INDEX OF SHEETS

SEE SHEET NO. 2

FUNCTIONAL CLASS = PRINCIPAL ATERIAL

FEDERAL-AID PROJECT NUMBER			
F 2021(714)			
CONT	SECT	JOB	HIGHWAY
0069	03	060, ETC.	US 87, ETC.
DIST	COUNTY		SHEET NO.
SJT	STERLING, ECT.		1

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT

US 87, ETC.
STERLING, ETC.

NET LENGTH OF PROJECT
ROADWAY = 141,004.32 FT = 26.705 MI
BRIDGE = 0 FT = 0.000 MI
TOTAL = 141,004.14 FT = 26.705 MI

LIMITS: FROM SH 158
TO TOM GREEN CO LINE

FOR THE INSTALLATION OF MEDIAN CABLE BARRIER

FINAL PLANS

Letting Date: ____________

Name of Contractor: ____________

Date Work Began: ____________

Date Work Completed: ____________

Date Work Accepted: ____________

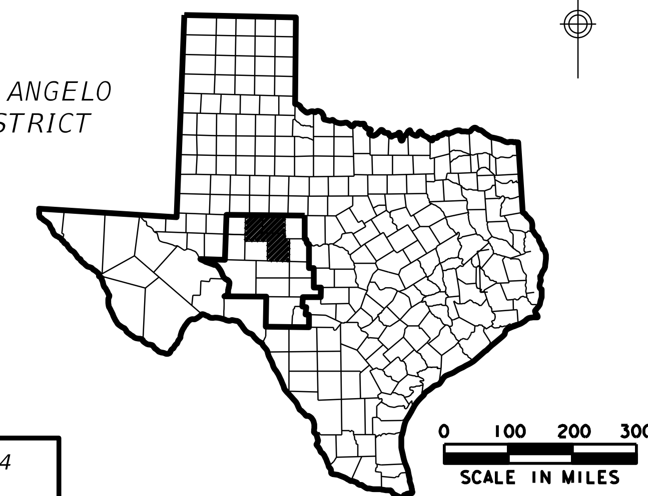
Final Contract Cost: ____________

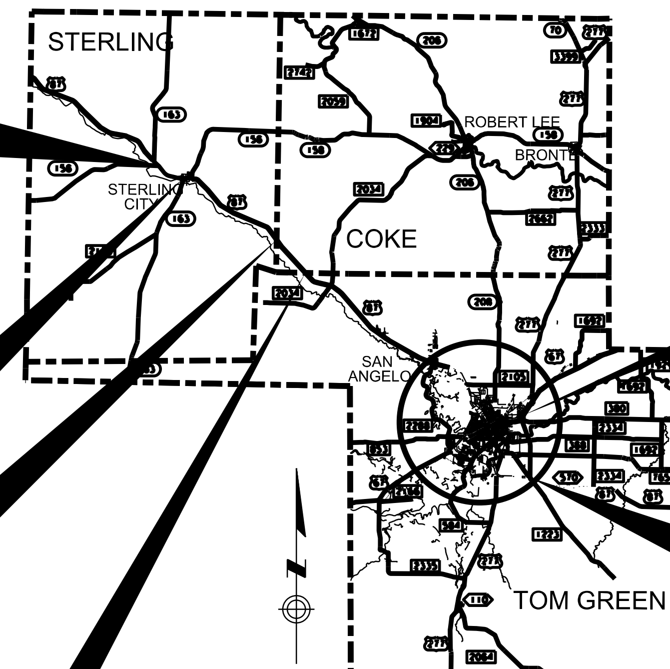
Project was built according to the Plans & Specifications. These final plans reflect the work done and the quantities shown thereon and on the Final Estimate are Final Quantities.

Area Engineer   Date

Summary of Change Orders:

SAN ANGELO DISTRICT





BEGIN PROJECT CCSJ 0069-03-060, etc.
BEGIN C-S-J 0069-03-60
STA 0+00.00
TRM 420+1.013
DFO 394.636
BEGIN MILE POINT 17.068
LATITUDE 31.852470°
LONGITUDE -101.032777°

END C-S-J 0069-03-060
END MILE 19.845
BEGIN C-S-J 0069-04-044
STA 173+31.97
TRM 422+1.789
DFO 397.413
BEGIN MILE POINT 0.187
LATITUDE 31.836558°
LONGITUDE -100.9918537°

END C-S-J 0069-04-044
END MILE POINT 12.319
BEGIN C-S-J 0069-05-030
STA 813+88.93
TRM 436+0.002
DFO 409.545
BEGIN MILE POINT 1.000
LATITUDE 31.7451264°
LONGITUDE -100.8249305°

END C-S-J 0069-05-030
END MILE POINT 5.578
STA 1055+77.38
TRM 442+0.005
DFO 414.123
LATITUDE 31.6963978°
LONGITUDE -100.7744243°

END C-S-J 0264-07-034
STA 369+08.16
TRM 386+1.747
DFO 16.528
MILE POINT 6.889
LATITUDE 31.48216636°
LONGITUDE -100.3851665°

BEGIN C-S-J 0264-07-034
STA 14+42.40
TRM 382-1.003
DFO 9.811
BEGIN MILE POINT 0.172
LATITUDE 31.3866257°
LONGITUDE -100.373823°

EXCEPTIONS
NONE

EQUATIONS
NONE

RAILROAD CROSSINGS
NONE

2021 Texas Department of Transportation

SUBMITTED FOR LETTING: 5/12/2021
DocuSigned by:
Randee Shields P.E.
BA73DA470CAD492...
District Design Engineer

RECOMMENDED FOR LETTING: 5/12/2021
DocuSigned by:
P.E.
826185212F51427...
District Director of TP&D

APPROVED FOR LETTING: 5/12/2021
DocuSigned by:
BC10B17FA709437...
District Engineer

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL G(PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL TION CONTRACTS (FORM FHWA 1273, MAY 1, 2012).

