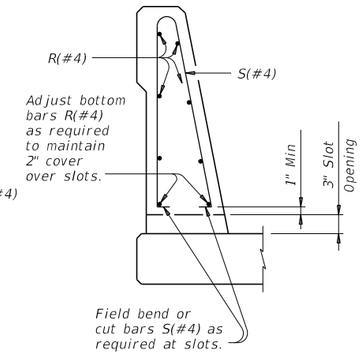
OPTIONAL WELDED WIRE REINFORCEMENT (WWR)

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



OPTIONAL SIDE SLOT DRAIN DETAIL

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



SECTION THRU OPTIONAL SIDE SLOT DRAIN

Texas Department of Transportation

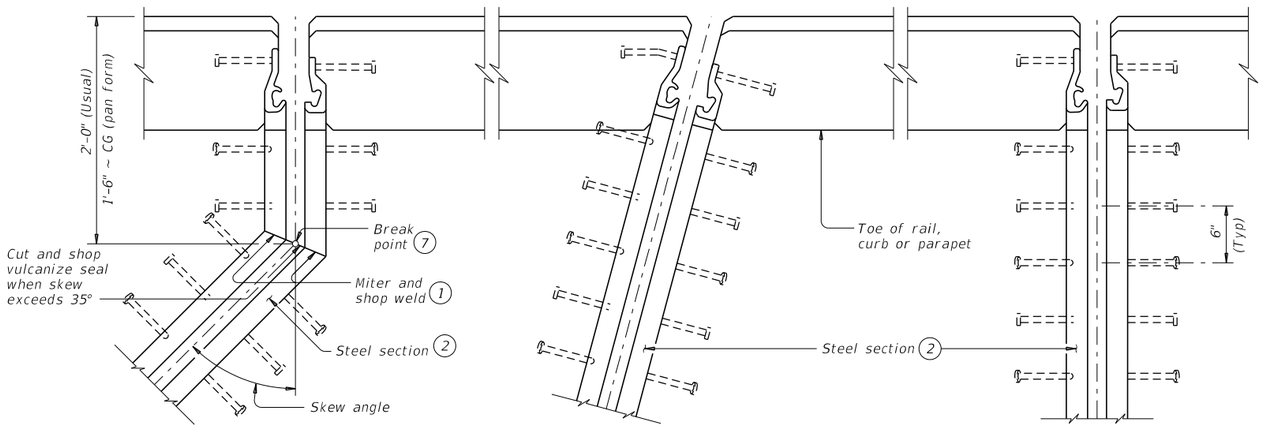
Bridge Division Standard

TRAFFIC RAIL SINGLE SLOPE

TYPE SSTR

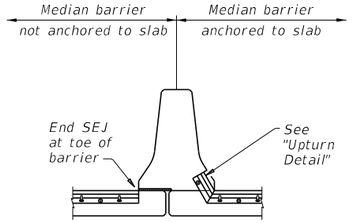
FILE: rlstd014-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		95

DATE:
FILE:

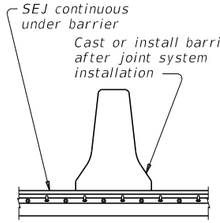


SHOWING SKEWS WITH SLAB BREAKBACKS | SHOWING SKEWS WITHOUT SLAB BREAKBACKS | SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

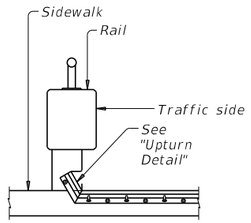
PLANS OF END CONDITIONS



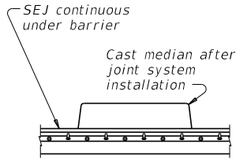
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



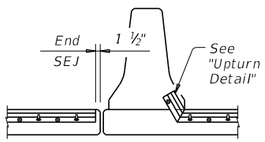
AT MEDIAN BARRIER



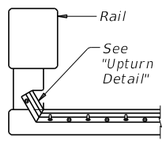
AT SIDEWALK BEHIND BRIDGE RAIL



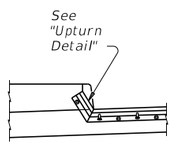
AT RAISED MEDIAN



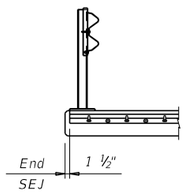
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

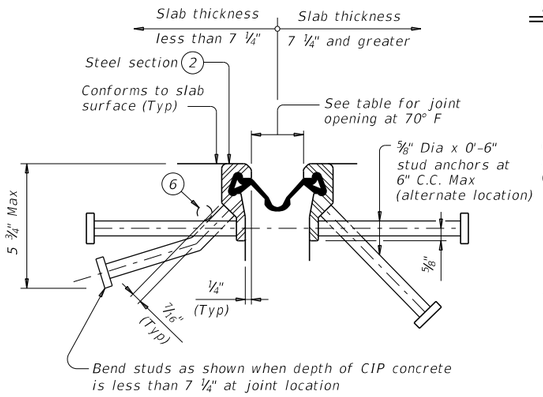


AT SIDEWALK

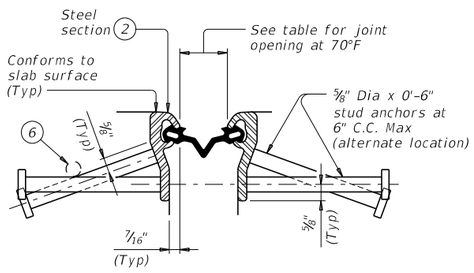


AT STEEL POST BRIDGE RAIL

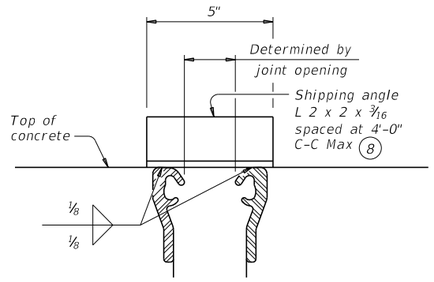
TYPICAL SECTIONS (5)



SECTION THRU WATSON BOWMAN ACME (SE-400 OR SE-500) JOINTS



SECTION THRU D.S. BROWN (A2R-400 OR A2R-XTRA) JOINTS



SHOWING D.S. BROWN (Ty SSCM2)
(All joints are similar.) (Studs are not shown for clarity.)

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (2)	STRIP SEAL			
		4" JOINT		5" JOINT	
		Seal Type	Joint Opening (3)	Seal Type	Joint Opening (3)
D.S. Brown	Type SSCM2	A2R-400	1 ¾"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 ¾"	SE-500	2"

REDUCED LONGITUDINAL MOVEMENT RANGE

SKEW (deg)	JOINT SIZE	
	4"	5"
0	4.0"	5.0"
15	4.0"	5.0"
30	3.5"	4.3"
45	2.8"	3.5"

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

(1) Remove all burrs which will be in contact with seal prior to making splice.

(2) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(3) These openings are also the recommended minimum installation openings.

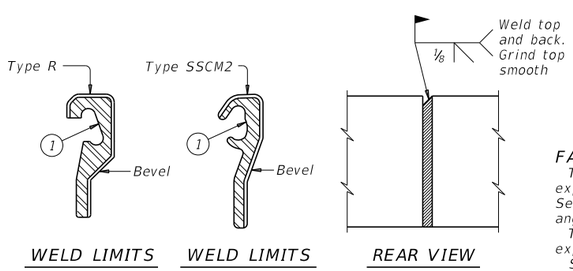
(4) Reduce for sidewalk or parapet heights less than 6".

(5) Other conditions affecting the joint profile should be noted elsewhere.

(6) Move transverse bars that are in conflict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.

(7) See Span details for location of break point.

(8) Align shipping angle perpendicular to joint.



WELD LIMITS | WELD LIMITS | REAR VIEW

FIELD SPLICE DETAIL

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Feild Cleaning and Painting Steel", unless required to galvanize when shown in the plans. Provide galvanizing in accordance with Item 445, "Galvanizing". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:

Secure the sealed expansion joint in position and place to the proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for sealed expansion joint.

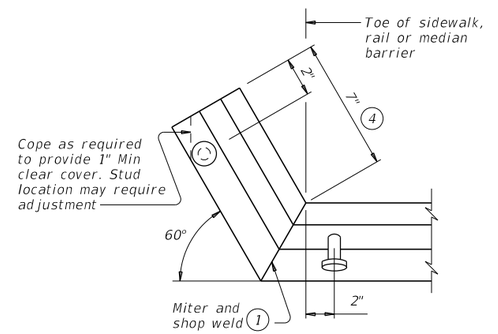
Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-M is 6 ½".



UPTURN DETAIL

Texas Department of Transportation

Bridge Division Standard

SEALED EXPANSION JOINT TYPE M WITHOUT OVERLAY

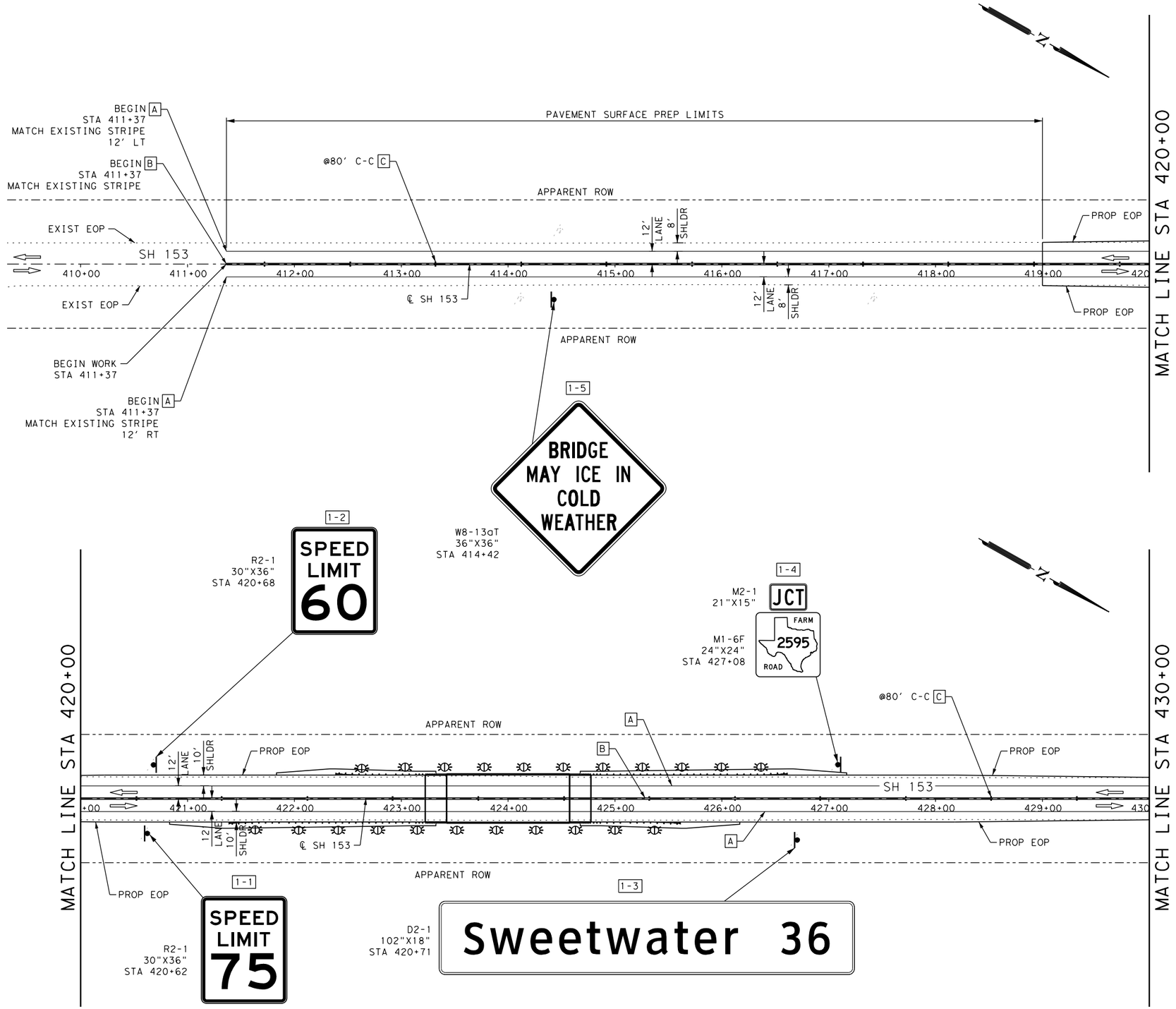
SEJ-M

FILE: sejmste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		96

Plotted on: 10/3/2022

Design Filename: P:\118\79\01\Design\Civil\Traffic\SH153-SPM-01.dgn

ITEM	DESCRIPTION	UNIT	QTY
0644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	3
0644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	1
0644-6031	IN SM RD SN SUP&AM TYS80(1)SA(T-2EXT)	EA	1
0658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	22
0666-6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	3,727
0666-6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	7,452
0666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	3,727
0666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	7,452
0672-6009	REFL PAV MRKR TY II-A-A	EA	94
0678-6001	PAV SURF PREP FOR MRK (4")	LF	7,452



LEGEND

- A 4" SLD (W) STRIPE
- B 4" DBL SLD (Y) STRIPE
- C MRKR TY II A-A
- DELINEATOR(D-SW)SZ1(BRF)GF2(BI)
- TRAFFIC FLOW ARROWS
- SIGN

NOTES

1. FOR ADDITIONAL DETAILS SEE TxDOT TYPICAL STANDARD SHEETS.
2. EXISTING FEATURES ARE SHOWN SCREENED BACK.
3. ALL REFLECTIVE PAVEMENT MARKINGS SHALL RECEIVE A TY I AND TY II APPLICATION.
4. ALL DIMENSIONS ARE TO CENTER OF PAVEMENT MARKINGS, UNLESS OTHERWISE INDICATED.

DESIGN

STATE OF TEXAS · HEATHER McNEAL · 114428 · LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS · JAMES A. LUTZ · 84722 · LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

0 50 100 150

SCALE: 1"= 100'

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SIGNING AND PAVEMENT MARKINGS

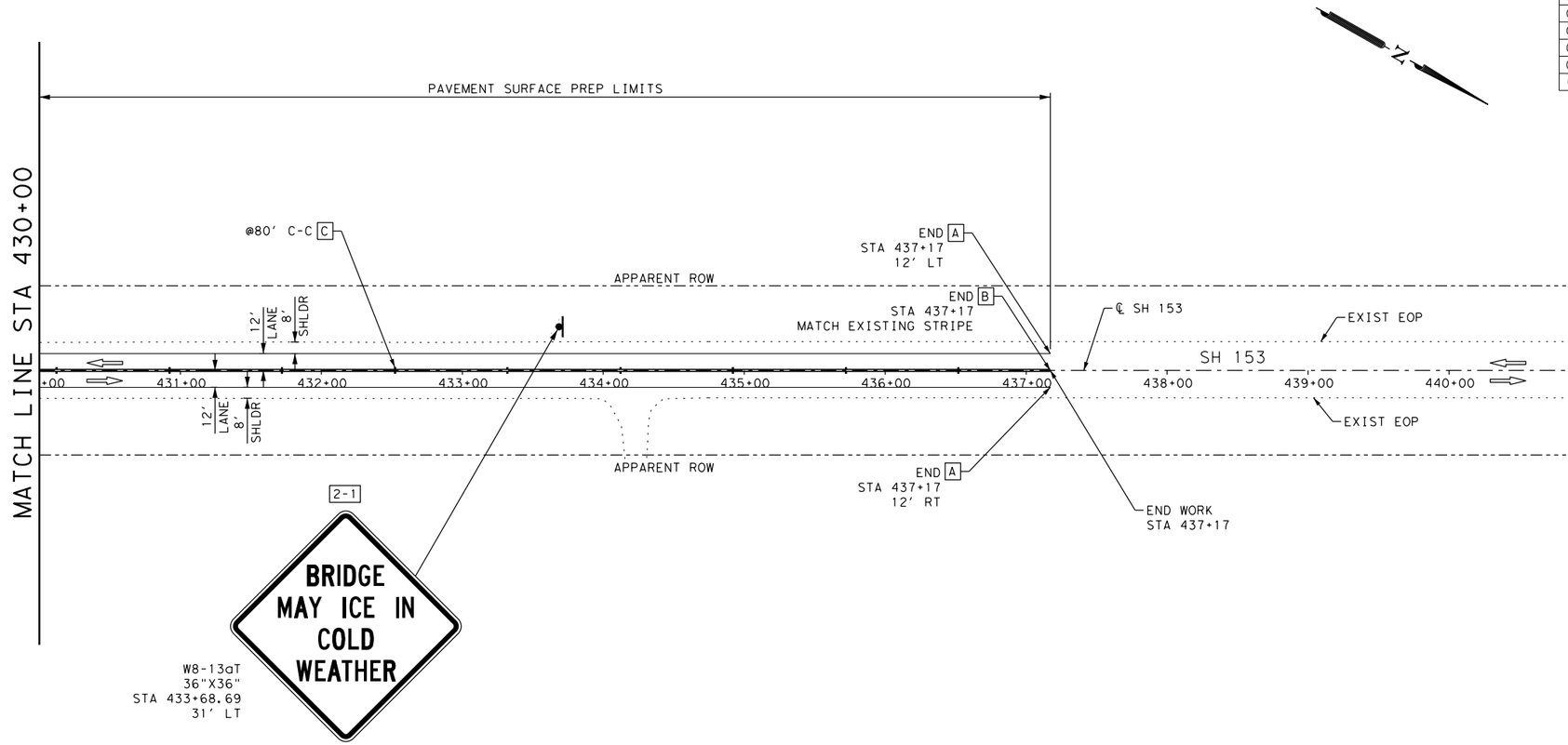
BEGIN WORK TO STA 430+00

SH 153 AT VALLEY CREEK

SHEET 1 OF 2

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	97

ITEM	DESCRIPTION	UNIT	QTY
0644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	1
0666-6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	1,434
0666-6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	718
0666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	1,434
0666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	718
0672-6009	REFL PAV MRKR TY II-A-A	EA	18
0678-6001	PAV SURF PREP FOR MRK (4")	LF	1,434



LEGEND

- A — 4" SLD (W) STRIPE
- B — 4" DBL SLD (Y) STRIPE
- C — MRKR TY II A-A
- TRAFFIC FLOW ARROWS
- SIGN
- DELINEATOR(D-SW)SZ1(BRF)GF2(BI)

NOTES

1. FOR ADDITIONAL DETAILS SEE TxDOT TYPICAL STANDARD SHEETS.
2. EXISTING FEATURES ARE SHOWN SCREENED BACK.
3. ALL REFLECTIVE PAVEMENT MARKINGS SHALL RECEIVE A TY I AND TY II APPLICATION.
4. ALL DIMENSIONS ARE TO CENTER OF PAVEMENT MARKINGS, UNLESS OTHERWISE INDICATED.