DATE: 4/28/2021 5:22:49 PM
FILE: pw:\\azbpw1.azb-engrs.com:PWAZBPROD01\Documents\Collaboration Projects\TxDOT\220013.001\0069-03-060\4 - Design\Plan Set\1. General\AZB GEN\001-TITLE SHEET.dgn

STATE OF TEXAS
JUAN RAMON FLORES
66715
REGISTERED PROFESSIONAL ENGINEER

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

NAME P.E. DATE 4-27-2021

STATE OF TEXAS
JOSE LUIS DIAZ, JR.
99365
REGISTERED PROFESSIONAL ENGINEER

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

NAME DATE 4-27-2021

SHEET 1 OF 1

NO.	REVISIONS	BY	DATE

POZNECKI CAMARILLO INC.
(210) 349-3273
(210) 349-4395 (FAX)
5835 CALLAGHAN RD. SUITE 200
SAN ANTONIO, TEXAS, 78228
TBPE REG. NO. F-483
http://www.pozcom.com/

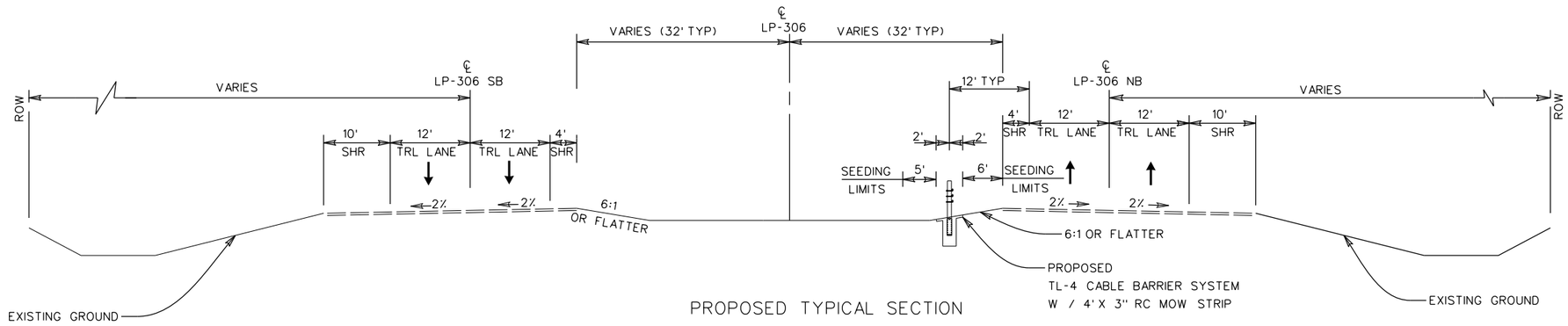
AZ&B
ARREDONDO, ZEPEDA & BRUNZ, LLC
11355 McCree Road - Dallas, Texas 75238
(214) 341-9900
FIRM REGISTRATION No. F-10098

US87/LP306
INDEX SHEET

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	F 2021(714)		2
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

0 10 20 30 40

HORIZ. SCALE IN FEET



PROPOSED TYPICAL SECTION

CABLE BARRIER RIGHT
OF C/L LP-306 (NBML)

BEGIN CSJ:0069-03-060
STA. 32+90 TO STA. 40+43
STA. 49+32 TO STA. 57+84
STA. 67+80 TO STA. 77+45
STA. 88+53 TO STA. 92+91
STA. 99+91 TO STA. 106+04
STA. 113+46 TO STA. 137+81
STA. 163+44 TO STA. 193+01
STA. 195+04 TO STA. 217+43
STA. 325+60 TO STA. 350+11

NOTES:

1. PLACE MOWSTRIP TO EXISTING GRADE WHEN THE GRADE IS 6:1 OR FLATTER, OR AS DIRECTED BY THE ENGINEER.
2. VERIFY ALL SLOPE CONDITIONS TO ENSURE THE DESIRED SLOPES ARE ATTAINABLE PRIOR TO PLACING MOWSTRIP.
3. SEEDING QUANTITIES CALCULATED BASED ON A 11 LF WIDTH.
4. FOR LIMITS AND DETAILS OF CABLE BARRIER SYSTEM SEE THE "STRAIGHT LINE DIAGRAM" AND "CABLE BARRIER TERMINATION DETAILS" SHEETS.

STATE OF TEXAS
JUAN RAMON FLORES
66715
REGISTERED PROFESSIONAL ENGINEER

Juan Flores P.E. 4-27-2021

SHEET 1 OF 2

NO.	REVISIONS	BY	DATE

ARREDONDO, ZEPEDA & BRUNZ, LLC
11355 McCree Road - Dallas, Texas 75238
(214) 341-9900
FIRM REGISTRATION No. F-10098

Texas Department of Transportation

LP-306
CABLE BARRIER
TYPICAL SECTIONS

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			3
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, Etc.	US 87, ETC.

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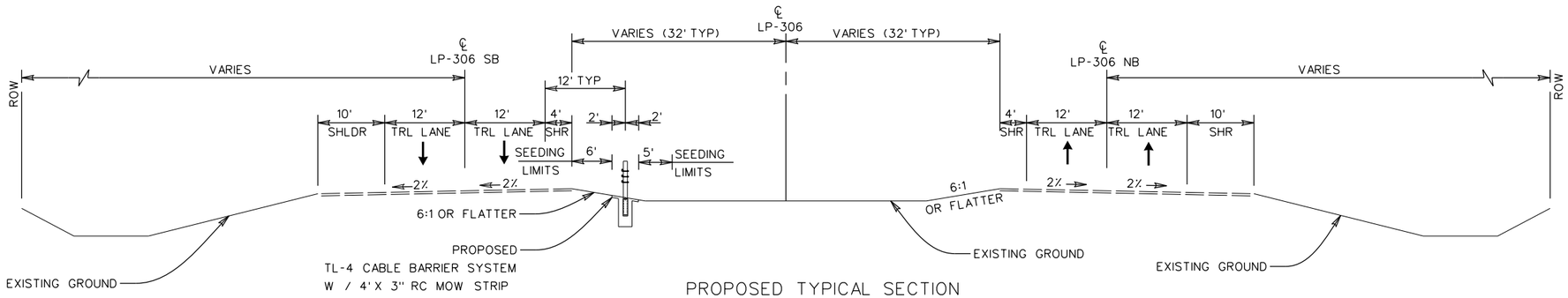
HORIZ. SCALE IN FEET



PROPOSED TYPICAL SECTION

CABLE BARRIER LEFT
OF C/L LP-306 (SBML)
BEGIN CSJ:0069-03-060
STA. 19•66 TO STA. 30•94
STA. 39•83 TO STA. 47•36
STA. 57•24 TO STA. 65•75
STA. 76•84 TO STA. 86•49
STA. 92•33 TO STA. 97•94
STA. 105•44 TO STA. 111•57
STA. 144•12 TO STA. 161•45
STA. 224•19 TO STA. 243•13
STA. 258•14 TO STA. 288•85
STA. 289•25 TO STA. 326•75

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4. FOR LIMITS AND DETAILS OF CABLE BARRIER SYSTEM SEE THE "STRAIGHT LINE DIAGRAM" AND "CABLE BARRIER TERMINATION DETAILS" SHEETS.

STATE OF TEXAS
JUAN RAMON FLORES
66715
REGISTERED
PROFESSIONAL ENGINEER

Juan Flores P.E. 4-27-2021

SHEET 2 OF 2

NO.	REVISIONS	BY	DATE

ARREDONDO, ZEPEDA & BRUNZ, LLC
11355 McCree Road - Dallas, Texas 75238
(214) 341-9900
FIRM REGISTRATION No. F-10098

Texas Department of Transportation

LP-306
CABLE BARRIER
TYPICAL SECTIONS

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			4
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, Etc.	US 87, ETC.

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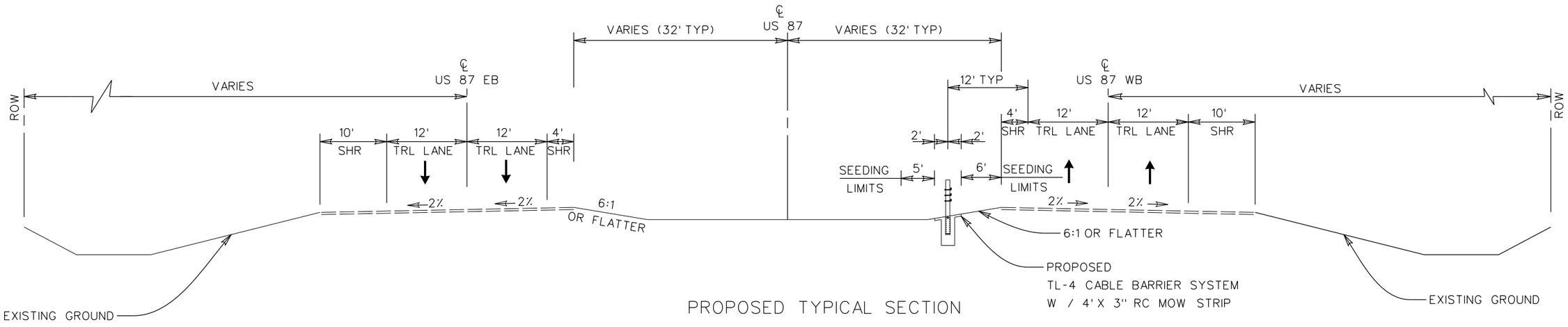

PROPOSED TYPICAL SECTION

CABLE BARRIER RIGHT
OF C/L US 87 (EBML)

BEGIN CSJ:0069-03-060
STA. 25+25 TO STA. 32+12
STA. 33+89 TO STA. 50+66
STA. 52+37 TO STA. 81+33
STA. 83+30 TO STA. 91+53
STA. 93+71 TO STA. 104+03

CABLE BARRIER RIGHT
OF C/L US 87 (EBML)

BEGIN CSJ:0069-03-044
STA. 274+32 TO STA. 300+52
STA. 328+32 TO STA. 343+54
STA. 357+80 TO STA. 364+22
STA. 372+26 TO STA. 413+99
STA. 415+39 TO STA. 448+41
STA. 456+54 TO STA. 460+97
STA. 468+92 TO STA. 496+96
STA. 522+47 TO STA. 540+58
STA. 558+88 TO STA. 590+00
STA. 620+14 TO STA. 632+00
STA. 634+43 TO STA. 665+10
STA. 671+37 TO STA. 677+83
STA. 700+58 TO STA. 703+77
STA. 711+88 TO STA. 718+02
STA. 758+00 TO STA. 776+00
STA. 794+40 TO STA. 803+15