DESIGN

STATE OF TEXAS — HEATHER McNEAL — 114428 — LICENSED PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS — JAMES A. LUTZ — 84722 — LICENSED PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

0 50 100 150

SCALE: 1"= 100'

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SIGNING AND PAVEMENT MARKINGS

STA 430+00 TO END WORK

SH 153 AT VALLEY CREEK

SHEET 2 OF 2

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	98

Plotted on: 10/3/2022

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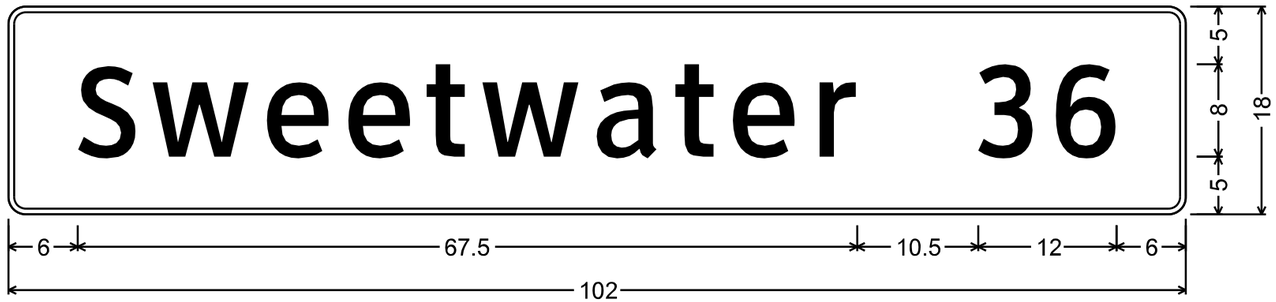

D2-1 8in;
1.5" Radius, 0.5" Border, White on Green;
"Sweetwater", ClearviewHwy-3-W; "36", ClearviewHwy-3-W;

DESIGN

STATE OF TEXAS
HEATHER McNEAL
114428
LICENSED
PROFESSIONAL ENGINEER

HEATHER McNEAL, P.E. — 10/3/2022 DATE

APPROVAL

STATE OF TEXAS
JAMES A. LUTZ
84722
LICENSED
PROFESSIONAL ENGINEER

JAMES A. LUTZ, P.E. — 10/3/2022 DATE

PAPE-DAWSON ENGINEERS
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SH 153 AT VALLEY CREEK

SIGN DETAILS SHEET

DGN: PI	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: AC	6	TEXAS				SH 153
DWG: AC	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: PI	SJT	RUNNELS	0650	03	031	99

Plotted on: 10/3/2022

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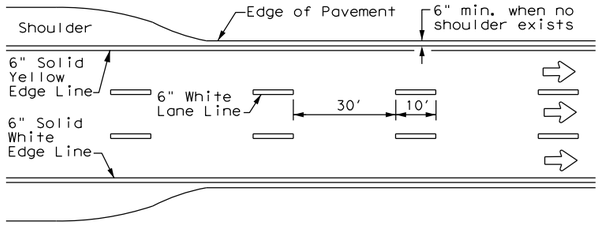
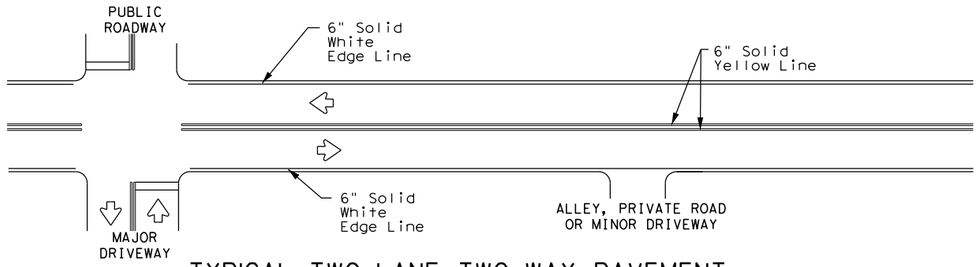
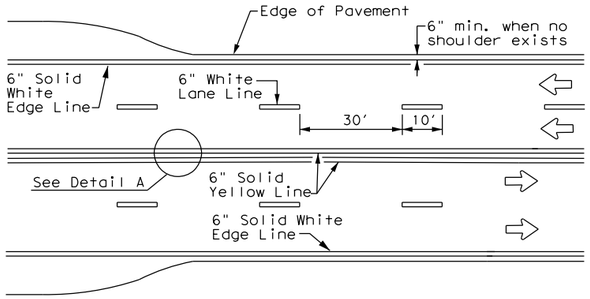
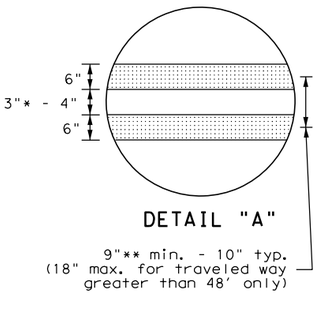


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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

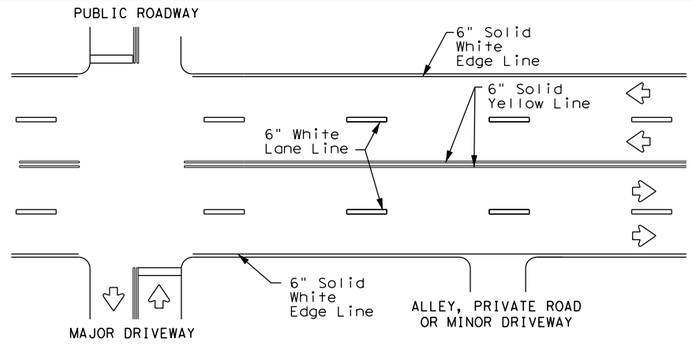




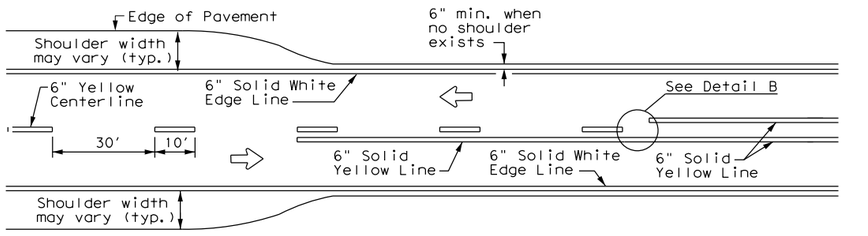
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

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

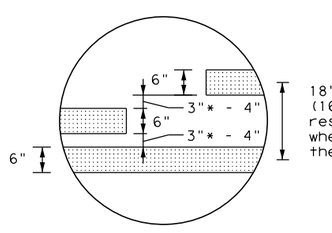
** 8" minimum for restripe projects when approved by the Engineer.



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

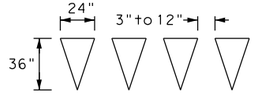


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



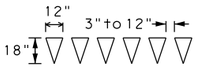
DETAIL "B"

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

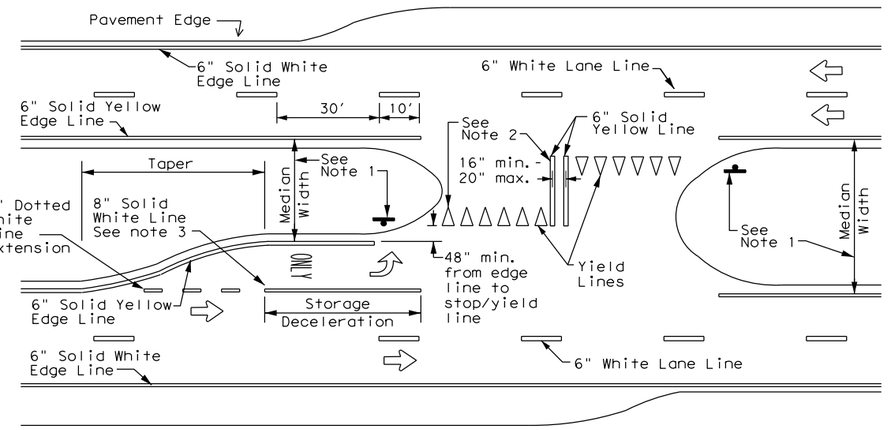


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

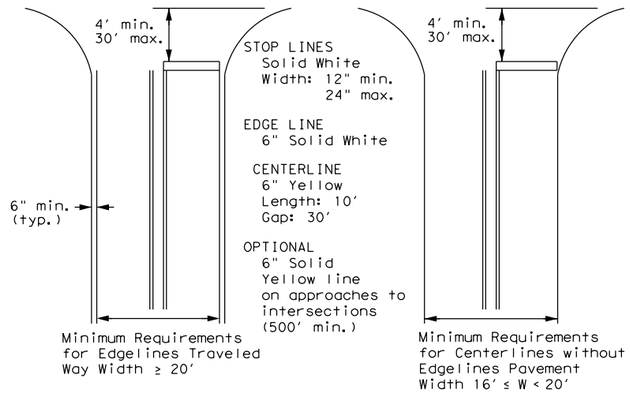
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections.
   Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

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

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



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

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

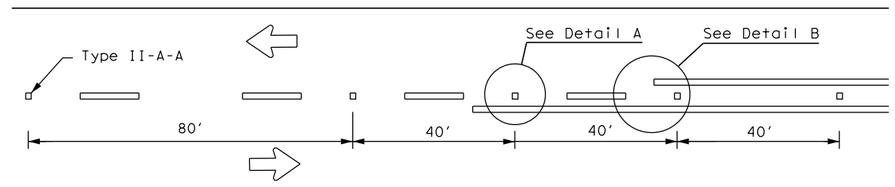
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
11-78 8-00 6-20	DIST	COUNTY		SHEET NO.
8-95 3-03 12-22	SJT	RUNNELS		100
5-00 2-12				

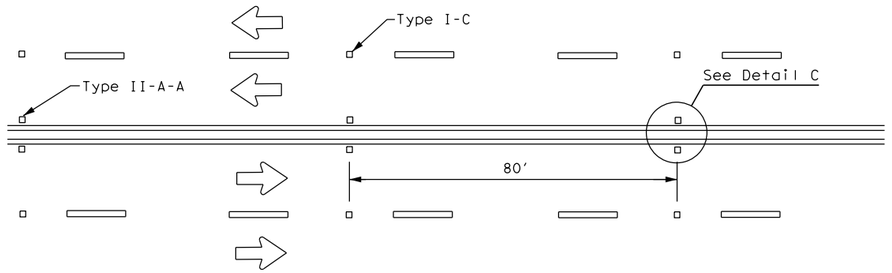
22A

DATE: 6/26/2023 10:36:10 AM
FILE: P:\118\79\01\Design\Civil\Standards\PavementMarkers\pm1-22.dgn

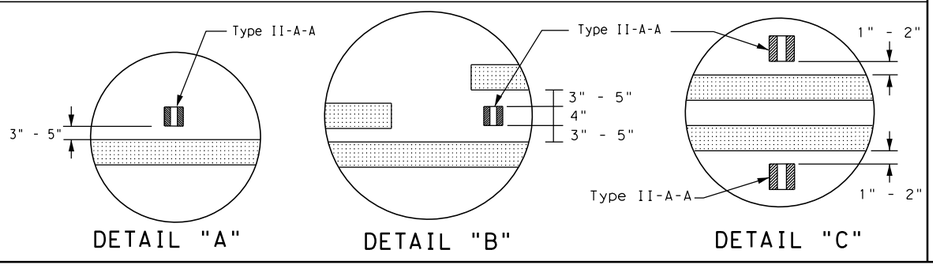
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



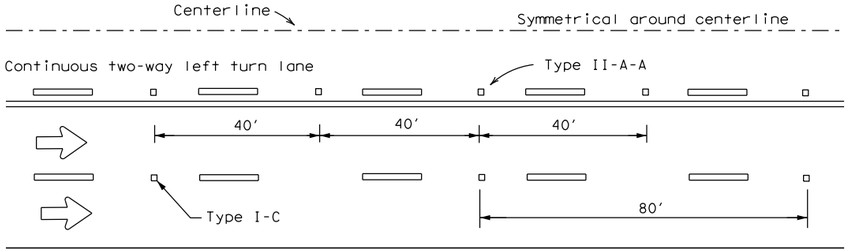
CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



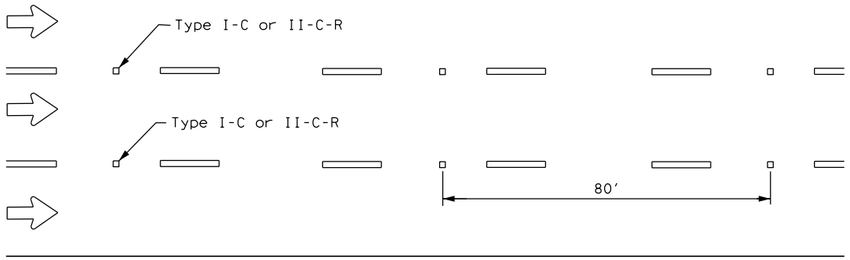
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS



DETAIL "A" DETAIL "B" DETAIL "C"



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



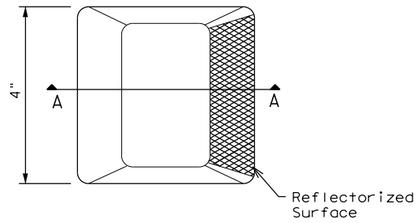
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

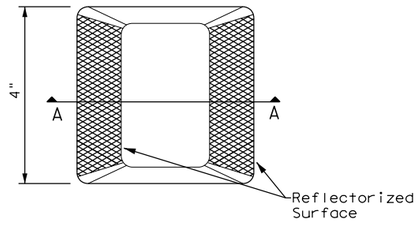
See Note 3.

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

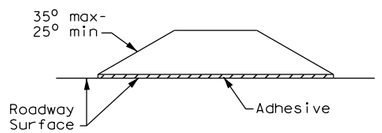
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

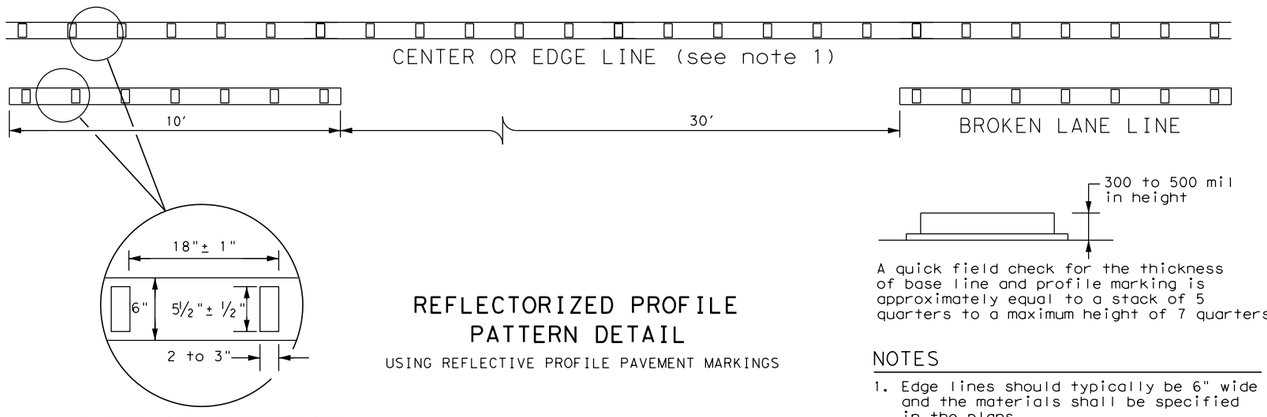


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



6" EDGE LINE, 6" CENTERLINE OR 6" LANE LINE

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

Traffic Safety Division Standard

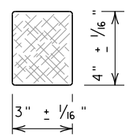
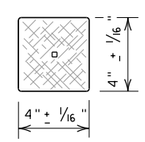
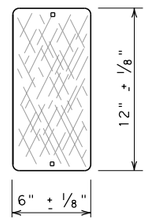
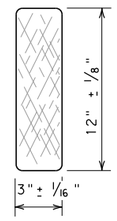
POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-22

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		101

22B

DATE: 6/26/2023 10:36:11 AM
FILE: P:\118779\01\design\Civil\Standards\PavementMarkers\pm2-22.dgn

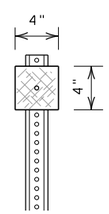
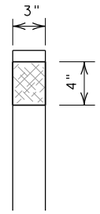
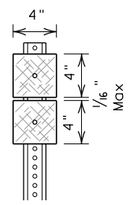
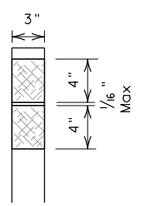
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	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

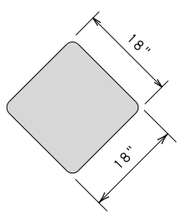
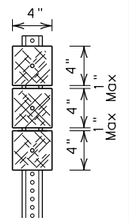
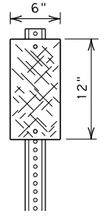
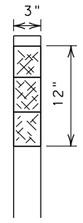
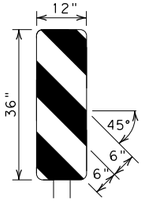
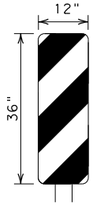
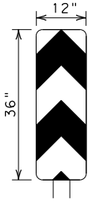
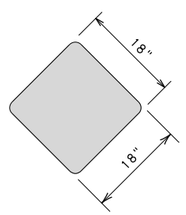
NUMBER OF REFLECTORS OR DIRECTION
- X = 3-Size 2 reflector units (Type 2 only)
- Y = 1-Size 3 reflector unit (Type 2 only)
- Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
- L = Left Side (Type 3 Object Marker only)
- R = Right Side (Type 3 Object Marker only)
- C = Center (Type 3 Object Marker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

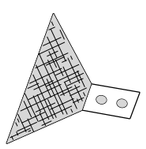
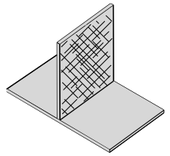
OBJECT MARKERS

	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

DEPARTMENTAL MATERIAL SPECIFICATIONS

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

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			

1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

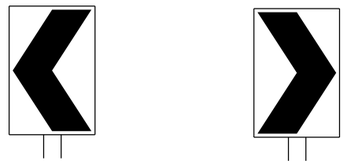
SHEETING: Yellow, White, Red

NOTE

1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.

CHEVRONS

DEVICE



W1-8

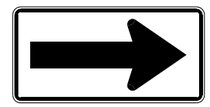
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE

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

ONE DIRECTION LARGE ARROW

DEVICE



W1-6

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

NOTE:

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

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	0650	03	031	SH 153
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	SJT	RUNNELS		102

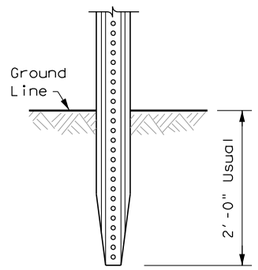
20A

DATE: 10/3/2022 4:13:01 PM
FILE: P:\118V79\01\Design\Civil\Standards\PavementMarkers\dom1-20.dgn

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

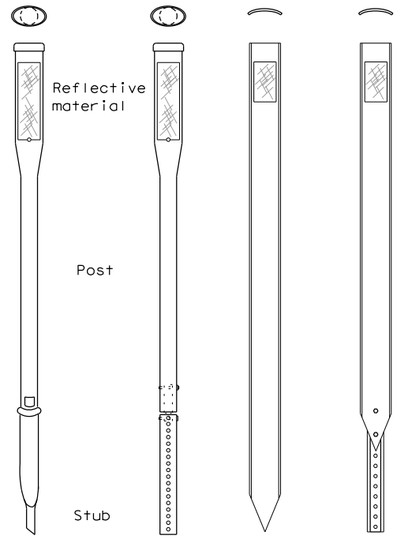


NOTES

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

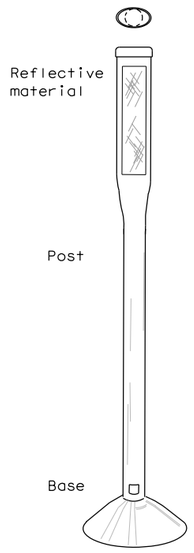
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



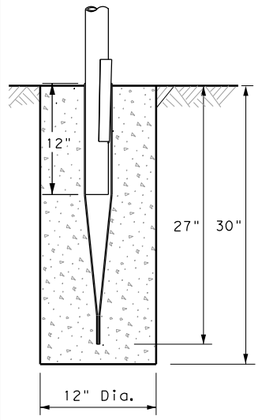
SURFACE MOUNT

NOTES

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

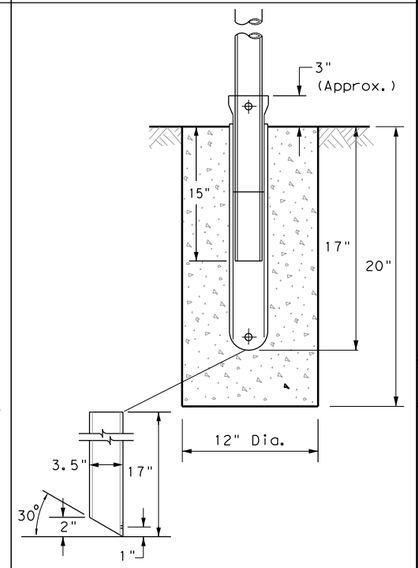
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

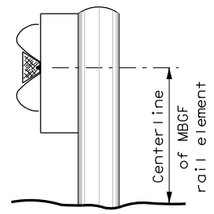
NOTE

1. Install per manufacturer's recommendations.

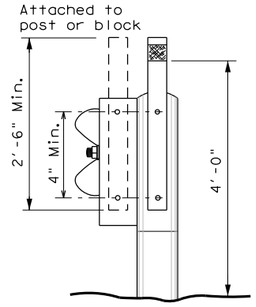
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

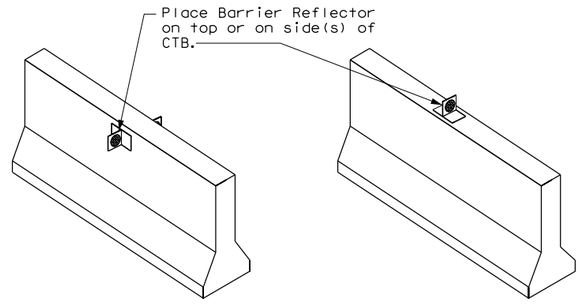
GF1



GF2



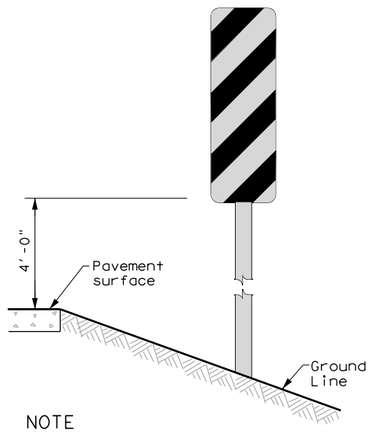
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

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

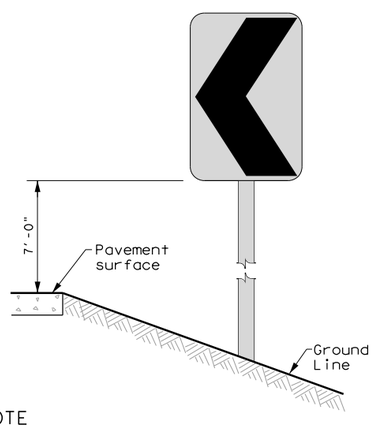
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

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

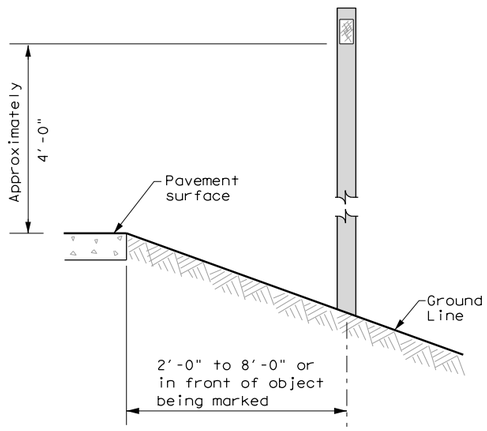
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