CABLE BARRIER RIGHT
OF C/L US 87 (EBML)

BEGIN CSJ:0069-05-030
STA. 823+89 TO STA. 873+06
STA. 920+04 TO STA. 926+53
STA. 920+04 TO STA. 953+10
STA. 970+26 TO STA. 982+00
STA. 995+85 TO STA. 1000+28
STA. 1002+56 TO STA. 1020+35
STA. 1028+18 TO STA. 1047+41

NOTES:

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3. SEEDING QUANTITIES CALCULATED BASED ON A 11 LF WIDTH.
4. FOR LIMITS AND DETAILS OF CABLE BARRIER SYSTEM SEE THE "STRAIGHT LINE DIAGRAM" AND "CABLE BARRIER TERMINATION DETAILS" SHEETS.

STATE OF TEXAS
JOSE LUIS DIAZ, JR.
99365
REGISTERED PROFESSIONAL ENGINEER
4/28/2021

SHEET 1 OF 2

NO.	REVISIONS	BY	DATE

POZNECKI CAMARILLO INC
(210) 349-3273
(210) 349-4395 (FAX)
5835 CALLAGHAN RD. SUITE 200
SAN ANTONIO, TEXAS, 78228
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Texas Department of Transportation

US87

TYPICAL SECTION

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			5
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

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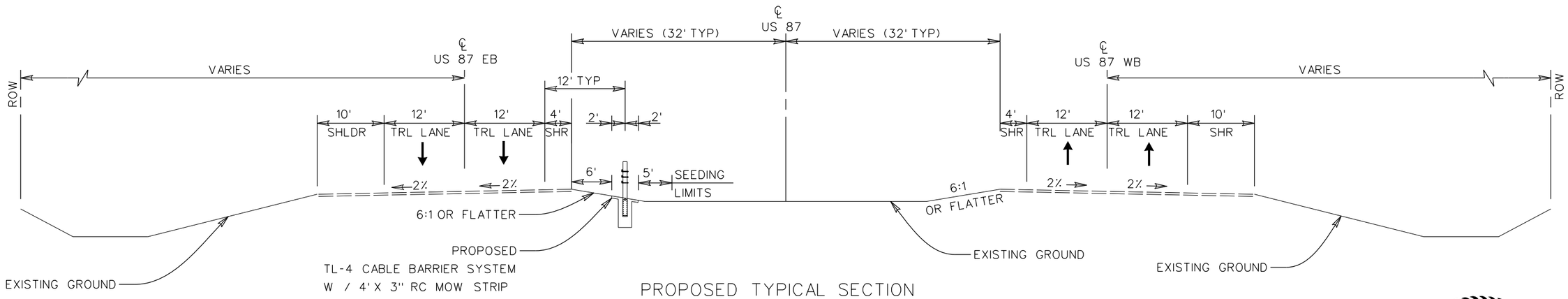

PROPOSED TYPICAL SECTION

CABLE BARRIER LEFT
OF C/L US 87 (WBML)

BEGIN CSJ:0069-03-060
STA. 103+00 TO STA. 112+81
STA. 115+14 TO STA. 127+35
STA. 129+38 TO STA. 148+34

CABLE BARRIER LEFT
OF C/L US 87 (WBML)

BEGIN CSJ:0069-03-044
STA. 233+58 TO STA. 271+98
STA. 298+82 TO STA. 326+08
STA. 343+31 TO STA. 355+58
STA. 363+63 TO STA. 369+88
STA. 447+77 TO STA. 454+19
STA. 462+28 TO STA. 466+45
STA. 496+48 TO STA. 520+51
STA. 537+89 TO STA. 556+49
STA. 589+52 TO STA. 617+79
STA. 677+23 TO STA. 698+19
STA. 706+56 TO STA. 709+58
STA. 717+42 TO STA. 747+92
STA. 775+43 TO STA. 792+17
STA. 802+60 TO STA. 813+88

CABLE BARRIER LEFT
OF C/L US 87 (WBML)

BEGIN CSJ:0069-05-030
STA. 874+46 TO STA. 917+66
STA. 957+89 TO STA. 967+98
STA. 981+47 TO STA. 993+70
STA. 1019+76 TO STA. 1025+88

NOTES:

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STATE OF TEXAS
JOSE LUIS DIAZ, JR.
99365
REGISTERED
PROFESSIONAL ENGINEER
4/27/2021

SHEET 2 OF 2

NO.	REVISIONS	BY	DATE

POZNECKI CAMARILLO INC
(210) 349-3273
(210) 349-4395 (FAX)
5835 CALLAGHAN RD. SUITE 200
SAN ANTONIO, TEXAS, 78228
TBPE REG. NO. F-483
http://www.pozcam.com/

AZ&B
ARREDONDO, ZEPEDA & BRUNZ, LLC
11355 McCree Road - Dallas, Texas 75238
(214) 341-9900
FIRM REGISTRATION No. F-10098

Texas Department of Transportation

US87

TYPICAL SECTION

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			6
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

GENERAL NOTES

The following Standard Sheets have been modified: **None**

Locate the project bulletin board at an approved location within the project limits such as at a field office, staging area, or stockpile, and make accessible to the public at all times. Do not remove the bulletin board from the project until approved. If a construction site notice is required for the project, post a copy at each geographically separated work location.

In those instances where fixed features require, vary the governing slopes indicated in these plans from within the limits to the extent determined.

If Contractor elects to establish a pit within 200 ft. of a public road, construct a barrier or other device in accordance with Natural Resources Code, Chapter 133, and Section 133.041.

Do not use salt water with solids in excess of 10,000 parts per million, as determined by evaporation.

Contractor questions on this project are to be addressed by the following individual:

Bryan Lutz, P.E.; email SJT_PreliminaryReview@txdot.gov

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

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

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

Item 5, "Control of the Work"

Make suitable advance notification to affected non-participating municipalities regarding Class B underground facilities, call the Department's San Angelo District Traffic Office at telephone number (325) 947-9208 to have the Department's existing traffic signal and illumination utilities located, and call the Department's San Angelo District Maintenance Office at telephone number (325) 947-9322 to have the Department's existing irrigation utilities located.

Responsibility for construction surveying shall conform to Section 5.9.3., "Method C."

Submit shop drawings electronically for the fabrication of structural items and other items specifically listed in the plans to SJT_ShopPlanReview@txdot.gov. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop

County: STERLING, ETC. **Sheet:** 7

Highway: US 87, ETC. **Control:** 0069-03-060, ETC.

Drawing Submittal" at http://www.txdot.gov/business/resources/specifications/shop-drawings.html.

Item 6, "Control of Materials"

When allowed, store materials and equipment in approved areas within the right of way.

Item 7, "Legal Relations and Responsibilities"

No significant traffic generator events have been identified.

Item 8, "Prosecution and Progress"

Submit the sequence of work and estimated progress schedule on paper or as a Portable Document Format (PDF) electronic file compatible with Adobe Systems Incorporated "Acrobat Reader XI".

A copy of the contract time determination summary may be obtained by qualified bidders by sending a request to SJT_PreliminaryReview@txdot.gov.

A delayed start provision is included in the contract to allow time to procure construction materials including cable barrier components.

Item 9, "Measurement and Payment"

The progress payment period shall end two working days before the last working day of the month. Deliver invoices to be paid as material on hand on or before the end of the progress payment period.

Item 150, "Blading"

This Item is for grading at crossovers, for grading adjacent to concrete mow strip riprap, and grading at other locations as directed.

Item 330, "Equipment for Asphalt Concrete Pavement"

Use of motor grader equipment to place limestone rock asphalt is allowed.

Item 432, "Riprap"

Concrete mow strip riprap may be conventionally formed, extruded, or slip formed.

Terminate concrete mow strip riprap workday production at an expansion joint or at end of concrete mow strip riprap.

Install joint fillers in concrete mow strip riprap at intervals not to exceed 40 ft. and between concrete mow strip riprap and adjacent existing concrete. Provide joint fillers in accordance with DMS-6310, Joint Sealants and Fillers".

The use of synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber is listed on the Department's "Fiber for Class A and Class B Concrete Applications" Material/Producer List.

Furnish and install ½-in. thick joint filler board conforming to DMS-6310, "Joint Sealants and Fillers" between concrete riprap and adjacent existing concrete, and where directed.

Item 453: Cable Barrier System

Furnish and install delineators on cable barrier posts at a maximum spacing of 100 ft. with a minimum of three required per section of cable barrier. Delineators shall have double yellow reflectors, size 1, with flexible posts, type GF2 guard fence attachments, and bi-directional.

Where post foundations require a higher design strength concrete than Class B, the higher design strength concrete may be substituted for Class B concrete in mow strip in order to allow placement of post foundations and mow strip in one operation.

Item 502, "Barricades, Signs and Traffic Handling"

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

Item 506, "Temporary Erosion, Sedimentation, and Environmental Controls"

Furnish compost for core material in biodegradable erosion control logs.

The Best Management Practices for this project shall include using the following erosion control measures as directed:

1. Construction Exits

2. Biodegradable Erosion Control Logs

Item 644, "Small Roadside Sign Assemblies"

Furnish and install omni-directional sign post wrap (12 in. by 12 in. Type C retroreflective sheeting with pressure sensitive backing) on sign posts that have sign faces that do not face the predominant direction of traffic, as directed. Sign post wrap shall be yellow for signs R6-1 "ONE WAY" and shall be red for signs R1-2 "YIELD", R5-1 "DO NOT ENTER", R5-1a "WRONG WAY", and R1-1 "STOP". Place the bottom of sign post wrap a height of 4 ft. above the edge of travel lane.

County: STERLING, ETC. **Sheet:** 7-A

Highway: US 87, ETC. **Control:** 0069-03-060, ETC.

Where foundations protrude through riprap or other concrete areas, wrap the foundation with 1/4-in. thick bituminous fiber sheets before placing concrete or repairing the concrete area. Bituminous fiber sheet tubes may be used for forming sign foundations instead of removable forms and shall be left in place below the finished concrete or riprap surface. Neatly trim the bituminous fiber sheets flush with the finished surface after the concrete has cured.

Drill and pour small roadside sign foundations on the same day or suitably cover the drilled hole.

Signs indicated to be mounted on the back of another sign or on a traffic signal pole or mast arm may require punch spacing different from that shown on the Standard Sheets. Adjust punch spacing on affected signs.

Cover each unfinished sign base with a reflectorized traffic cone.