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

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	SJT	RUNNELS		103

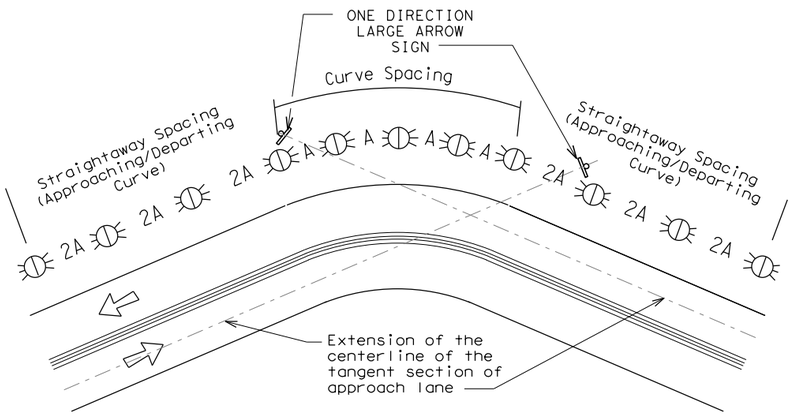
20B

DATE: 10/3/2022 4:13:02 PM
FILE: P:\118579\01\Design\Civil\Standards\PavementMarkers\dom2-20.dgn

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

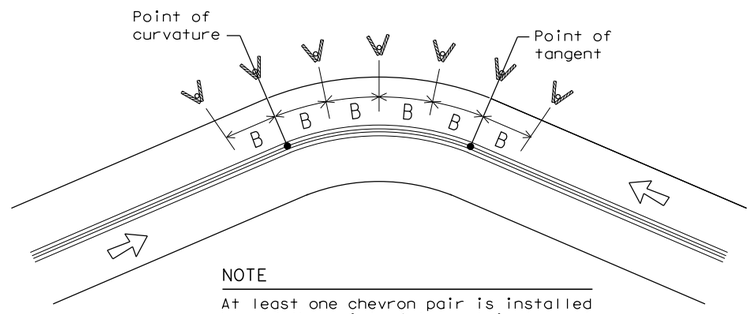
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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	0650	03	031	SH 153
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	SJT	RUNNELS		104

20C

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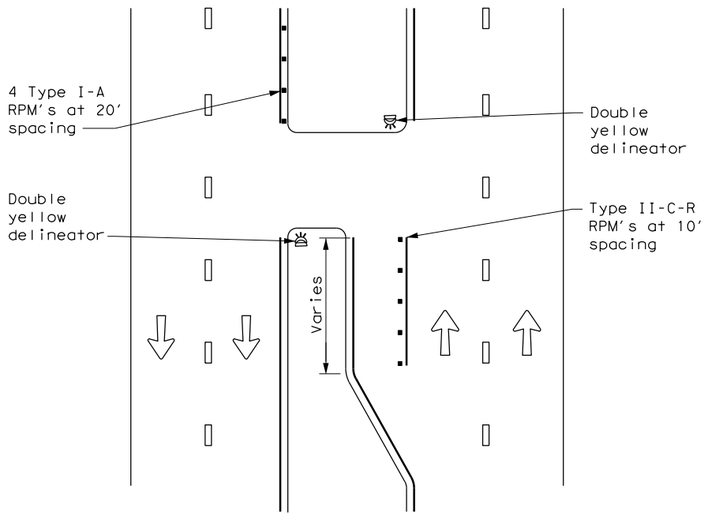
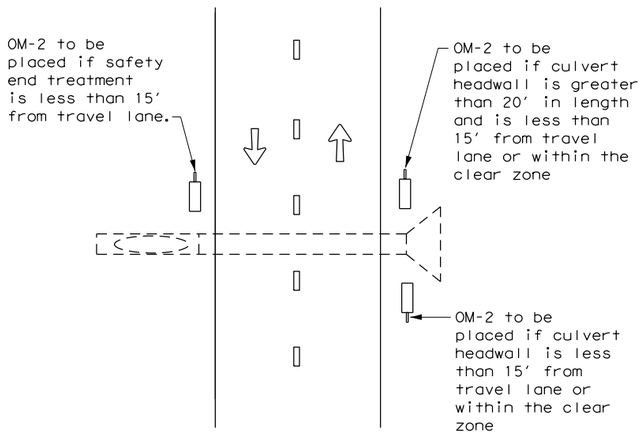
CROSSOVERS



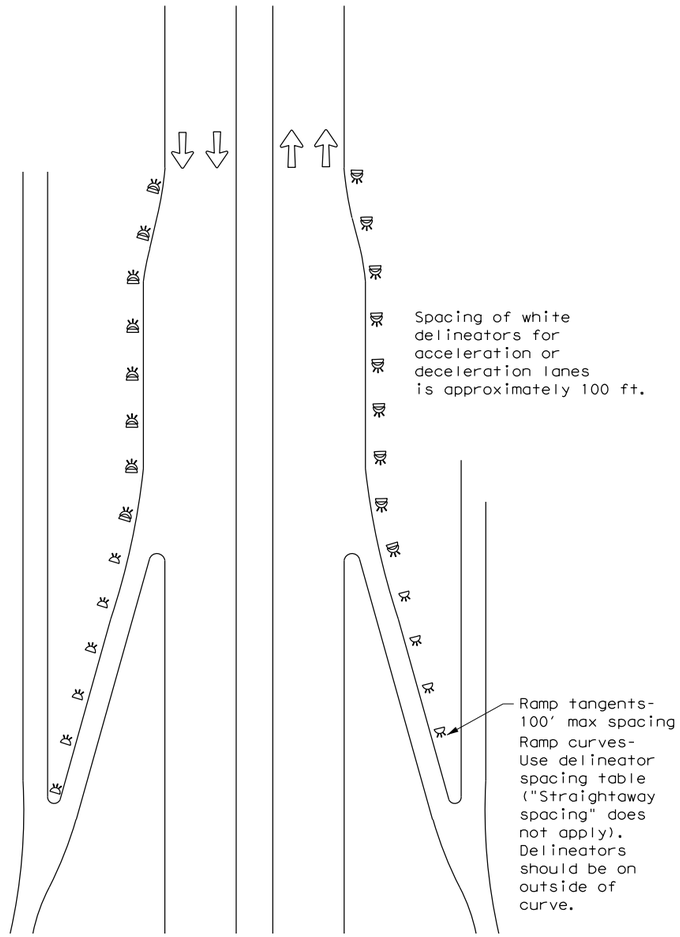
DETAIL 1

FOR CULVERTS WITHOUT MBGF



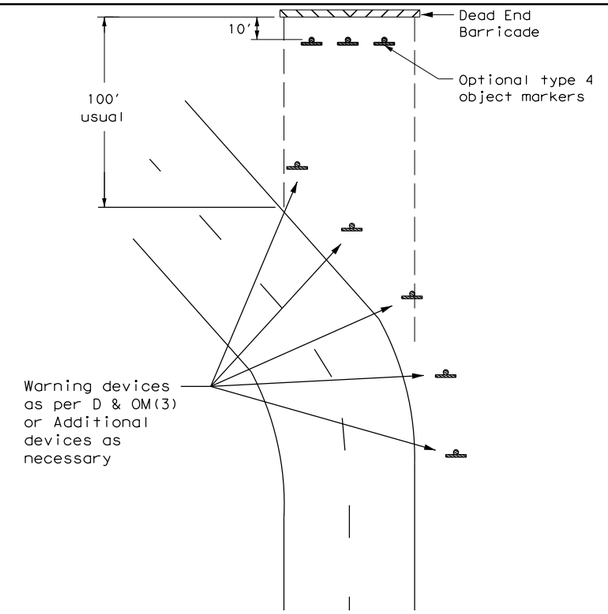
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



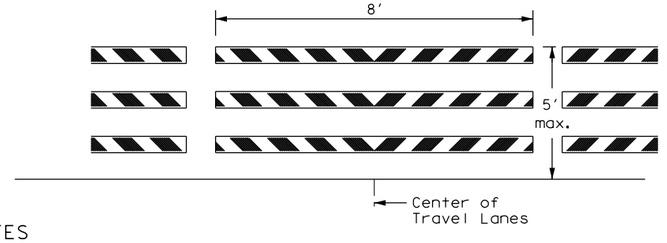
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

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

DETAIL 5

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
3-15	DIST	COUNTY		SHEET NO.
7-20	SJT	RUNNELS		105

20D

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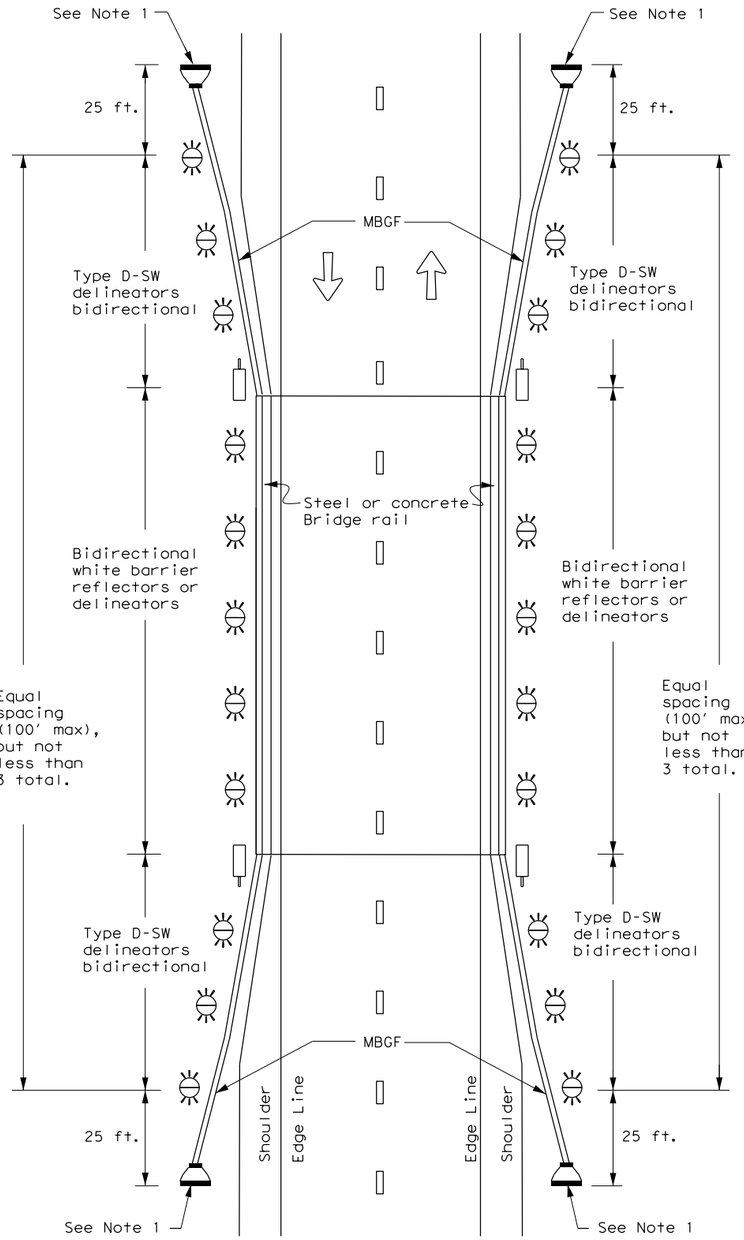
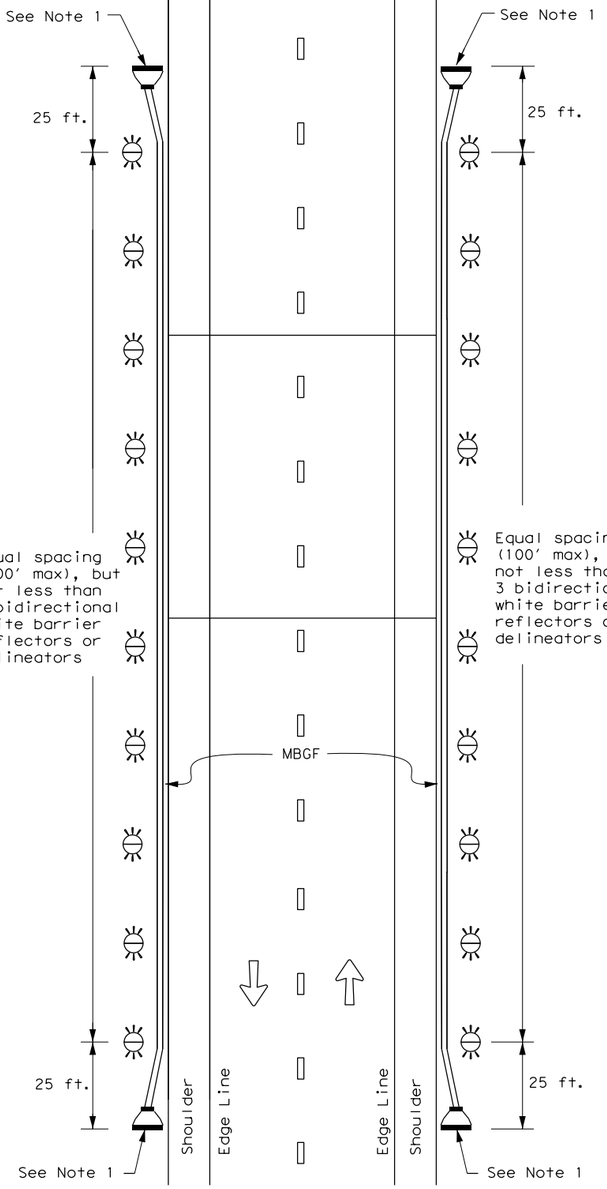
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

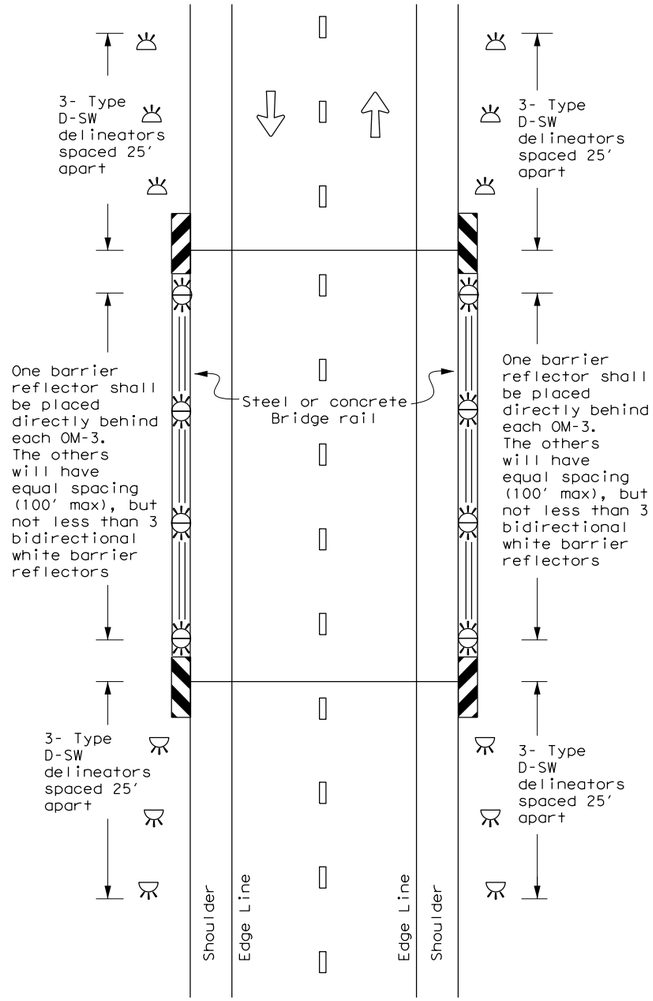
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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	0650	03	031	SH 153
7-20	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		106

20E

DATE: 10/3/2022 4:13:07 PM
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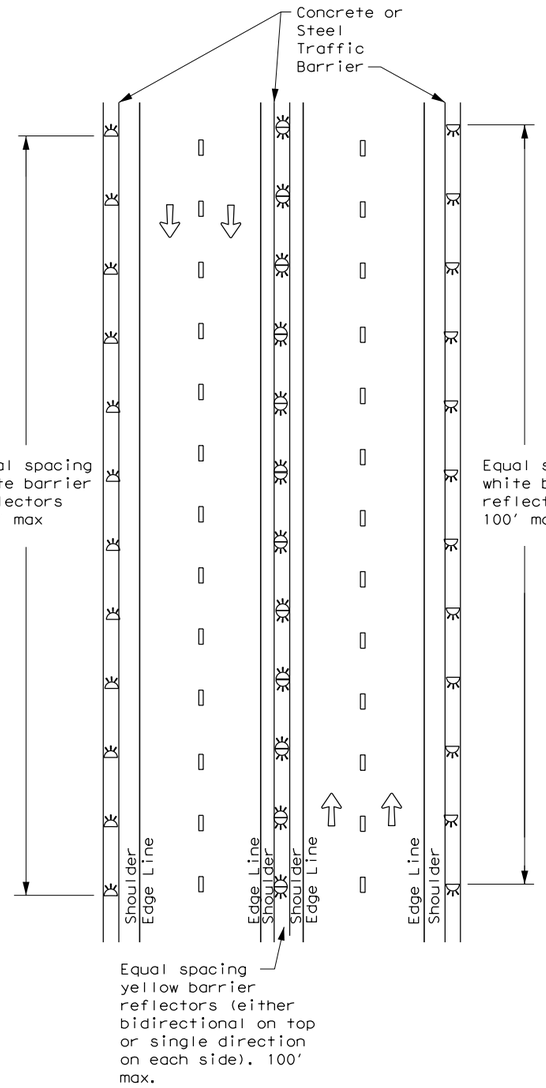
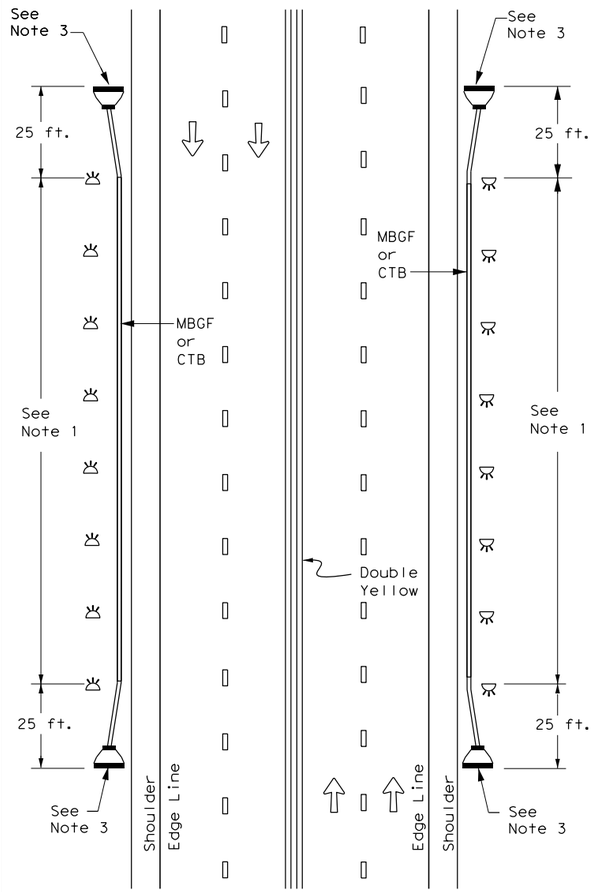
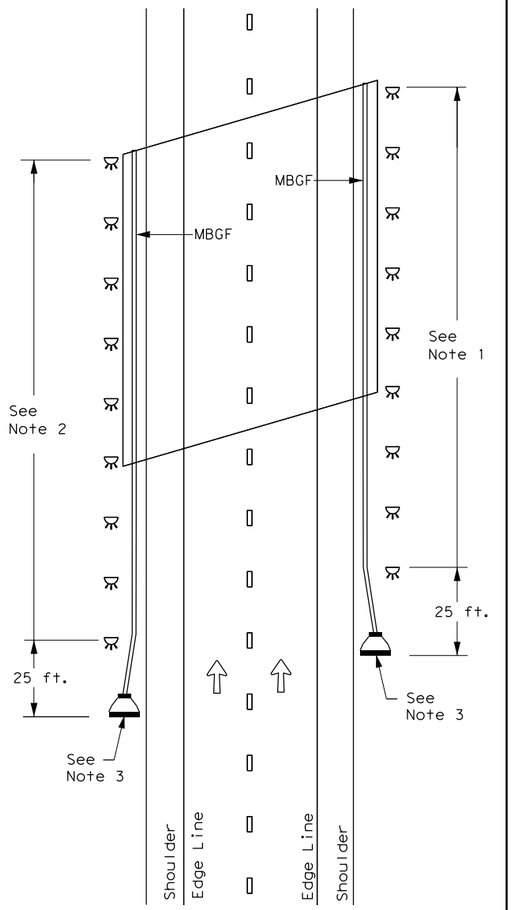
CONTINUOUS CONCRETE OR STEEL BARRIER



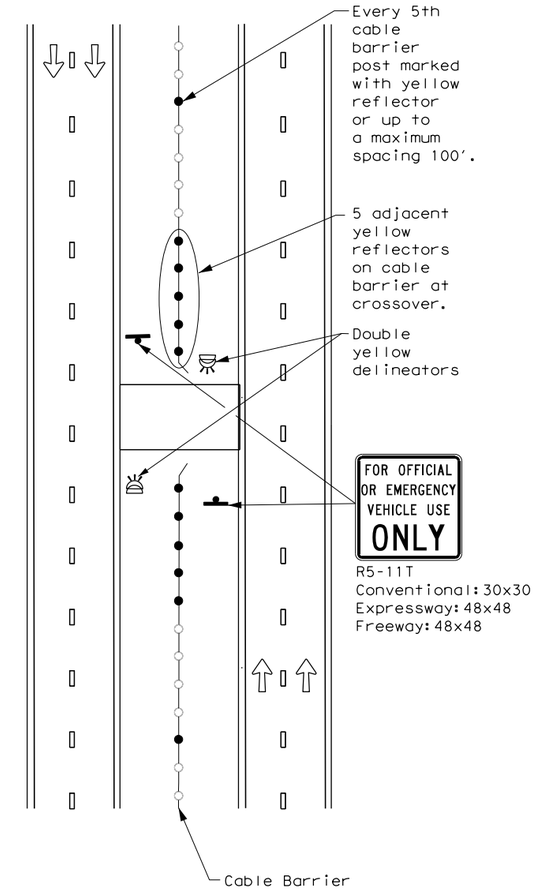
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

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

LEGEND

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(6)-20

FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
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7-20	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		107

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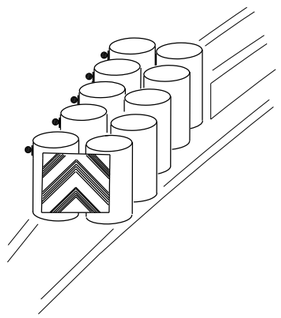
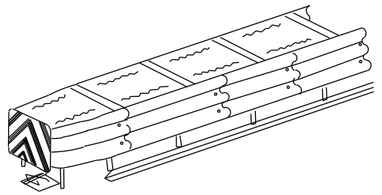
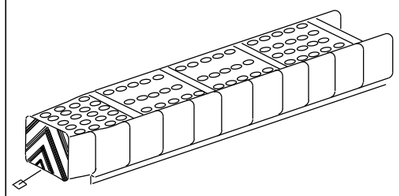
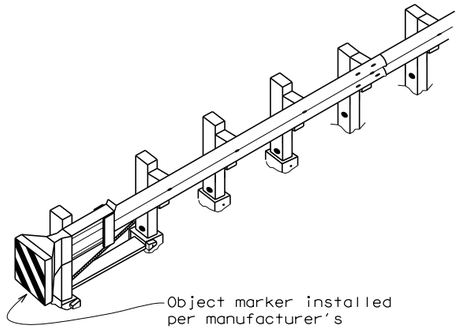
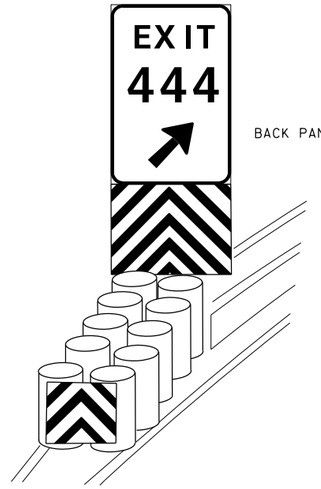
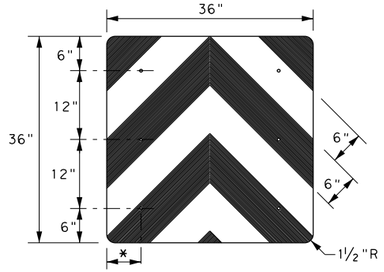


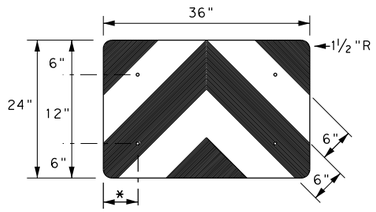




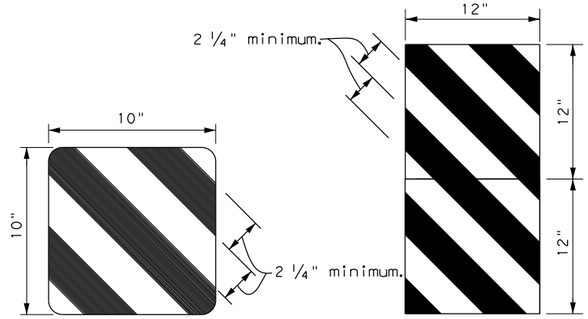




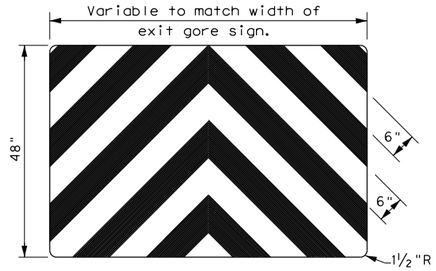


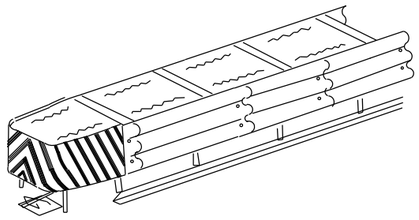


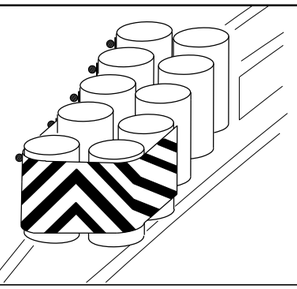
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

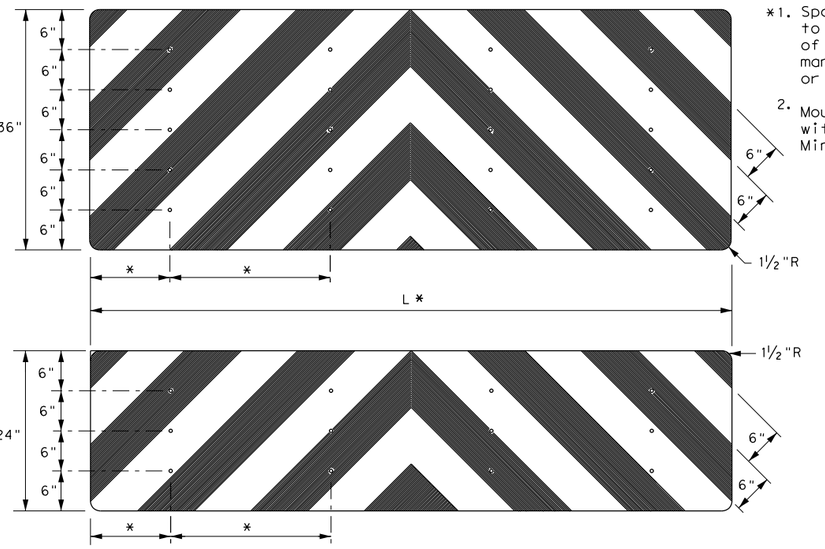


OBJECT MARKERS SMALLER THAN 3 FT^2









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

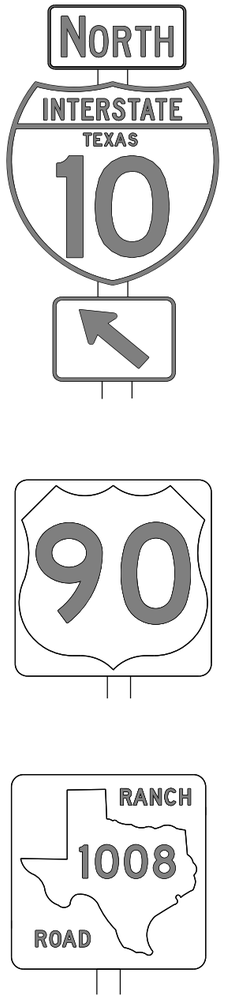
FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	SJT	RUNNELS		108
4-98 7-20				
20G				

DATE: 10/3/2022 4:13:08 PM
FILE: P:\118\79\01\Design\Civil\Standards\PavementMarkers\domvia-20.dgn

DATE: 10/3/2022 4:13:09 PM
FILE: P:\118179\01\Design\Civil\Standards\Signing\tsr3-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

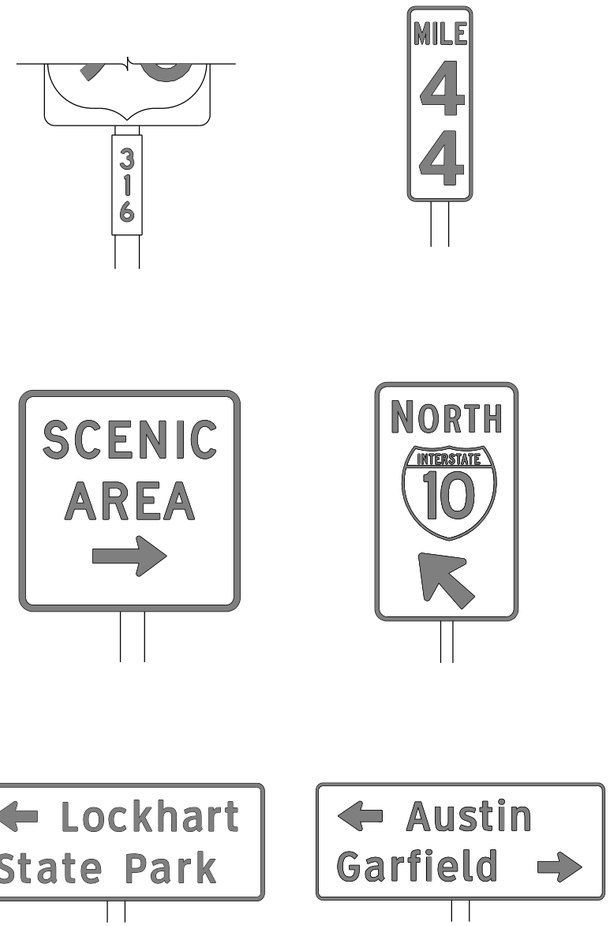
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

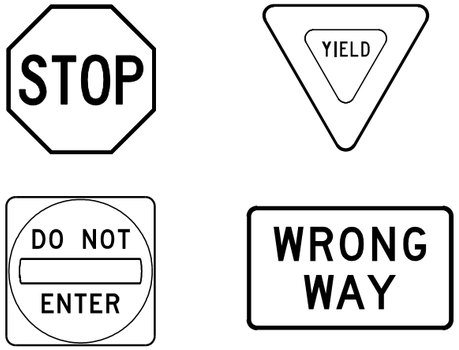
FILE:	tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS		0650	03	031	SH 153
12-03 7-13		DIST	COUNTY		SHEET NO.
9-08		SJT	RUNNELS		109

3

DATE: 10/3/2022 4:13:10 PM
FILE: P:\118179.01\Design\Civil\Standards\Signing\tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

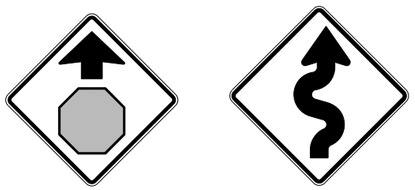
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

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

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

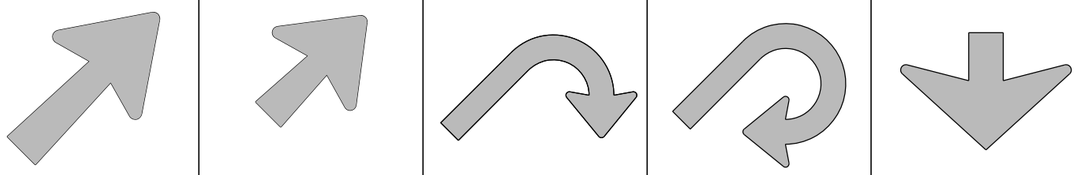
TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-03 7-13 9-08	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		110

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



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

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

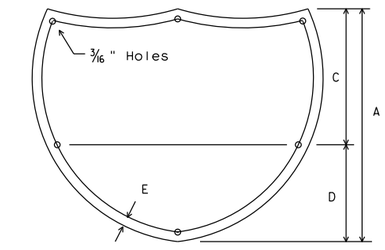
NOTE

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

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

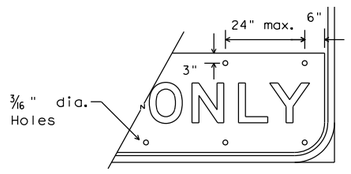
http://www.txdot.gov/

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

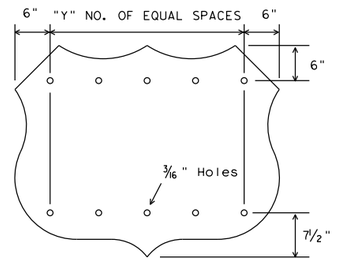


INTERSTATE ROUTE MARKERS

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

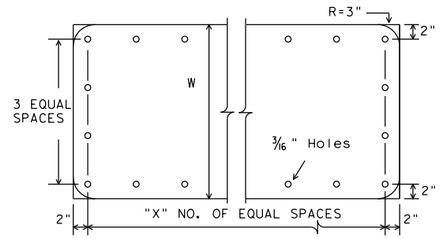


EXIT ONLY PANEL



U.S. ROUTE MARKERS

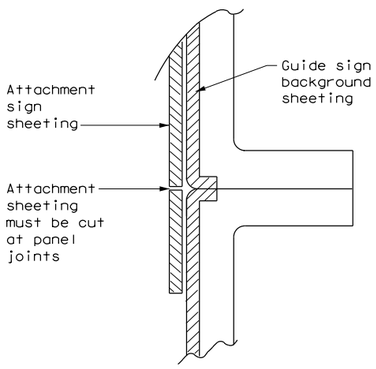
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



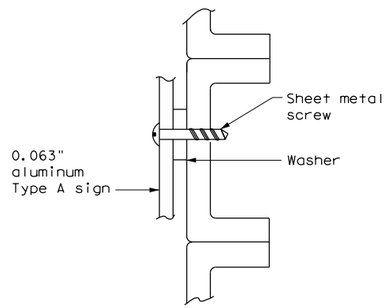
STATE ROUTE MARKERS

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

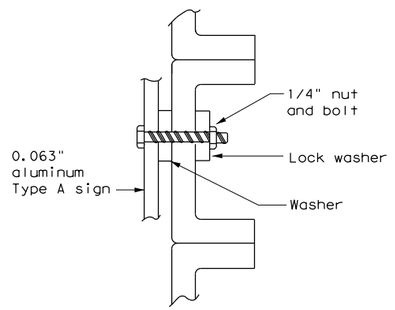
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

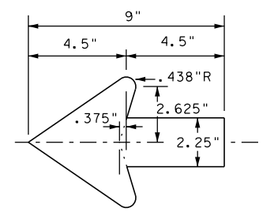
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

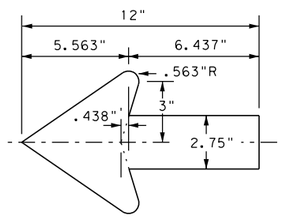
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	SJT	RUNNELS		111

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SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

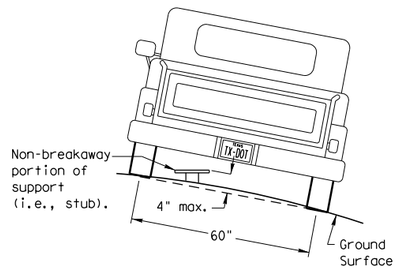
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

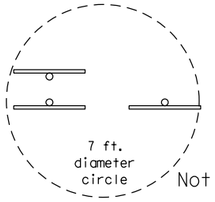
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT

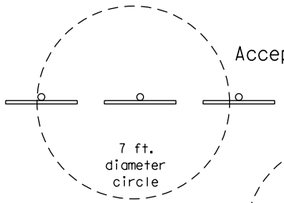


To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

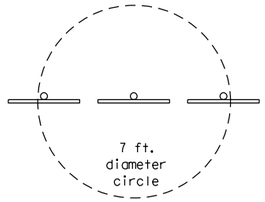
No more than 2 sign posts should be located within a 7 ft. circle.



Not Acceptable



Acceptable



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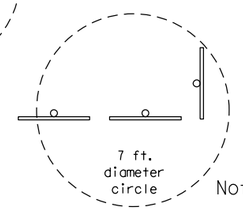
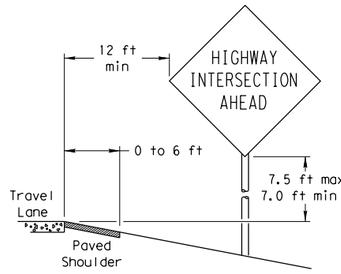


Not Acceptable

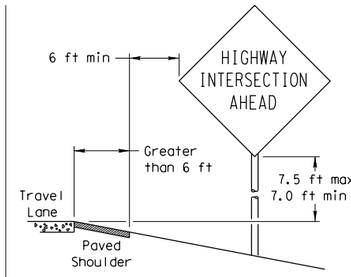
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

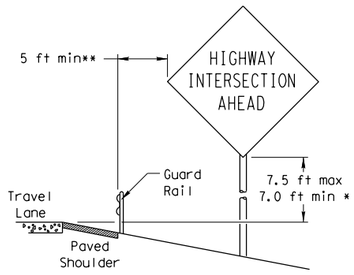
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



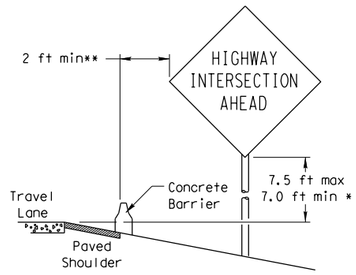
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

BEHIND BARRIER



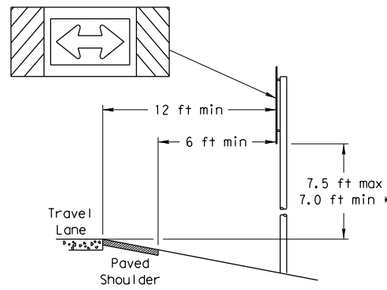
BEHIND GUARDRAIL



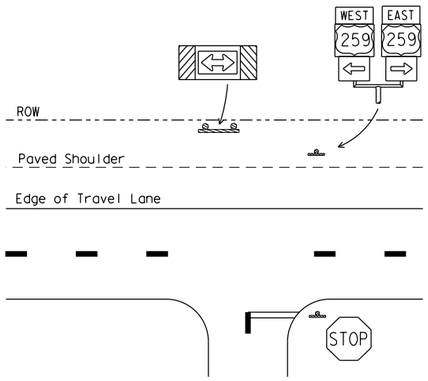
BEHIND CONCRETE BARRIER

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

T-INTERSECTION



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



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

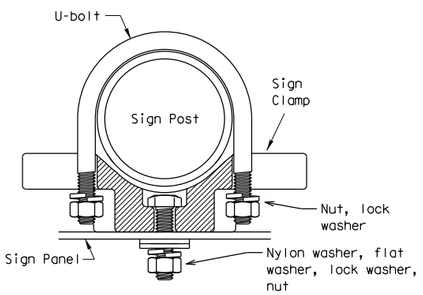
The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

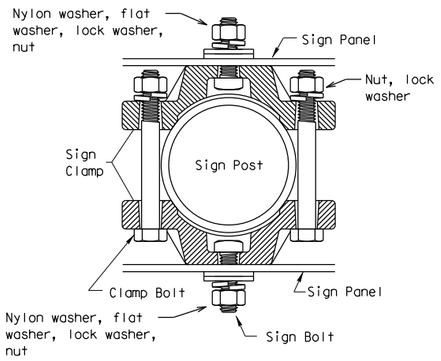
The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



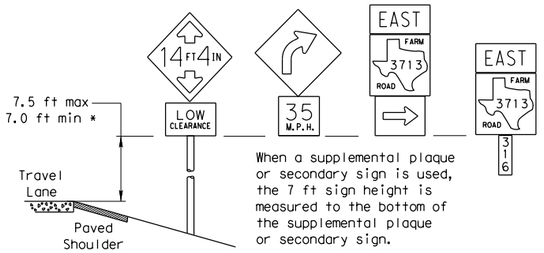
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

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

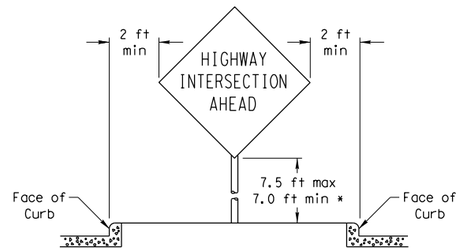
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



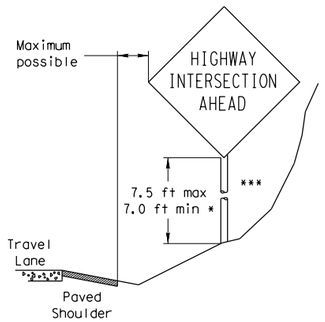
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		112

26A

DATE: 10/3/2022 4:13:13 PM
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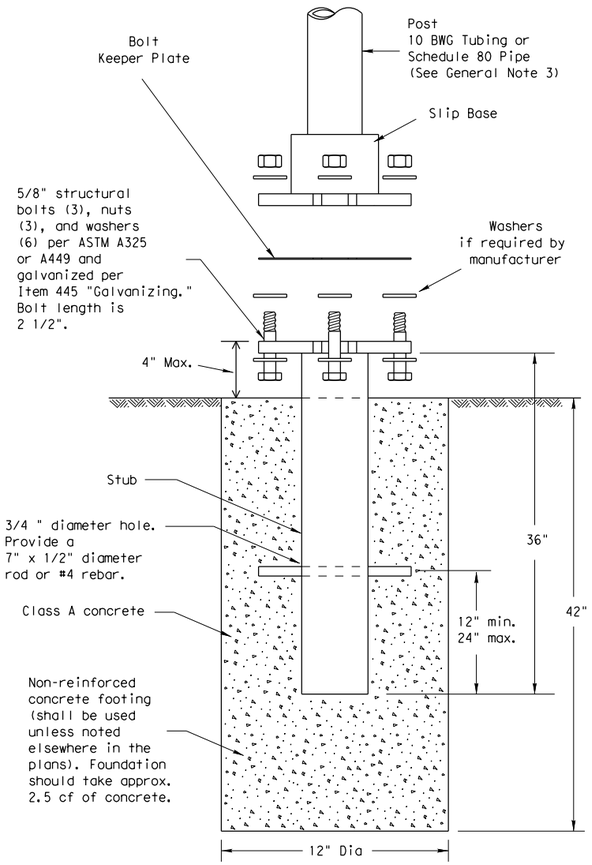
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)
   - 0.134" nominal wall thickness
   - Seamless or electric-resistance welded steel tubing or pipe
   - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
   - Other steels may be used if they meet the following:
     - 55,000 PSI minimum yield strength
     - 70,000 PSI minimum tensile strength
     - 20% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
   - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
   - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.