ESTIMATE & QUANTITY SHEET

CONTROLLING PROJECT ID 0069-03-060 **DISTRICT** San Angelo **COUNTY** Coke, Sterling, Tom Green
HIGHWAY SL 306, US 87

													TOTAL EST.	TOTAL FINAL
			CONTROL SECTION JOB	**0069-03-060**		**0069-04-044**		**0069-05-030**		**0264-07-034**				
			PROJECT ID	**A00133832**		**A00133833**		**A00138988**		**A00133834**				
			COUNTY	**Sterling**		**Sterling**		**Coke**		**Tom Green**				
			HIGHWAY	**US 87**		**US 87**		**US 87**		**SL 306**				
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL	EST.	FINAL			
	150-6002	BLADING	HR	28.000		134.000		53.900		59.000			274.900	
	164-6034	DRILL SEEDING (PERM) (RURAL) (SANDY)	AC	2.800		13.600		5.400		7.300			29.100	
	164-6042	DRILL SEEDING (TEMP) (WARM)	AC	2.800		13.600		5.400		7.300			29.100	
	164-6044	DRILL SEEDING (TEMP) (COOL)	AC	2.800		13.600		5.400		7.300			29.100	
	330-6002	LRA PAV TY-I GR-A	TON			64.000		64.000		64.000			192.000	
	432-6006	RIPRAP (CONC)(CL B)	CY	410.000		1,991.000		796.000		1,078.000			4,275.000	
	500-6001	MOBILIZATION	LS	11.00%		45.00%		22.00%		22.00%			100.00%	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1.000		4.000		2.000		2.000			9.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	111.000		111.000		111.000		111.000			444.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	111.000		111.000		111.000		111.000			444.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	201.000		987.000		222.000		671.000			2,081.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	201.000		987.000		222.000		671.000			2,081.000	
	543-6002	CABLE BARRIER SYSTEM (TL-4)	LF	10,193.000		43,889.000		20,403.000		26,837.000			101,322.000	
	543-6006	CABLE BARRIER SYSTEM (TL-4) (10'-0")	LF			6,414.000							6,414.000	
	543-6020	CABLE BARRIER TERMINAL SECTION (TL-4)	EA	16.000		59.000		20.000		36.000			131.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA			1.000		1.000		1.000			3.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	12.000		57.000		22.000		31.000			122.000	
	6185-6002	TMA (STATIONARY)	DAY	12.000		57.000		22.000		31.000			122.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000									1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000									1.000	

SUMMARY OF ROADWAY ITEMS

DESCRIPTION	CABLE BARRIER LIMITS (TERMINAL SECTION INCLUDED)		LENGTH	CABLE BARRIER SB OR NB SIDE OF MEDIAN C/L	BROADCAST SEEDING AREA	150 6002 BLADING	432 6006 RIPRAP (CONC)(CL B)	543 6002 CABLE BARRIER SYSTEM (TL-4)	543 6006 CABLE BARRIER SYSTEM (TL-4) (10'-0")	543 6020 CABLE BARRIER TERMINAL SECTION (TL-4)
					AC	HR	CY	LF	LF	EA
	STATION TO STATION		LF	SB / NB	L X 11' / 43560	400LF/1HR	(L X 4' X 0.25')/27	LENGTH - 115'		
BEGIN PROJECT CCSJ: 0069-03-060 etc.										
BEGIN PROJECT CSJ: 0069-03-060 (US-87)										
CABLE BARRIER SECTION #1	26+25	32+12	587	EB	0.15	1	22	472		2
CABLE BARRIER SECTION #2	33+89	50+66	1677	EB	0.42	4	62	1562		2
CABLE BARRIER SECTION #3	52+37	81+33	2896	EB	0.73	7	107	2781		2
CABLE BARRIER SECTION #4	83+30	91+53	823	EB	0.21	2	30	708		2
CABLE BARRIER SECTION #5	93+71	104+03	1032	EB	0.26	3	38	917		2
CABLE BARRIER SECTION #6	103+00	112+81	981	WB	0.25	2	36	866		2
CABLE BARRIER SECTION #7	115+14	127+35	1221	WB	0.31	3	45	1106		2
CABLE BARRIER SECTION #8	129+38	148+34	1896	WB	0.48	5	70	1781		2
CSJ: 0069-03-060 PROJECT TOTALS					2.8	28	410	10193	0	16
BEGIN PROJECT CSJ: 0069-04-044										
CABLE BARRIER SECTION #9	233+58	271+98	3840	WB	0.97	10	142		3725	2
CABLE BARRIER SECTION #10	274+32	300+52	2620	EB	0.66	7	97	2505		2
CABLE BARRIER SECTION #11	298+82	326+08	2726	WB	0.69	7	101	2611		2
CABLE BARRIER SECTION #12	328+32	343+54	1522	EB	0.38	4	56	1407		2
CABLE BARRIER SECTION #13	343+31	355+58	1227	WB	0.31	3	45	1112		2
CABLE BARRIER SECTION #14	357+80	364+22	642	EB	0.16	2	24	527		2
CABLE BARRIER SECTION #15	363+63	369+88	625	WB	0.16	2	23	510		2
CABLE BARRIER SECTION #16	372+26	413+99	4173	EB	1.05	10	155	4058		2
CROSSOVER #414	414+69									
CABLE BARRIER SECTION #17	415+39	448+41	3302	WB	0.83	8	122	3187		2
CABLE BARRIER SECTION #18	447+77	454+19	642	EB	0.16	2	24	527		2
CABLE BARRIER SECTION #19	456+54	460+97	443	WB	0.11	1	16	328		2
CABLE BARRIER SECTION #20	462+28	466+45	417	WB	0.11	1	15	302		2
CABLE BARRIER SECTION #21	468+92	496+96	2804	EB	0.71	7	104		2689	2
CABLE BARRIER SECTION #22	496+48	520+51	2403	WB	0.61	6	89	2288		2
CABLE BARRIER SECTION #23	522+47	540+58	1811	EB	0.46	5	67	1696		2
CABLE BARRIER SECTION #24	537+89	556+49	1860	WB	0.47	5	69	1745		2
CABLE BARRIER SECTION #25	558+88	590+00	3112	EB	0.79	8	115	2997		2
CABLE BARRIER SECTION #26	589+52	617+79	2827	WB	0.71	7	105	2712		2
CABLE BARRIER SECTION #27	620+14	632+00	1186	EB	0.30	3	44	1071		2
CABLE BARRIER SECTION #28	634+43	665+10	3067	WB	0.77	8	114	2952		2
CABLE BARRIER SECTION #29	671+37	677+83	646	EB	0.16	2	24	531		2
CABLE BARRIER SECTION #30	677+23	698+19	2096	WB	0.53	5	78	1981		2
CABLE BARRIER SECTION #31	700+58	703+77	319	EB	0.08	1	12	204		2
CABLE BARRIER SECTION #32	706+56	709+58	302	WB	0.08	1	11	187		2
CABLE BARRIER SECTION #33	711+88	718+02	614	EB	0.16	2	23	499		2
CABLE BARRIER SECTION #34	717+42	747+92	3050	WB	0.77	8	113	2935		2
CABLE BARRIER SECTION #35	758+00	776+00	1800	EB	0.45	5	67	1685		2
CABLE BARRIER SECTION #36	775+43	792+17	1674	EB	0.42	4	62	1559		2
CABLE BARRIER SECTION #37	794+40	803+15	875	WB	0.22	2	32	760		2
CABLE BARRIER SECTION #38	802+60	813+88	11+28	EB	0.28	3	42	1013		1
CSJ: 0069-04-044 PROJECT TOTALS					13.6	134	1991	43889	6414	59