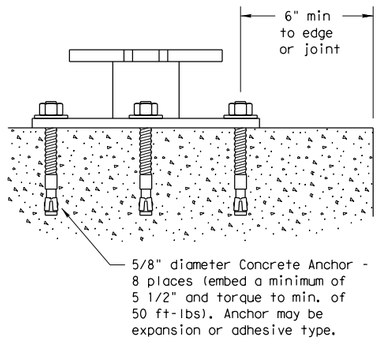
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum yield strength
     - 62,000 PSI minimum tensile strength
     - 21% minimum elongation in 2"
   - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
   - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
   - Galvanization per ASTM A123
3. See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: http://www.txdot.gov/publications/traffic.htm
4. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

Foundation
1. Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
2. The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
3. Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
4. Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
5. The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support
1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

©TxDOT July 2002	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		113

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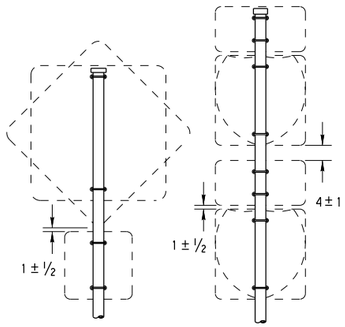
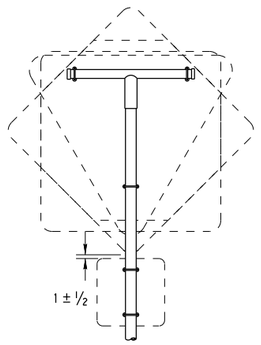


SM RD SGN ASSM TY XXXXX(1)XX(P)



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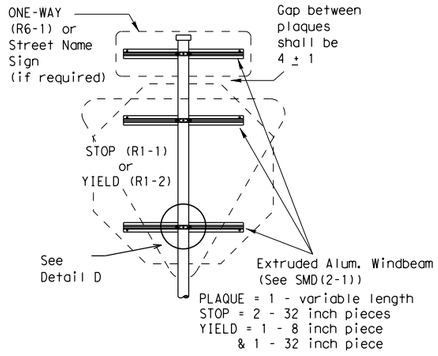
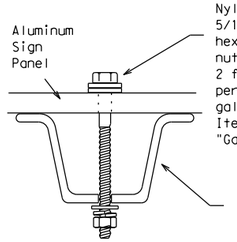
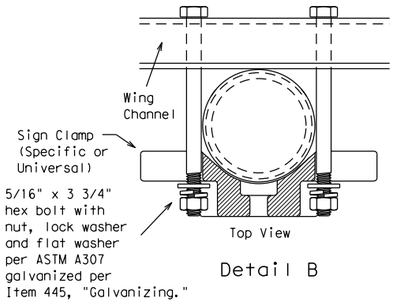


SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



Detail A



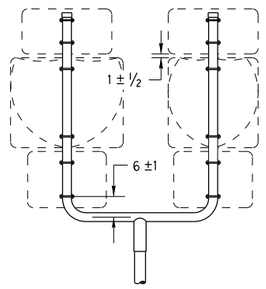
Detail B

GENERAL NOTES:

1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.



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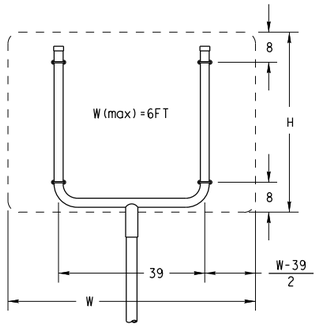

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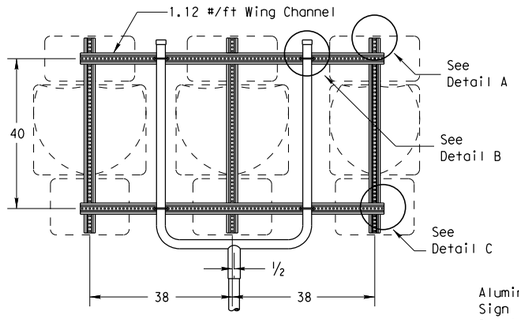
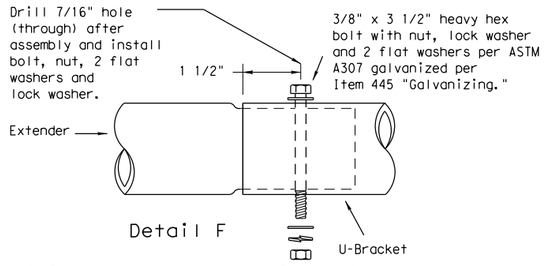
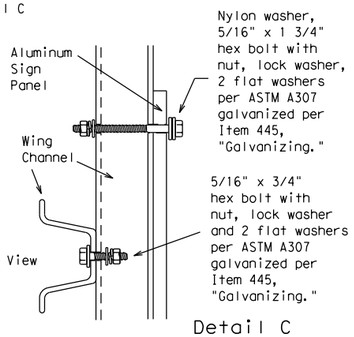


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



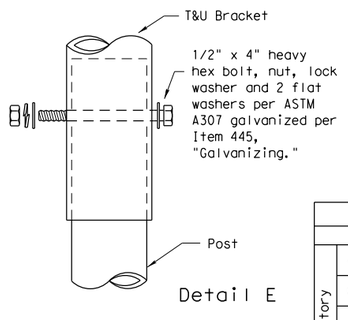
Detail F

Splices shall only be allowed behind the sign substrate.

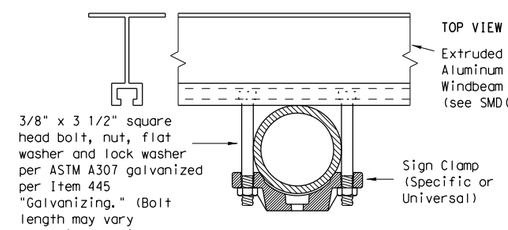


SIDE VIEW

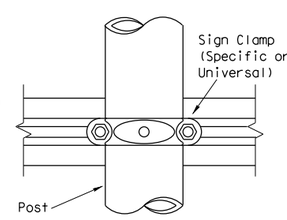
Detail C



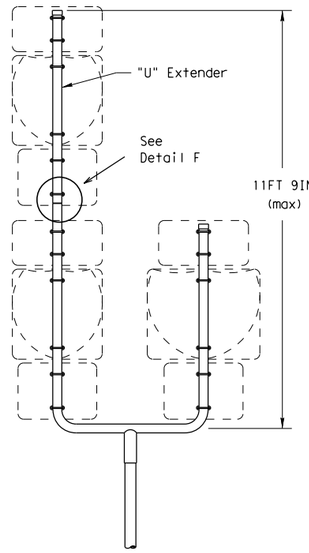
Detail E



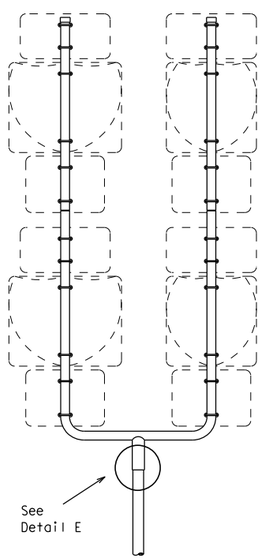
Detail D



REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)



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



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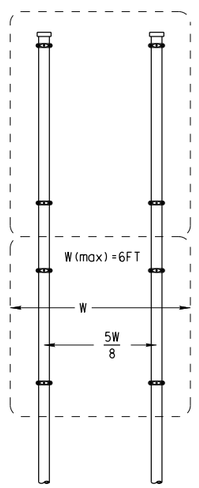

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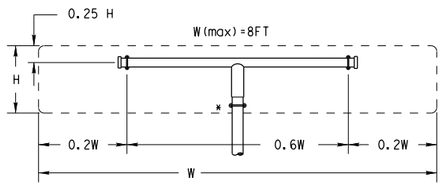
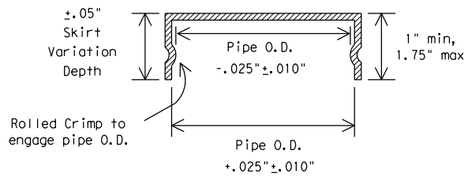


SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

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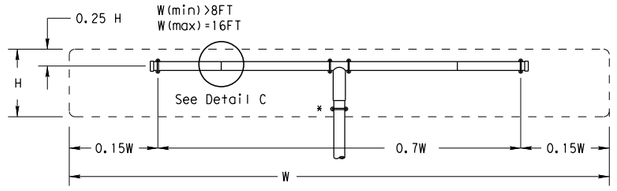
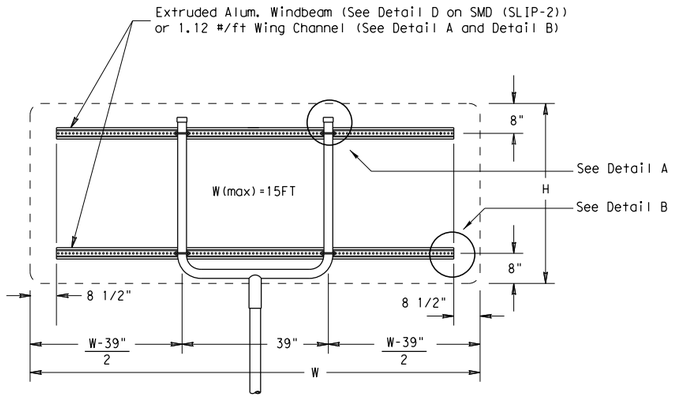
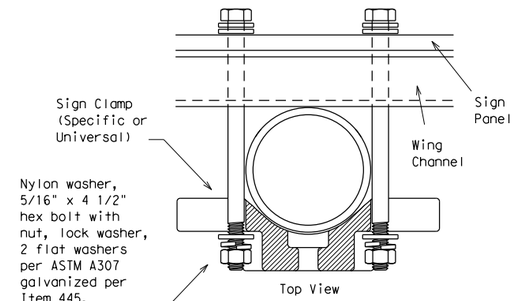


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

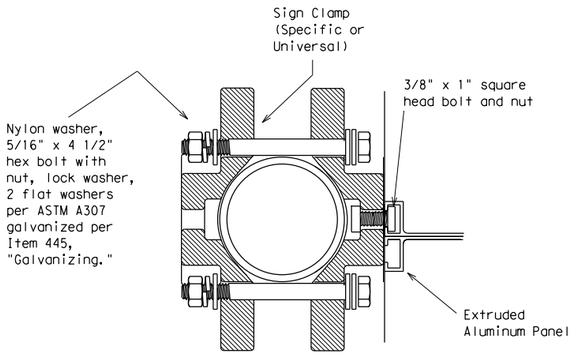
(* - See Note 12)



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

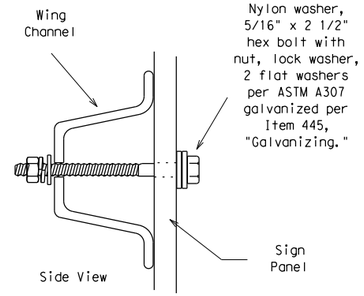


Detail A

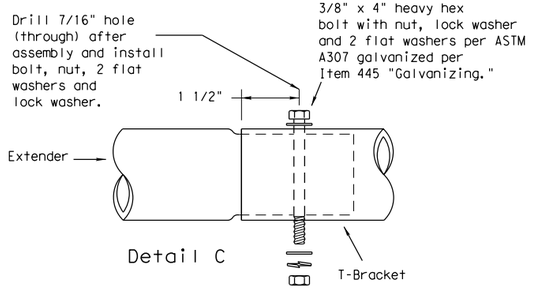


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET

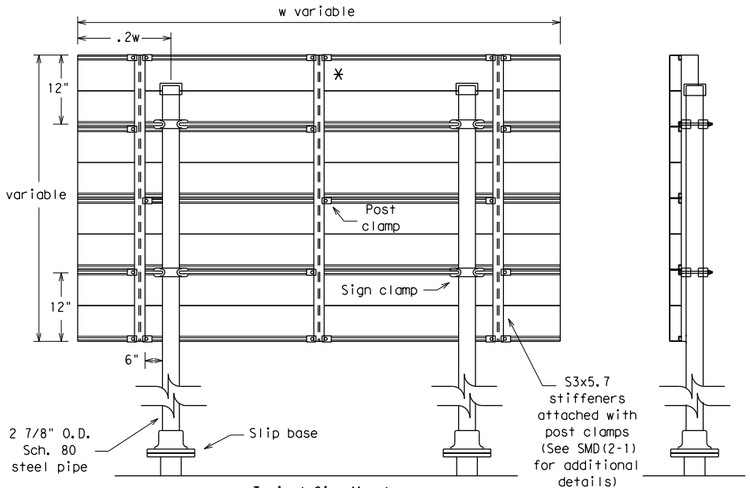


Detail B



Detail C

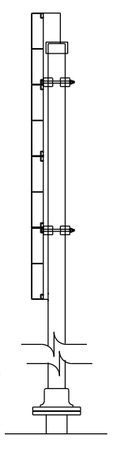
Splices shall only be allowed behind the sign substrate.



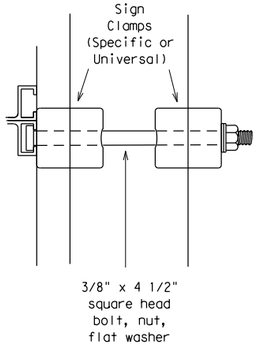
Typical Sign Mount

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

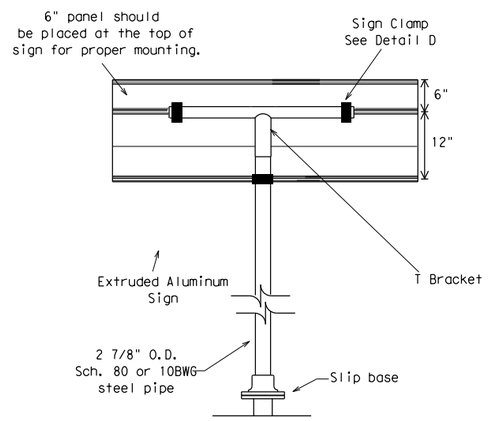
* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



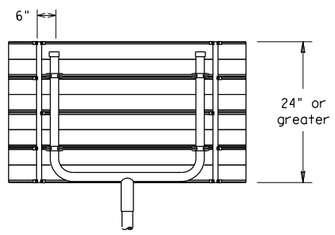
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Sign blanks shall be the sizes and shapes shown on the plans.
11. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS
9-08

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

CONT	SECT	JOB	HIGHWAY
0650	03	031	SH 153

DIST	COUNTY	SHEET NO.
SJT	RUNNELS	115

DATE: 10/3/2022 4:13:17 PM
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I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or CGP 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 that may receive discharges from this project. The MS4 Operator may need to be notified prior to construction activities.

1. N/A

☐ NO ACTION REQUIRED ☑ ACTION REQUIRED

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 CSN with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When 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.

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#

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.

Required Actions: List waters of the U.S. that the permit applies to, the location in project, and check BMP's planned to control erosion, sedimentation and post-construction TSS.

1. WILLOW CREEK

BEST MANAGEMENT PRACTICES

EROSION

☑ SEEDING OR SODDING
☐ MULCHING
☐ SOIL RETENTION BLANKETS
☑ BIODEGRADABLE EROSION CONTROL LOGS
☐ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
☐ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
☑ TOPSOIL OR COMPOST
☐ FLEXIBLE CHANNEL LINERS
☑ GROUND COVER

SEDIMENTATION

☑ ROCK FILTER DAMS
☑ TEMPORARY SEDIMENT CONTROL FENCES
☐ TRIANGULAR FILTER DIKES
☑ TOPSOIL OR COMPOST
☐ BIODEGRADABLE EROSION CONTROL LOGS
☐ SEDIMENT BASINS
☐ SAND BAG BERMS
☐ STRAW BALE DIKES
☐ BRUSH BERMS
☐ STORM INLET SEDIMENT TRAPS

POST-CONSTRUCTION TSS

☐ VEGETATIVE FILTER STRIPS
☐ RETENTION/IRRIGATION SYSTEMS
☐ EXTENDED DETENTION BASINS
☐ CONSTRUCTED WETLANDS
☐ WET BASINS
☑ TOPSOIL OR COMPOST
☐ BIODEGRADABLE EROSION CONTROL LOGS
☑ VEGETATION LINED DITCHES
☐ SAND FILTER SYSTEMS
☐ GRASSY SWALES

III. CULTURAL RESOURCES

Refer to the 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 ☐ ACTION REQUIRED

1. N/A

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.

Adhere to specification requirements of Items 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 ☑ ACTION REQUIRED

1. Only remove woody vegetation between October 1 and March 1.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS

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.

☐ NO ACTION REQUIRED ☑ ACTION REQUIRED

1. The Migratory Bird Treaty Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, young, feather, or egg in part or in whole, without a federal permit issued in accordance with the Act's policies and regulations. Migration patterns would not be affected by the proposed project. Remove non-active migratory bird nests from structures where work would be performed from September 1 through the end of February. Prevent migratory birds from building nests from March 1 to August 31. In the event that migratory birds are encountered on-site during project construction, avoid adverse impacts on protected birds, active nests, eggs, and/or young.

ABBREVIATIONS USED

BMP – Best Management Practice
CGP – Construction General Permit
CSN – Construction Site Notice
DSHS – Texas Department of State Health Services
EPA – U.S. Environmental Protection Agency
MS4 – Municipal Separate Stormwater Sewer System
MSDS – Material Safety Data Sheet
NOI – Notice of Intent
NWP – Nationwide Permit
PCN – Pre-Construction Notification
PSL – Project Specific Location
SW3P – Storm Water Pollution Prevention Plan
TCEQ – Texas Commission on Environmental Quality
TPDES – Texas Pollutant Discharge Elimination System
TSS – Total Suspended Solids
USACE – U.S. Army Corps of Engineers

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 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 labeling 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 TxDOT 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 ☑ ACTION REQUIRED

1. The paint system on the bridge rail is assumed to contain lead-based paint. The torching, grinding or mechanical cutting of the rail or its components is not recommended without the use of proper personal protective equipment (i.e., respirators). The contractor must remove the rail by unbolting the rail supports from the bridge. Only licensed professionals trained in lead abatement should remove by means other than mechanical. Please dispose of railing accordingly.

2.

VII. OTHER ENVIRONMENTAL ISSUES

(Includes regional issues such as Edwards Aquifer District, etc.)

☑ NO ACTION REQUIRED ☐ ACTION REQUIRED

1. N/A

APPROVAL

STATE OF TEXAS
CODY J. MOCZYGEMBA
133448
LICENSED
PROFESSIONAL ENGINEER

10/25/2022

Texas Department of Transportation

San Angelo District

ENVIRONMENTAL PERMITS ISSUES AND COMMITMENTS

SHEET 1 OF 1 NOT TO SCALE

©TxDOT	CONT	SECT	JOB	HIGHWAY
SHEET ISSUED OR LAST REVISED	0650	03	031	SH 153
11-19	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		116

DATE: 10/25/2022 9:57:17 AM
FILE: I:\2293\19DT\CADD\SHEETS\09-Environmental Issues\Standards\SH 153\SH153 ENVIRONMENTAL PERMITS ISSUES AND COMMITMENTS.dgn

SITE DESCRIPTION

The site description is accomplished using various sheets, each revealing separate details. This sheet's purpose is to direct the user to the appropriate location where the information required by the NPDES CGP can be found.

General location map, project limits, and project description: See Title Sheet of plans.

Intended sequence of major soil disturbing activities: Excavation, drainage structures, embankment, temporary pavement structures, bridge construction, pavement structure.

Total project area (acres): 5.33 ac

Total area to be disturbed (acres): 5.08 ac

Pre- construction weighted runoff coefficient: 0.50

Post- construction weighted runoff coefficient: 0.50

Existing condition of soil and vegetative cover: Existing vegetative cover is typically pasture and grazing land. Existing soils are Colorado,Westola soils, Miles fine sandy loam and Spur loam.

Percent of existing vegetative cover: The area is covered 90% with various grasses.

Name and segment number of receiving waters: The runoff flows from the project in grass lined ditches to Valley Creek which continues on to Segment 1426 of the Colorado River.

Storm water management:

Location of wetland or special aquatic sites on or near the project shall be shown on the site map for the SW3P sheets.

Endangered species information is referenced on EPIC sheet.

Historic preservation effect information is referenced on EPIC sheet.

Drainage patterns, locations where storm water discharges to surface waters, slopes after major grading activities, typical areas of soil disturbance, areas which will not be disturbed, locations of control measures, and locations where stabilization practice will occur are depicted on the erosion control measures plan sheets and the landscape plan sheets.

Sediment must be removed from sediment traps and sedimentation ponds no later than the time that design capacity has been reduced by 50%.

If sediment escapes the site, accumulations must be removed at a frequency to minimize further negative effects, and whenever feasible, prior to the next rain.

Dust will be minimized by watering as necessary.

SW3P REQUIREMENTS

THE SWP3 MUST HAVE A DETAILED SITE MAP INDICATING THE FOLLOWING:

A detailed site map (or maps) indicating the following:

(i) drainage patterns and approximate slopes anticipated after major grading activities; This is usually addressed by adding a copy of the typical sections to the living document.

(ii) areas where soil disturbance will occur;

(iii) locations of all controls and buffers, either planned or in place;

(iv) locations where temporary or permanent stabilization practices are expected to be used;

(v) locations of construction support activities, including off-site activities, that are authorized under the permittee's NOI, including material, waste, borrow, fill, or equipment or chemical storage areas;

(vi) surface waters (including wetlands) either at, adjacent, or in close proximity to the site, and also indicating those that are impaired waters;

(vii) locations where storm water discharges from the site directly to a surface water body or a municipal separate storm sewer system;

(viii) vehicle wash areas; and

(ix) designated points on the site where vehicles will exit onto paved roads (for instance, this applies to construction transition from unstable dirt areas to exterior paved roads).

THE SW3P MUST INCLUDE A DESCRIPTION OF CONSTRUCTION AND WASTE MATERIALS EXPECTED TO BE STORED ON-SITE AND A DESCRIPTION OF CONTROLS TO MINIMIZE POLLUTANTS FROM THESE MATERIALS.

THE SW3P MUST INCLUDE VELOCITY DISSIPATION DEVICES AT DISCHARGE LOCATIONS AND ALONG THE LENGTH OF ANY OUTFALL CHANNEL (I.E. RUNOFF CONVEYANCE) TO PROVIDE A NON-EROSIVE FLOW VELOCITY FROM THE STRUCTURE TO A WATER COURSE, SO THAT THE NATURAL PHYSICAL AND BIOLOGICAL CHARACTERISTICS AND FUNCTIONS ARE MAINTAINED AND PROTECTED.

CONTROLS

(Check all that apply)

INTERIM SOIL STABILIZATION PRACTICES:

- ☑ SEEDING OR SODDING
- ☐ MULCHING
- ☑ SOIL RETENTION BLANKETS
- ☑ TOPSOIL OR COMPOST
- ☐ FLEXIBLE CHANNEL LINERS
- ☐ GROUND COVER

PERMANENT SOIL STABILIZATION PRACTICES:

- ☑ SEEDING OR SODDING
- ☐ MULCHING
- ☑ SOIL RETENTION BLANKETS
- ☑ TOPSOIL OR COMPOST
- ☐ FLEXIBLE CHANNEL LINERS
- ☐ GROUND COVER

INTERIM STRUCTURAL PRACTICES:

- ☑ TEMPORARY SEDIMENT CONTROL FENCE
- ☐ BALED HAY FOR EROSION CONTROL
- ☑ ROCK FILTER DAMS
- ☐ PIPE SLOPE DRAINS
- ☐ CHANNEL LINERS
- ☐ STORM SEWERS
- ☐ STORM INLET SEDIMENT TRAPS
- ☐ STONE OUTLET STRUCTURES
- ☐ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- ☐ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- ☐ PAVED FLUMES
- ☑ CONSTRUCTION EXITS
- ☐ DROP INLET SEDIMENT TRAPS
- ☐ CURB INLET SEDIMENT TRAPS
- ☐ SEDIMENT BASINS
- ☐ CURB AND GUTTER
- ☐ VELOCITY CONTROL DEVICES
- ☑ BIODEGRADABLE EROSION CONTROL LOGS

PERMANENT STRUCTURAL PRACTICES:

- ☑ TEMPORARY SEDIMENT CONTROL FENCE
- ☐ BALED HAY FOR EROSION CONTROL
- ☑ ROCK FILTER DAMS
- ☐ PIPE SLOPE DRAINS
- ☐ CHANNEL LINERS
- ☐ STORM SEWERS
- ☐ STORM INLET SEDIMENT TRAPS
- ☐ STONE OUTLET STRUCTURES
- ☐ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- ☐ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- ☐ PAVED FLUMES
- ☑ CONSTRUCTION EXITS
- ☐ DROP INLET SEDIMENT TRAPS
- ☐ CURB INLET SEDIMENT TRAPS
- ☐ SEDIMENT BASINS
- ☐ CURB AND GUTTER
- ☐ VELOCITY CONTROL DEVICES
- ☑ BIODEGRADABLE EROSION CONTROL LOGS

NARRATIVE (sequence of construction for storm water management activities)
The order of activities will be as follows:

1. Install silt fence and rock filter dams, prepare the right of way. Erosion control logs may be used in leu of silt fence if aproved by engineer.

2. Construct temporary detour and temporary culvert crossing in creek bed. Place temporary seeding and soil retention blankets in all disturbed areas along temporary pavement as shown in the SWPPP layouts.

3. Construct bridge replacement and bridge approaches.

4. Remove temporary detour, grade ditches so that flow matches existing conditions. Place topsoil, permanent seeding, and final soil retention blankets.

5. Place final pavement section and pavement markings.

6. When all construction activity is complete and the site is stabilized and approved by the engineer, remove all temporary structural controls and reseed any areas disturbed by their removal.

NOTE: Limit the disturbed area such that construction activities will commence in that portion of the site within 14 days. Place stabilization measures in portions of the site no later than 14 days after construction activity has temporarily ceased.

The above indicated practices are proposed to control pollutants in storm water discharges. These practices are based on information contained in TxDOT storm water management guidelines. The schedule of implementation of these practices will be based on the intended sequence of major soil disturbing activities. Stabilization measures shall be initiated no later than 14 days after construction activity in that portion of the site has temporarily or permanently ceased.

Expected construction waste may include concrete rubble and concrete washout waste. Construction waste shall be removed from the project. Temporary stockpiles for waste material shall be located at an upland location approved by the Engineer. Any rubble waste stockpiled for more than 14 days shall require sedimentation control. This will not be paid for directly, but shall be considered subsidiary to the various bid items. Concrete wash-out waste shall be placed on concrete truck cleanout box and then disposed off project.

Describe pollutant sources from areas other than construction and measures implemented at those sites to minimize pollutant discharges:
Storm sewer system (if present) will be protected with structural controls.

Sedimentation basins are required in drainage areas having disturbance of 10 or more acres.

ABBREVIATIONS USED

BMP - Best Management Practice
CGP - Construction General Permit
EPIC - Environmental Permits, Issues, and Commitments
MSDS - Material Safety Data Sheet
NOI - Notice of Intent
NOT - Notice of Termination
NPDES - National Pollutant Discharge Elimination System
SW3P - Storm Water Pollution Prevention Plan

INFORMATION

MAINTENANCE:
All erosion and sediment control and other protective measures identified in the SW3P must be maintained in effective operating conditions. If site inspections required by this permit identify BMP's that are not operating effectively, maintenance shall be performed before the next anticipated storm event, or as necessary to maintain the continued effectiveness of storm water controls. If maintenance prior to the next anticipated storm event impracticable, maintenance must be scheduled and accomplished as soon as possible.

INSPECTION:
Qualified personnel shall inspect disturbed areas of the construction site that have not been finally stabilized, areas used for storage of materials that are exposed to precipitation, structural control measures, and locations where vehicles enter or exit the site, at intervals as indicated by check mark below:

- ☐ *At least once every 14 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater as recorded on a non-freezing rain gauge to be located at the project site.*
- ☑ *At least once every 7 calendar days. An inspection must occur regardless of whether or not there has been a rainfall event since the previous inspection.*

Disturbed areas that are exposed to precipitation shall be inspected for evidence of, or the potential for pollutants entering the drainage system. Sediment and erosion control measures identified on the SW3P shall be observed to ensure that they are operating correctly. Locations where vehicles enter or exit site shall be inspected for evidence of off-site sediment tracking.
Based on the result of the inspection, the SW3P shall be revised to include additional or modified BMP's designed to correct the observed deficiency.
A report summarizing the scope, date, name and qualifications of Inspector, and major observations relating to the implementation of the SW3P shall be produced and retained as part of the SW3P for three years from date of final stabilization.

WASTE MATERIALS:
All waste materials will be collected and stored in a securely lidded metal dumpster. The dumpster will meet all state and local city solid waste management regulations. All trash and construction debris from the site will be deposited in the dumpster. The dumpster will be emptied as necessary or as required by local regulation, and the trash will be hauled to a local dump. No construction waste material will be buried on-site. This will not be paid directly, but shall be considered subsidiary to the various SW3P items.

SANITARY WASTE:
All sanitary waste will be collected from the portable units as necessary or as required by local regulation, by a licensed sanitary waste management contractor.

HAZARDOUS WASTE:
Hazardous waste includes paints, cleaning solvents, asphalt products, chemical additives for soil stabilization, or concrete curing compounds and additives. All hazardous waste shall be disposed of in accordance with all federal, state, and local regulations.
Provide MSDS sheets prior to beginning work.

REMARKS:
Disposal areas, stockpiles, and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, water body or stream bed.
Construction staging areas and vehicle maintenance areas shall be constructed by the Contractor in a manner to minimize the runoff of pollutants.
All waterways shall be cleared as soon as practicable of temporary embankment, temporary bridges, matting, false work, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.

INSPECTOR PAPERWORK CHECKLIST:

- ☑ Contact Form (#)
- ☐ NOI (# and %)
- ☐ NOT (%)
- ☑ Project Diary (%)
- ☑ SW3P Plan (%)
- ☑ Inspection and Maintenance Report (%)
- ☑ SW3P Certification Statement (signed by Area Engineer) (%)
- ☑ NPDES General Permit (Federal Register, dated July 6, 1998) (%)
- ☑ Historic Resources Information - EPIC Sheet (%)
- ☑ Inspector Qualification Form (%)
- ☑ Delegation of Signature Authority (all Inspectors signing reports) (%)
- ☑ Endangered Species and Critical Habitat Information - EPIC Sheet (%)

The symbol (#) indicates that the information should be displayed on the Project Bulletin Board.

The symbol (%) indicates that the information should be a part of the permanent SW3P file maintained at the office managing construction.

Any reportable quantity of Hazardous Material release must be reported to National Response Center at (800) 424-8802.

A copy of the Construction General Permit is a part of the SW3P.

STATE OF TEXAS
CODY J. MOCZYGEMBA
133448
LICENSED
PROFESSIONAL ENGINEER
10/5/2022

Texas Department of Transportation | San Angelo District

SW3P INDEX

SHEET 1 OF 1 NOT TO SCALE

©TxDOT	CONT	SECT	JOB	HIGHWAY
SHEET ISSUED OR LAST REVISED	0650	03	031	SH 153
11-19	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		117

DATE: 10/5/2022 11:11:35 AM
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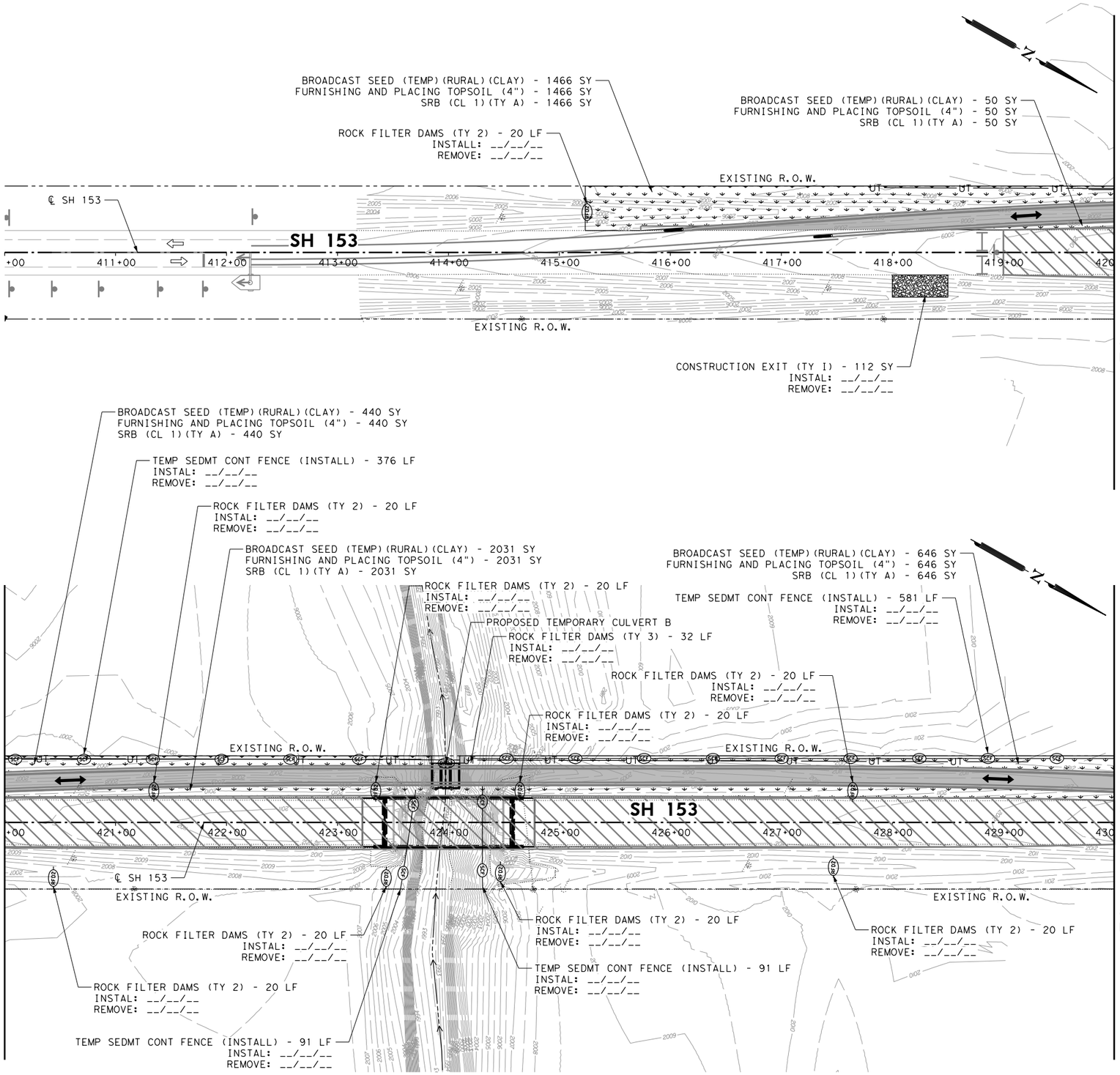
Plotted on: 10/5/2022



LEGEND

- EXISTING R.O.W.
- EX DRAINAGE EASEMENT
- EXISTING UTILITY
- EXISTING PLANIMETRICS
- DITCH FLOWLINE
- PROPOSED DRAINAGE
- (RFD) PROPOSED ROCK FILTER DAM
- (SCF) PROPOSED TEMP SEDMT CONT
- PROPOSED TEMP/PROP SEEDING
- PROPOSED PERM SEEDING & TOPSOIL WITH CL 2 SRB

NOTE:
PLACE TEMPORARY EROSION CONTROL ITEMS IN PHASE 1 OF TRAFFIC CONTROL PLAN, INCLUDING ROCK FILTER DAMS, TEMP SEDMT CONT FENCE, AND TEMPORARY SEEDING.

EROSION CONTROL LOGS MAY BE USED IN LEU OF SEDMT CONT FENCE IF APROVED BY ENGINEER.

STATE OF TEXAS
CODY J. MOCZYGEMBA
133448
LICENSED
PROFESSIONAL ENGINEER
10/5/2022

0 50 100 150
SCALE: 1"= 100'

LJA Engineering, Inc.
FRN - F-1386

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SH 153 AT VALLEY CREEK

STORM WATER POLLUTION PREVENTION PLAN

TCP PHASE 1

BEGIN TO STA 430+00

SHEET 1 OF 4

DGN: CM	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DG	6	TX				SH 153
DWG: CM	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DG	SJT	RUNNELS	0650	03	031	118

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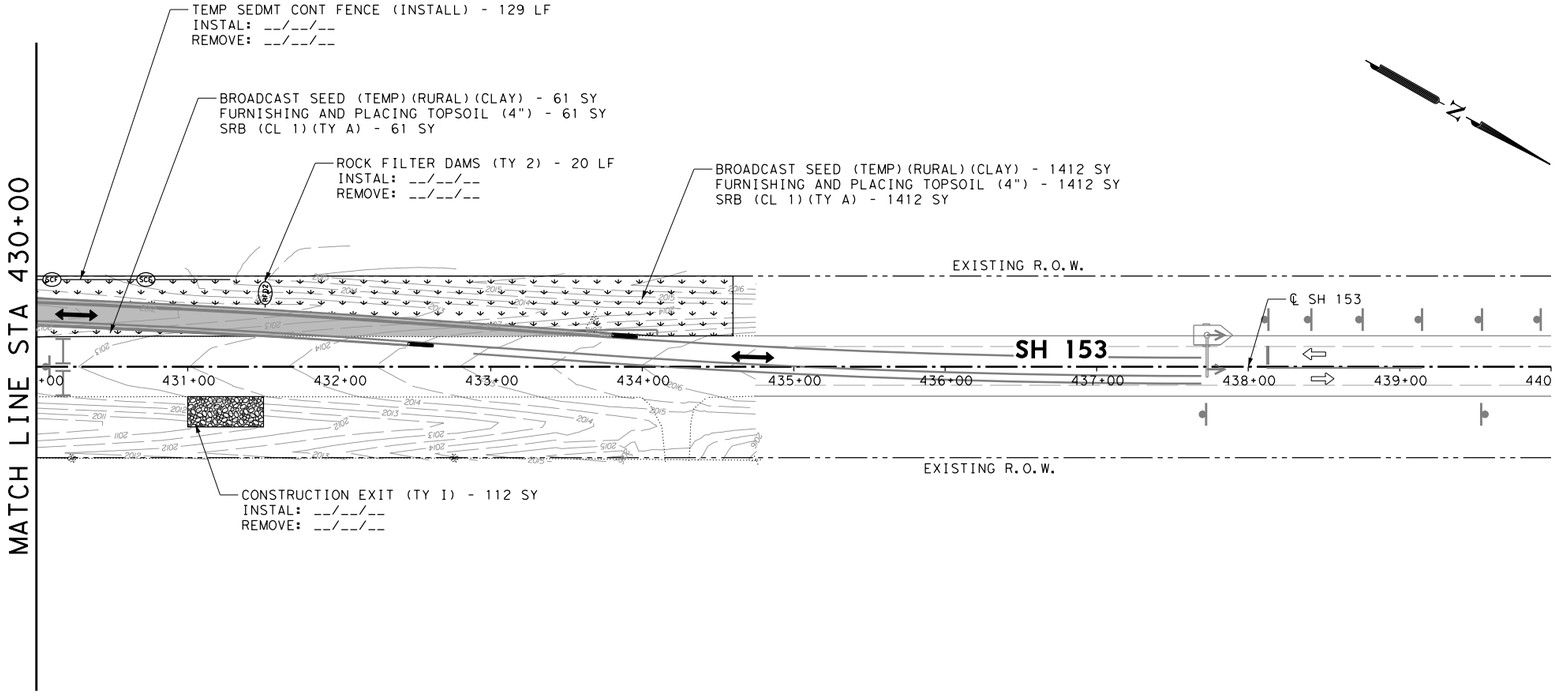
Plotted on: 10/5/2022



LEGEND

- EXISTING R.O.W.
- EX DRAINAGE EASEMENT
- EXISTING UTILITY
- EXISTING PLANIMETRICS
- DITCH FLOWLINE
- PROPOSED DRAINAGE
- PROPOSED ROCK FILTER DAM
- PROPOSED TEMP SEDMT CONT
- PROPOSED TEMP/PROP SEEDING
- PROPOSED PERM SEEDING & TOPSOIL WITH CL 2 SRB

NOTE:
PLACE TEMPORARY EROSION CONTROL ITEMS IN PHASE 1 OF TRAFFIC CONTROL PLAN, INCLUDING ROCK FILTER DAMS, TEMP SEDMT CONT FENCE, AND TEMPORARY SEEDING.

EROSION CONTROL LOGS MAY BE USED IN LEU OF SEDMT CONT FENCE IF APROVED BY ENGINEER.