NO.	REVISIONS	BY	DATE

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FIRM REGISTRATION No. F-10098

Texas Department of Transportation

US87/LP306
ROADWAY
QUANTITY SUMMARY

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			9
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

SUMMARY OF ROADWAY ITEMS

DESCRIPTION	CABLE BARRIER LIMITS (TERMINAL SECTION INCLUDED)		LENGTH	CABLE BARRIER SB OR NB SIDE OF MEDIAN C/L	BROADCAST SEEDING AREA	150 6002 BLADING	432 6006 RIPRAP (CONC)(CL B)	543 6002 CABLE BARRIER SYSTEM (TL-4)	543 6006 CABLE BARRIER SYSTEM (TL-4) (10'-0")	543 6020 CABLE BARRIER TERMINAL SECTION (TL-4)
					AC	HR	CY	LF	LF	EA
	STATION TO STATION		LF	SB / NB	L X 11' / 43560	400LF/1HR	(L X 4' X 0.25')/27	LENGTH - 115'		
BEGIN PROJECT CSJ: 0069-05-030										
CABLE BARRIER SECTION #38	813+89	821+75	786	WB	0.20	2	29	786		1
CABLE BARRIER SECTION #39	823+28	873+06	4978	WB	1.26	12	184	4863		2
CROSSOVER #874	873+76									
CABLE BARRIER SECTION #40	874+46	917+66	4320	EB	1.09	11	160	4205		2
CABLE BARRIER SECTION #41	920+04	953+10	3306	EB	0.83	8	122	3191		2
CABLE BARRIER SECTION #42	957+89	967+98	1009	WB	0.25	3	37	894		2
CABLE BARRIER SECTION #43	970+26	982+00	1174	EB	0.30	3	43	1059		2
CABLE BARRIER SECTION #44	981+47	993+70	1223	WB	0.31	3	45	1108		2
CABLE BARRIER SECTION #45	995+85	1000+28	443	WB	0.11	1	16	328		2
CABLE BARRIER SECTION #46	1002+56	1020+35	1779	WB	0.45	4	66	1664		2
CABLE BARRIER SECTION #47	1019+76	1025+88	612	EB	0.15	2	23	497		2
CABLE BARRIER SECTION #48	1028+18	1047+41	1923	WB	0.49	5	71	1808		2
CSJ: 0069-05-030 PROJECT TOTALS					5.4	53.9	796	20403	0	21
BEGIN PROJECT CSJ: 0264-07-034 (LP-306)										
	14+42.40	19+67	524.3							
CABLE BARRIER SECTION #1	19+66	30+94	1128	SB	0.28	3	42	1013		2
CABLE BARRIER SECTION #2	32+90	40+43	753	NB	0.19	2	28	638		2
CABLE BARRIER SECTION #3	39+83	47+36	753	SB	0.19	2	28	638		2
CABLE BARRIER SECTION #4	49+32	57+84	852	NB	0.22	2	32	737		2
CABLE BARRIER SECTION #5	57+24	65+75	851	SB	0.21	2	32	736		2
CABLE BARRIER SECTION #6	67+80	77+45	965	NB	0.24		36	850		
CABLE BARRIER SECTION #7	76+84	86+49	965	SB	0.24	2	36	850		2
CABLE BARRIER SECTION #8	88+53	92+91	438	NB	0.11	1	16	323		2
CABLE BARRIER SECTION #9	92+33	97+94	561	SB	0.14	1	21	446		2
CABLE BARRIER SECTION #10	99+91	106+04	613	NB	0.15	2	23	498		2
CABLE BARRIER SECTION #11	105+44	111+57	613	SB	0.15	2	23	498		2
CABLE BARRIER SECTION #12	113+46	137+81	2435	NB	0.61	6	90	2320		2
CABLE BARRIER SECTION #13	144+12	161+45	1733	SB	0.44	4	64	1618		2
CABLE BARRIER SECTION #14	163+44	193+01	2957	NB	0.75	7	110	2842		2
CABLE BARRIER SECTION #15	195+04	217+43	2239	NB	0.57	6	83	2124		2
CABLE BARRIER SECTION #16	224+19	243+13	1894	SB	0.48	5	70	1779		2
CABLE BARRIER SECTION #17	258+14	288+85	3071	SB	0.78	8	114	2956		2
CROSSOVER #289	289+05									
CABLE BARRIER SECTION #18	289+25	326+75	3750	SB	0.95	2	139	3635		2
CABLE BARRIER SECTION #19	325+60	350+11	2451	NB	0.62	2	91	2336		2
	350+11	369+08.16								
CSJ: 0264-07-034 (LP-306) PROJECT TOTALS					7.3	59	1078	26837	0	36
CCSJ: 0069-03-060 etc. PROJECT TOTALS					29.2	275	4275	101322	6414	132