STATE OF TEXAS
CODY J. MOCZYGEMBA
133448
LICENSED
PROFESSIONAL ENGINEER
10/5/2022

0 50 100 150
SCALE: 1"= 100'

LJA Engineering, Inc.
FRN - F-1386

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

Texas Department of Transportation

SH 153 AT VALLEY CREEK
STORM WATER POLLUTION PREVENTION PLAN
TCP PHASE 1
STA 430+00 TO END

SHEET 2 OF 4

DGN: CM	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DG	6	TX				SH 153
DWG: CM	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DG	SJT	RUNNELS	0650	03	031	119

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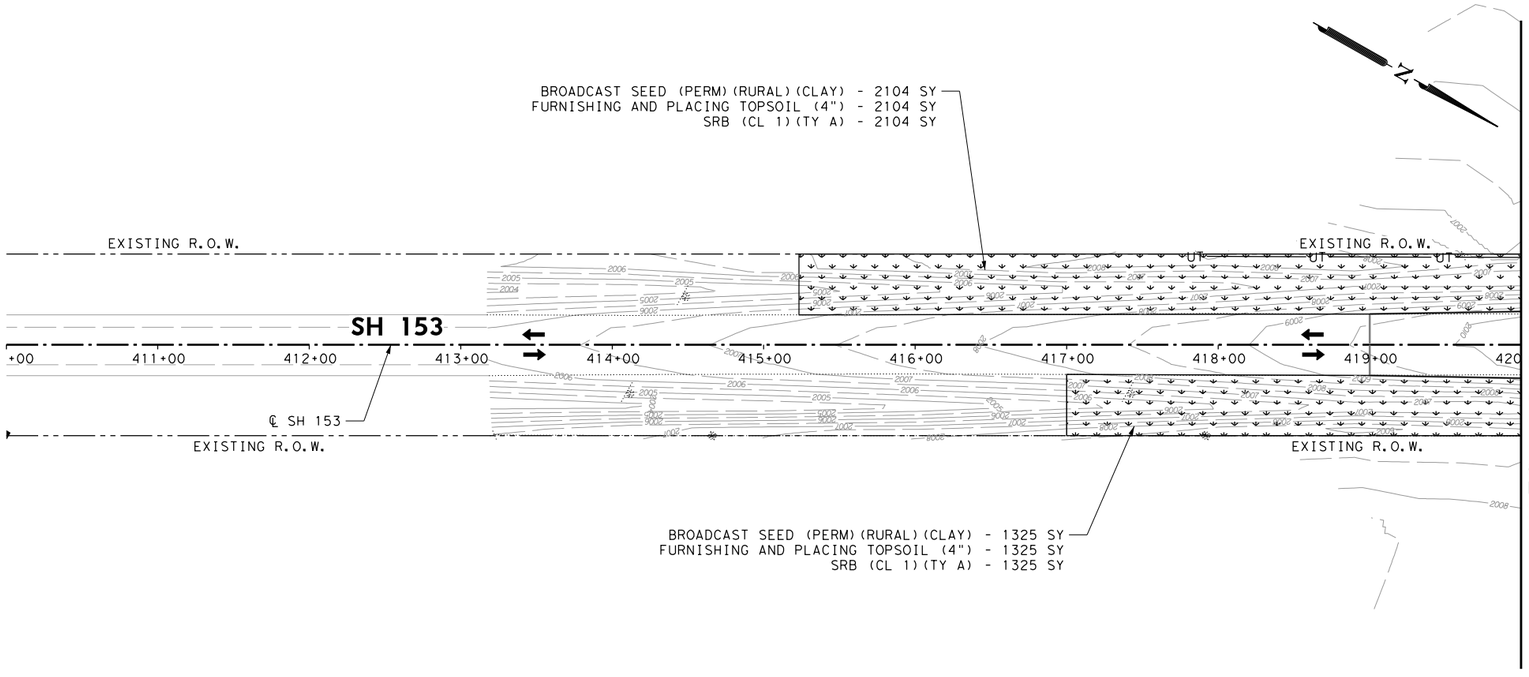
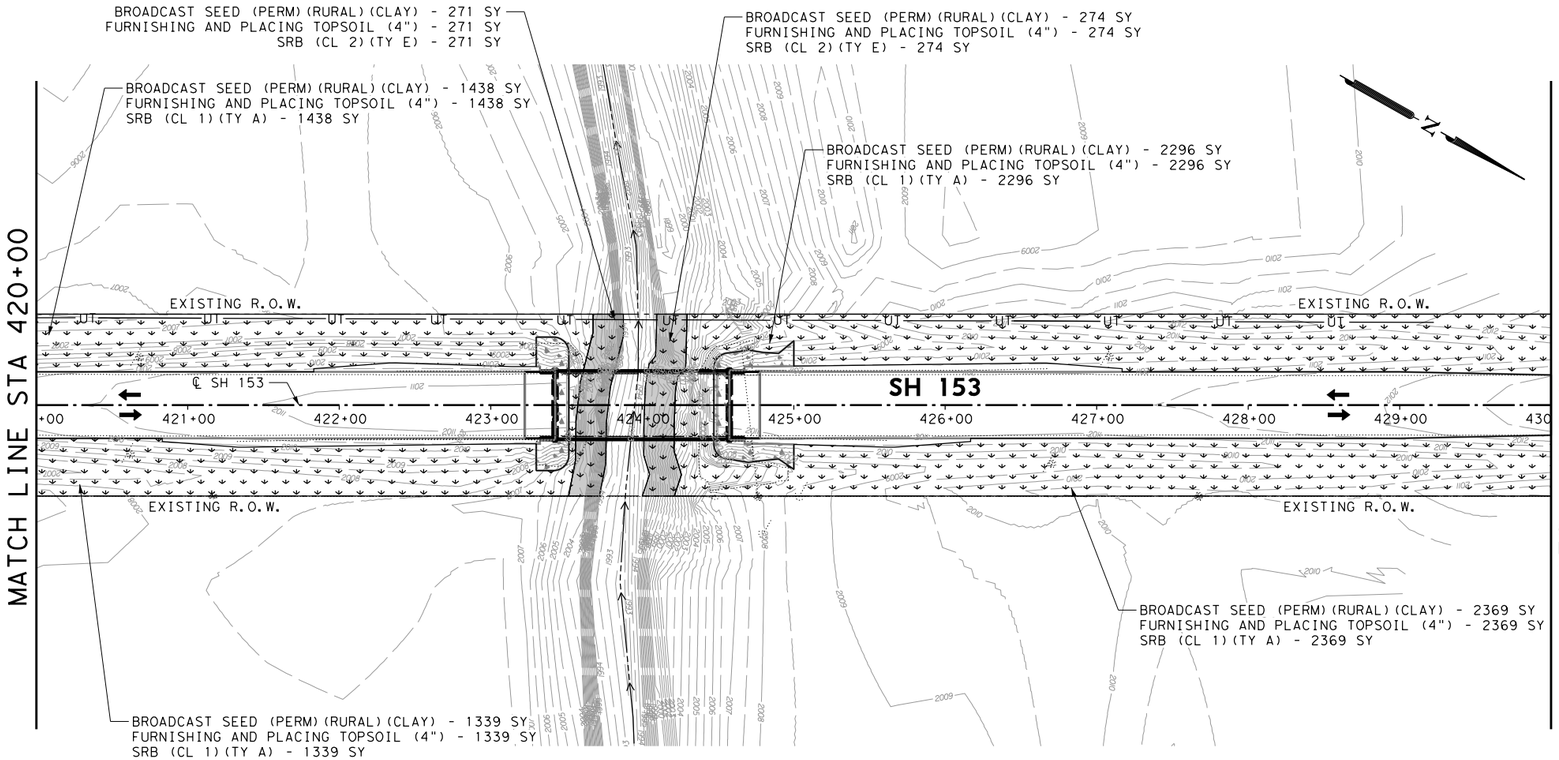




LEGEND

- EXISTING R.O.W.
- EX DRAINAGE EASEMENT
- EXISTING UTILITY
- EXISTING PLANIMETRICS
- DITCH FLOWLINE
- PROPOSED DRAINAGE
- RFD — PROPOSED ROCK FILTER DAM
- SCF — PROPOSED TEMP SEDMT CONT
- PROPOSED TEMP/PROP SEEDING
- PROPOSED PERM SEEDING & TOPSOIL WITH CL 2 SRB

NOTE:
PLACE TEMPORARY EROSION CONTROL ITEMS IN PHASE 1 OF TRAFFIC CONTROL PLAN, INCLUDING ROCK FILTER DAMS, TEMP SEDMT CONT FENCE, AND TEMPORARY SEEDING.

EROSION CONTROL LOGS MAY BE USED IN LEU OF SEDMT CONT FENCE IF APROVED BY ENGINEER.

PLACE TOPSOIL AND PERMANENT SEEDING AFTER REMOVAL OF TEMPORARY DETOUR.

STATE OF TEXAS
CODY J. MOCZYGEMBA
133448
LICENSED
PROFESSIONAL ENGINEER
10/5/2022

0 50 100 150
SCALE: 1"= 100'

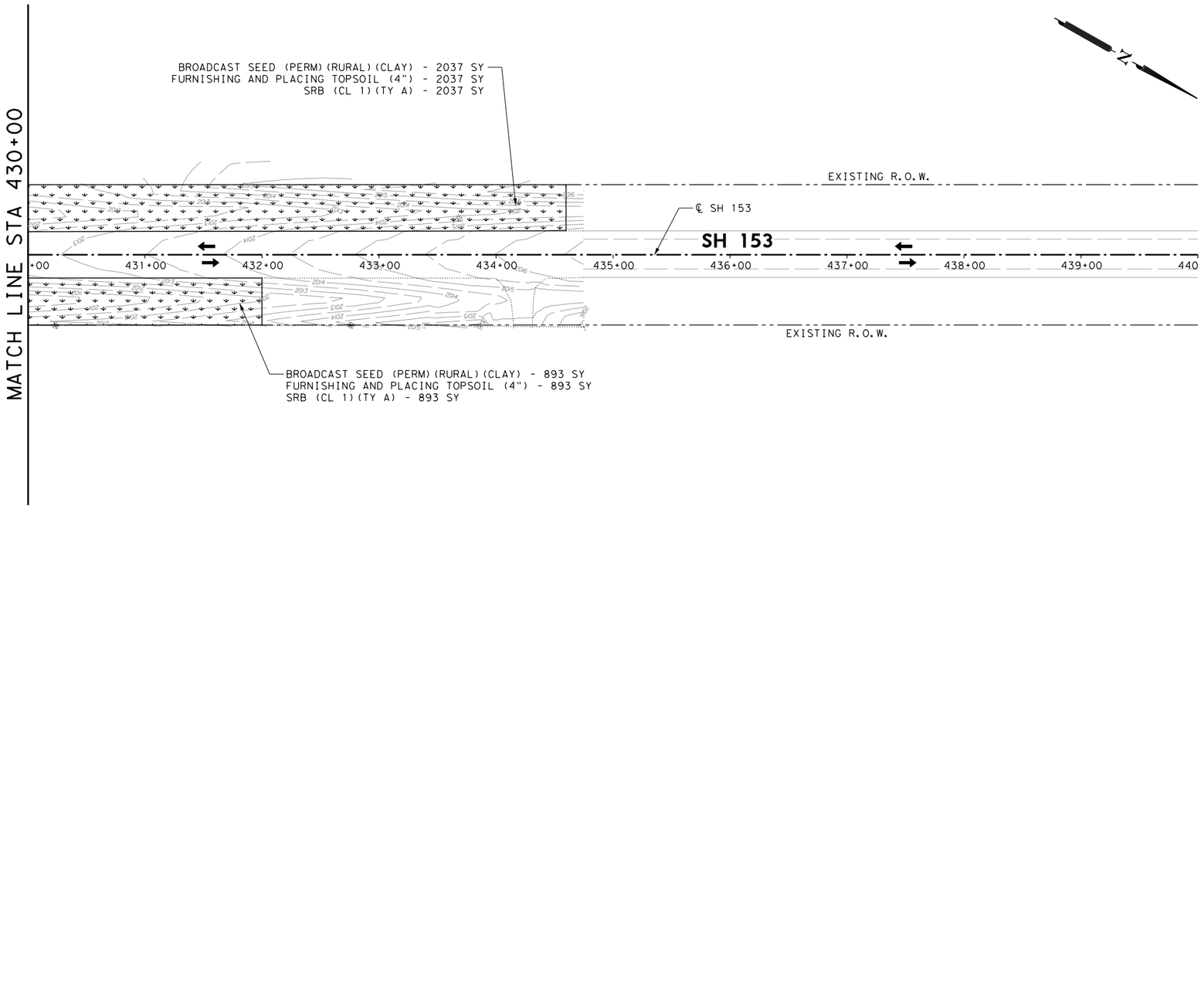
LJA Engineering, Inc.
FRN - F-1386

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SH 153 AT VALLEY CREEK
STORM WATER POLLUTION PREVENTION PLAN
POST CONSTRUCTION
BEGIN TO STA 430+00

SHEET 3 OF 4

DGN: CM	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DG	6	TX				SH 153
DWG: CM	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
CHK DWG: DG	SJT	RUNNELS	0650	03	031	120



LEGEND

- EXISTING R.O.W.
- EX DRAINAGE EASEMENT
- EXISTING UTILITY
- EXISTING PLANIMETRICS
- DITCH FLOWLINE
- PROPOSED DRAINAGE
- PROPOSED ROCK FILTER DAM (RFD)
- PROPOSED TEMP SEDMT CONT (SCF)
- PROPOSED TEMP/PROP SEEDING
- PROPOSED PERM SEEDING & TOPSOIL WITH CL 2 SRB

NOTE:
PLACE TEMPORARY EROSION CONTROL ITEMS IN PHASE 1 OF TRAFFIC CONTROL PLAN, INCLUDING ROCK FILTER DAMS, TEMP SEDMT CONT FENCE, AND TEMPORARY SEEDING.

EROSION CONTROL LOGS MAY BE USED IN LEU OF SEDMT CONT FENCE IF APROVED BY ENGINEER.

PLACE TOPSOIL AND PERMANENT SEEDING AFTER REMOVAL OF TEMPORARY DETOUR.

STATE OF TEXAS
CODY J. MOCZYGEMBA
133448
LICENSED
PROFESSIONAL ENGINEER
10/5/2022

0 50 100 150
SCALE: 1"= 100'

LJA Engineering, Inc.
FRN - F-1386

STRUCTURAL ENGINEERING ASSOCIATES, INC.
CONSULTING ENGINEERS
TBPE FIRM REG. NO. F-199

SH 153 AT VALLEY CREEK

STORM WATER POLLUTION PREVENTION PLAN

POST CONSTRUCTION

STA 430+00 TO END

DGN: CM	FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
CHK DGN: DG	6	TX				SH 153
DWG: CM	DIST.	COUNTY	CONT. NO.	SECT. NO.	JOB NO.	SHEET NO.
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Plotted on: 10/5/2022

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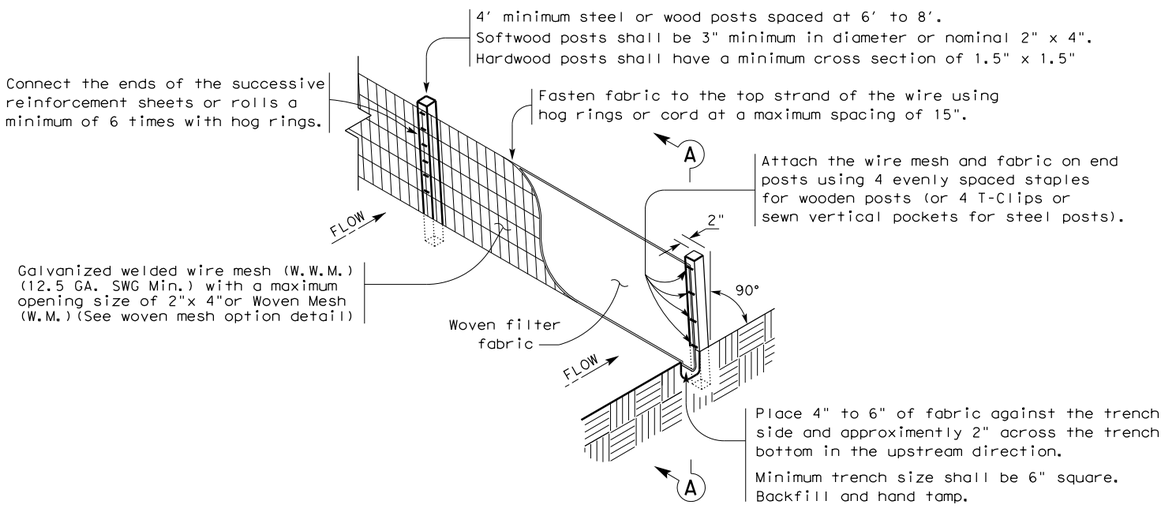
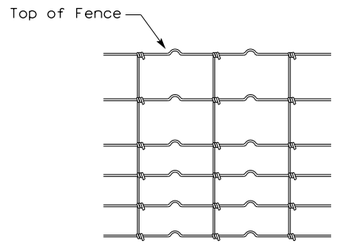
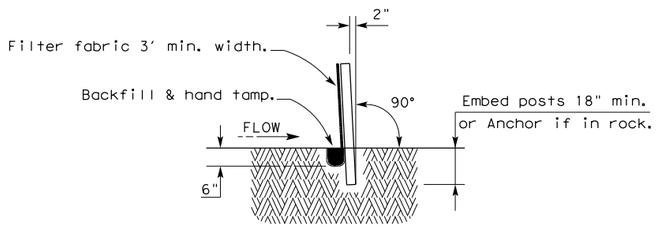


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

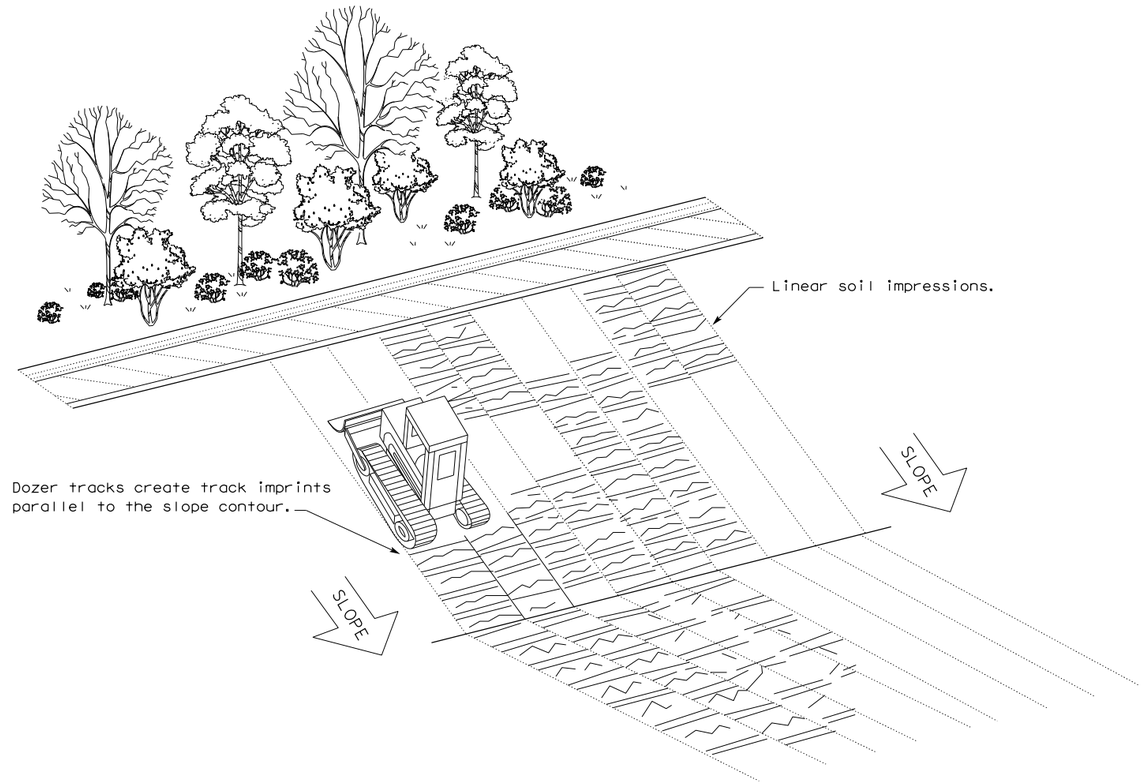
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0650	03	031		SH 153	
	DIST	COUNTY			SHEET NO.	
	SJT	RUNNELS			122	

DATE
FILE

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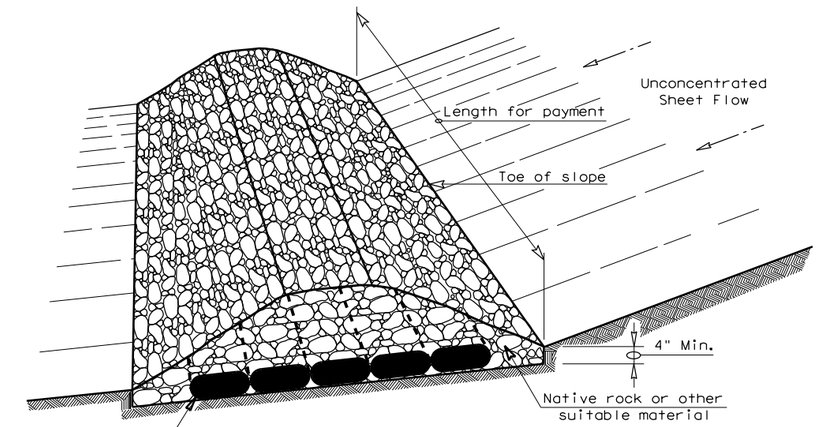
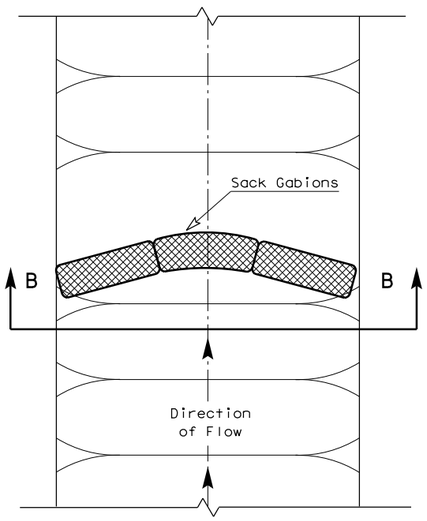
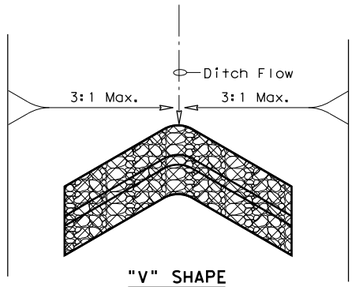


FILTER DAM AT TOE OF SLOPE

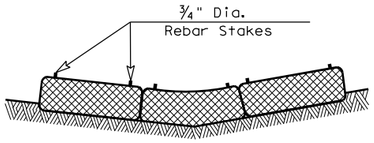
RFD1



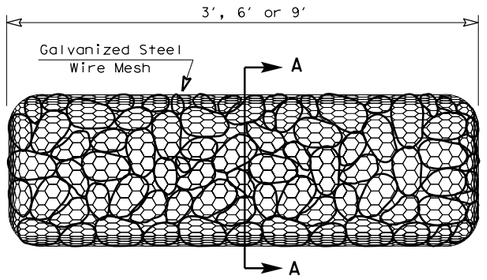
PLAN VIEW



"V" SHAPE PLAN VIEW

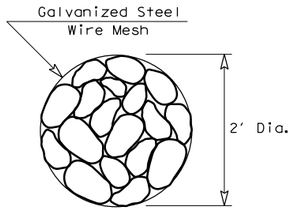


SECTION B-B

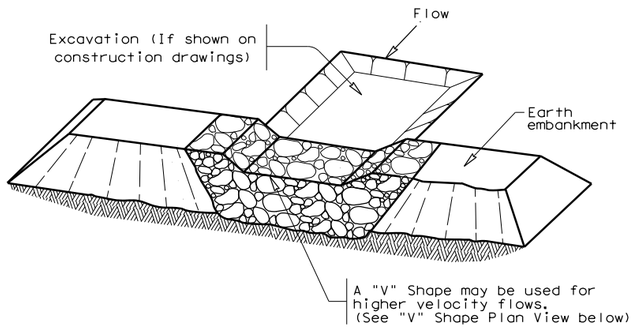


TYPE 4 (SACK GABIONS)

RFD4

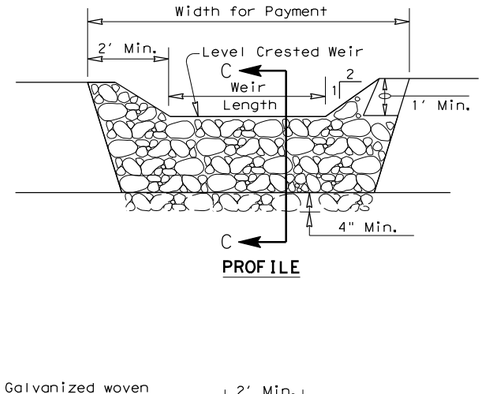


SECTION A-A

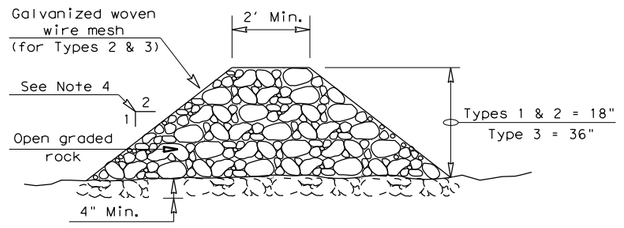


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



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.

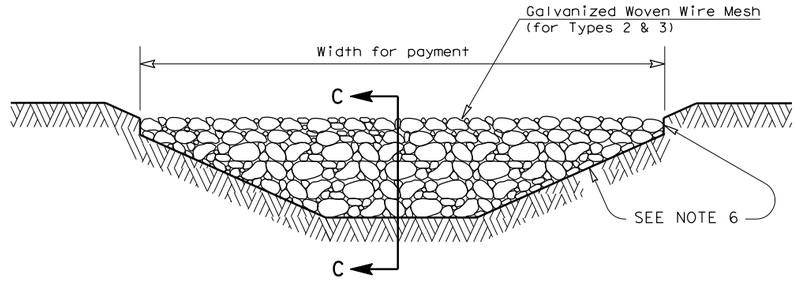
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity 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.



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

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

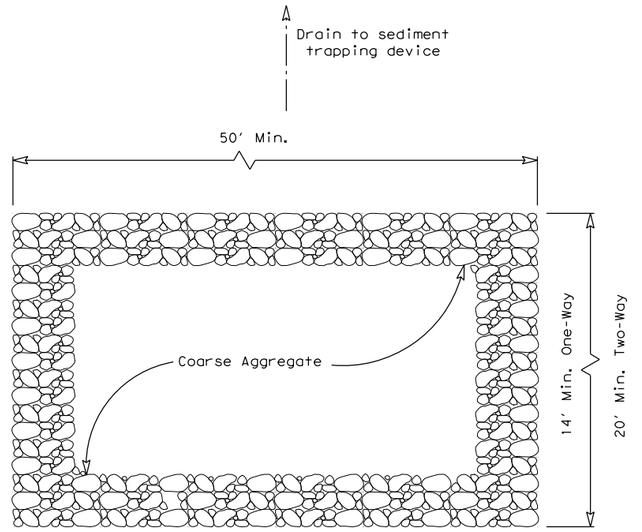
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

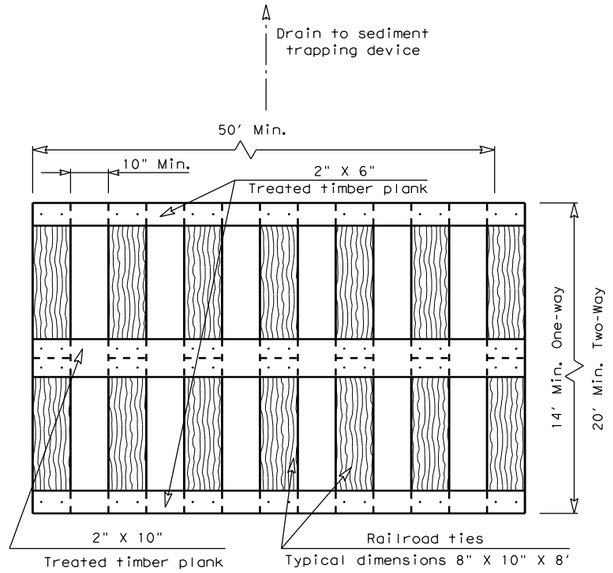
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		123

DATE:
FILE:



PLAN VIEW



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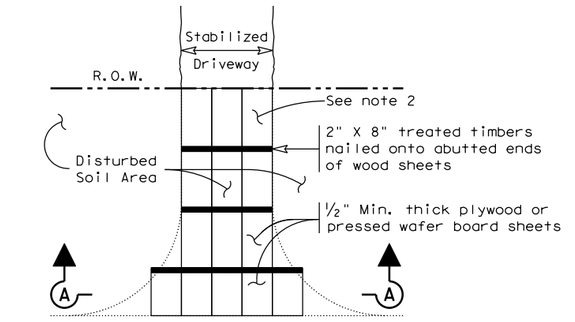
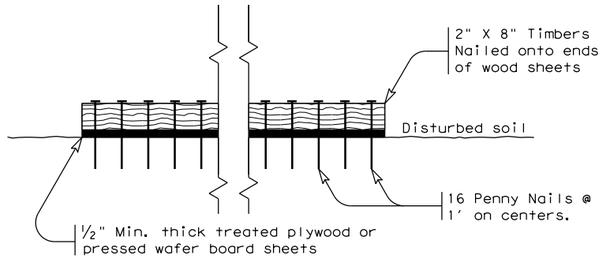


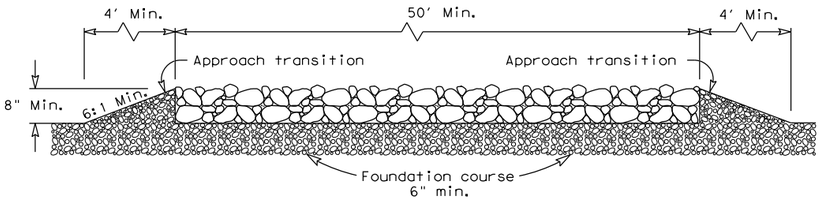
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

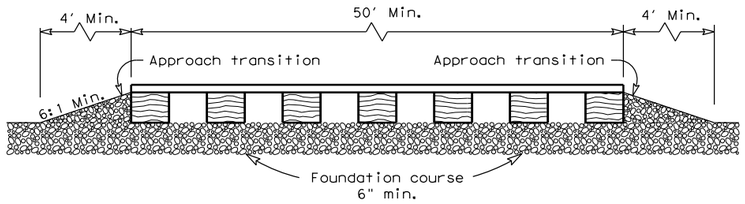
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

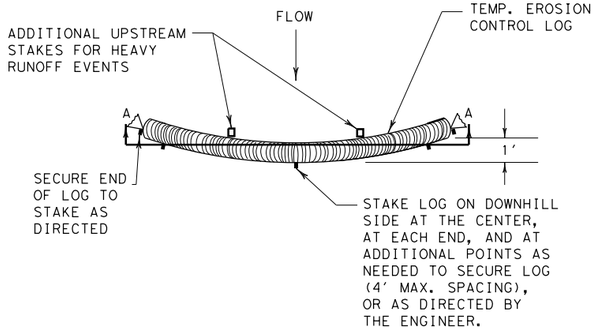
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

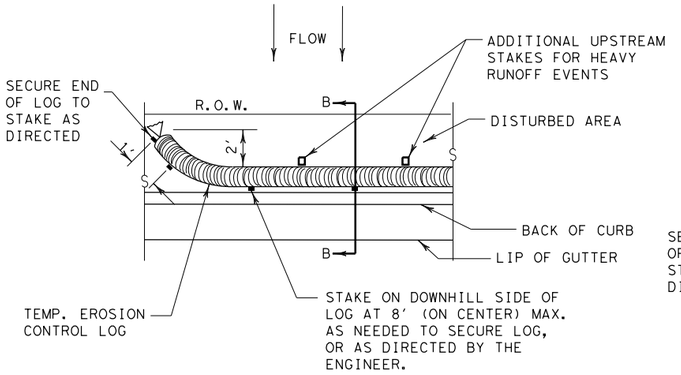
EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		124

DATE:
FILE:



PLAN VIEW



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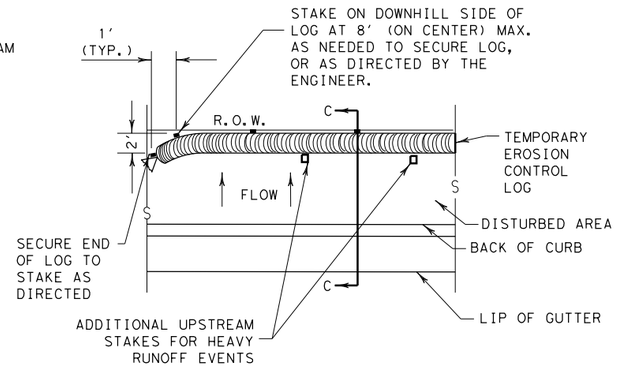
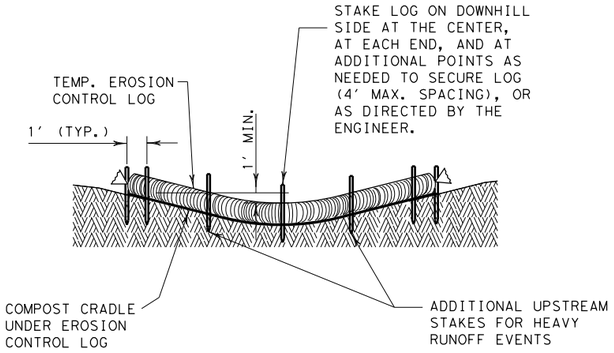


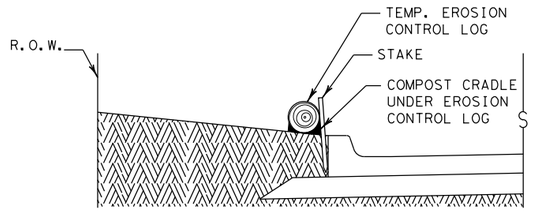
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

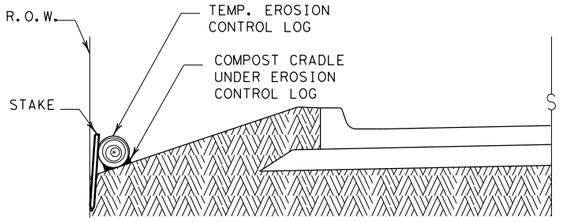
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



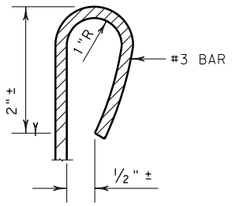
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

LEGEND

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



REBAR STAKE DETAIL

GENERAL NOTES:

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

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

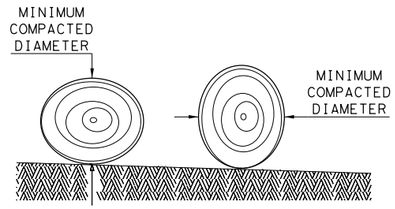
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

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

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

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



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916		DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0650	03	031		SH 153	
		DIST		COUNTY			SHEET NO.
		SJT		RUNNELS			125

DATE:
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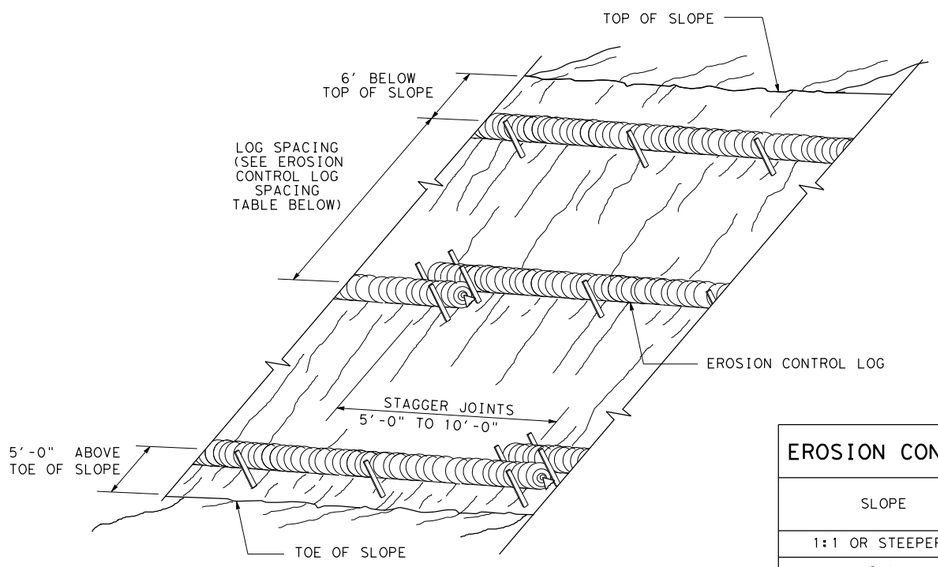
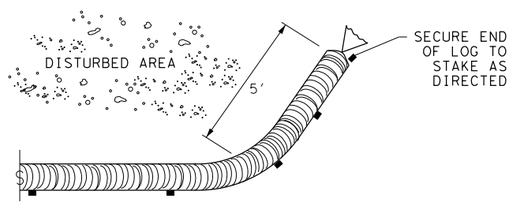


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

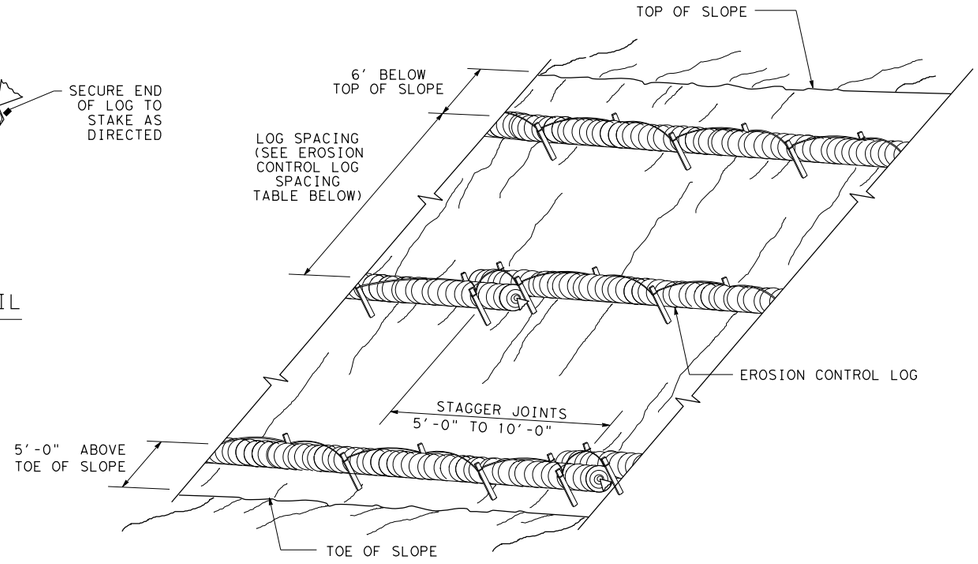
CL-SST



END SECTION RAP DETAIL

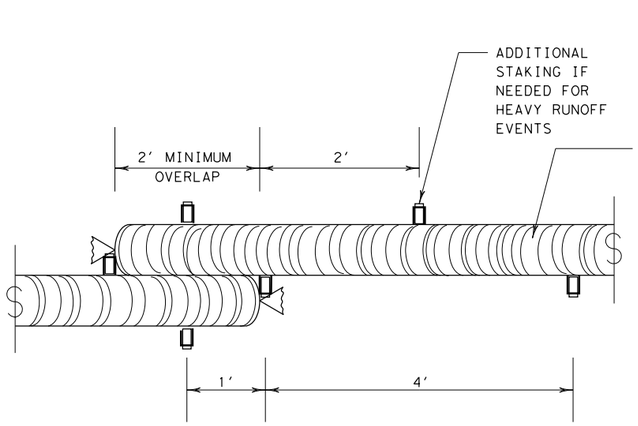
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

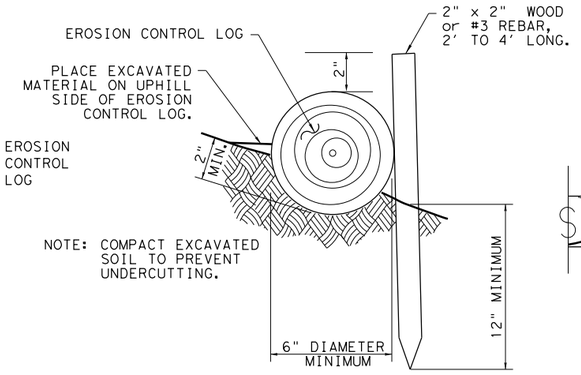
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

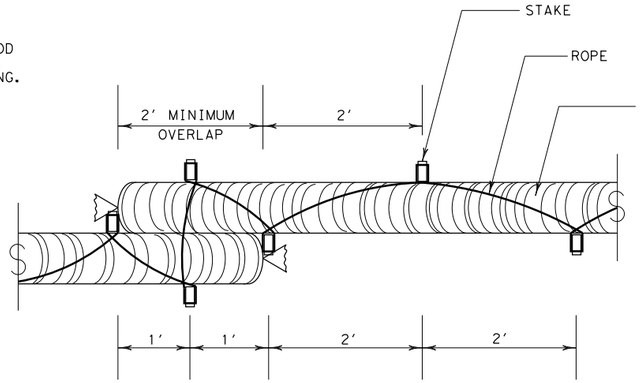


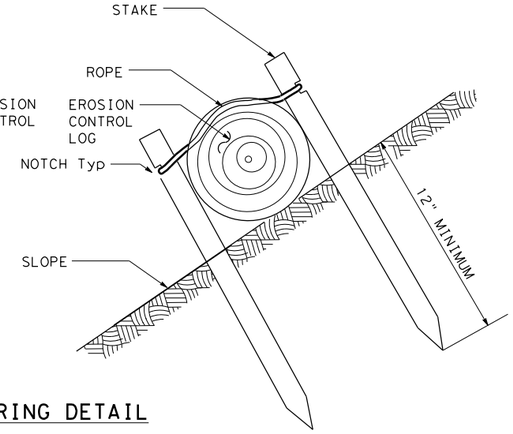


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

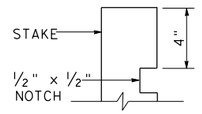
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

Design Division Standard

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

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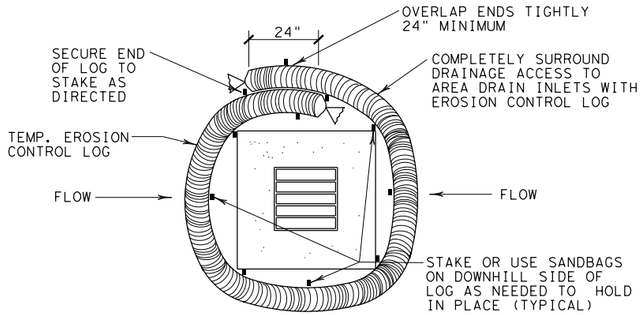
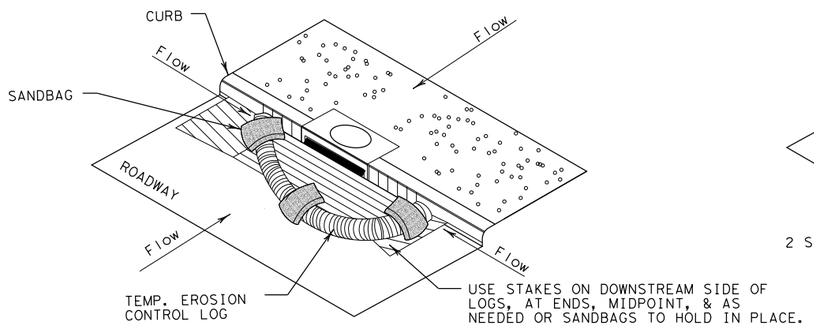
REVISIONS	0650	03	031	SH 153
	DIST	COUNTY		SHEET NO.
	SJT	RUNNELS		126

DATE:
FILE:



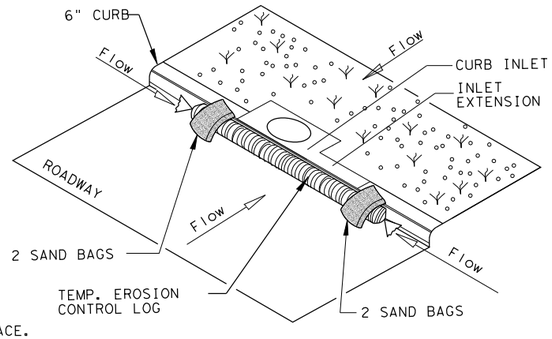
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

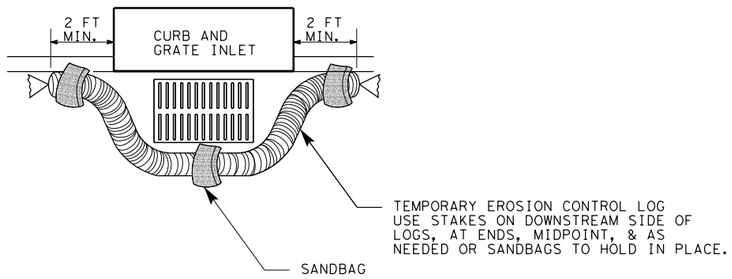
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

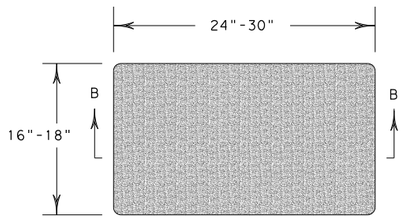
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

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	SJT	RUNNELS					127