NO.	REVISIONS	BY	DATE

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Texas Department of Transportation

US87/LP306
ROADWAY
QUANTITY SUMMARY

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			10
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

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SUMMARY OF EMERGENCY CROSSOVERS

CROSSOVER NUMBER	STATION	LENGTH	WIDTH	RADIUS	AREA	330 6002 LRA PAV TY-I GR-A
		LF	LF	LF	SY	TON
BEGIN PROJECT CCSJ: 0069-03-060 etc.						**
BEGIN PROJECT CSJ: 0069-03-060 (US-87)						
CSJ: 0069-03-060 PROJECT TOTALS						0
BEGIN PROJECT CSJ: 0069-04-044						
CROSSOVER #414	414+69	64	20	10	152	64
CSJ: 0069-04-044 PROJECT TOTALS						64
BEGIN PROJECT CSJ: 0069-05-030						
CROSSOVER #874	873+76	64	20	10	152	64
CSJ: 0069-05-030 PROJECT TOTALS						64
BEGIN PROJECT CSJ: 0264-07-034 (LP-306)						
CROSSOVER #289	289+05	64	20	10	152	64
CSJ: 0264-07-034 (LP-306) PROJECT TOTALS						64
CCSJ: 0069-03-060 etc. PROJECT TOTALS						192

** 105 LBS / SY
(AREA X 840(105 X 8) / 2000)

CROSSOVER CONSTRUCTION:
EXCAVATE 8" AND PROOF ROLL.
PLACE 8" LRA.
MATCH EXISTING
GRADE AT CROSSOVER EDGES.
USE ORDINARY COMPACTION. CONSIDER
EXCAVATION SUBSIDIARY TO ITEM 330.

NO.	REVISIONS	BY	DATE

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US87/LP306
ROADWAY
QUANTITY SUMMARY

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			11
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

SUMMARY OF TRAFFIC ITEMS

SECTION/CROSSOVER #	CROSSOVER STATION	644 6001 IN SM RD SN SUP&AM TY10BWG(1) SA(P)
BEGIN PROJECT CCSJ: 0069-03-060 etc.		EA
BEGIN PROJECT CSJ: 0069-03-060		
CSJ: 0069-03-060 PROJECT TOTALS		0
BEGIN PROJECT CSJ: 0069-04-044		
CROSSOVER #414	414+69	1
CSJ: 0069-04-044 PROJECT TOTALS		1
BEGIN PROJECT CSJ: 0069-05-030		
CROSSOVER #874	874+00	1
CSJ: 0069-05-030 PROJECT TOTALS		1
BEGIN PROJECT CSJ: 0264-07-034		
CROSSOVER #289	289+00	1
CSJ: 0264-07-034 PROJECT TOTALS		1
CCSJ: 0069-03-060 etc. PROJECT TOTALS		3

SHEET 1 OF 1

NO.	REVISIONS	BY	DATE

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Texas Department of Transportation

US87/LP306
TRAFFIC
QUANTITY SUMMARY

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			12
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

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SUMMARY OF EROSION CONTROL ITEMS

DESCRIPTION	LOCATION	STRUCTURE	164 6034 DRILL SEEDING (PERM) (RURAL) (SANDY)	164 6042 DRILL SEEDING (TEMP) (WARM)	164 6044 DRILL SEEDING (TEMP) (COOL)	506 6020 CONSTRUC TION EXITS (INSTALL) (TY 1)	506 6024 CONSTRUC TION EXITS (REMOVE)	506 6041 BIODEG EROSN CONT LOGS (INSTL) (12")	506 6043 BIODEG EROSN CONT LOGS (REMOVE)
	STATION	TYPE	AC	AC	AC	SY	SY	LF	LF
BEGIN PROJECT CCSJ: 0069-03-060 etc.									
BEGIN PROJECT CSJ: 0069-03-060									
	32+39	SET						15	15
	51+17	SET						15	15
	51+88	SET						15	15
	69+48	TY H INLET						48	48
	80+76	SET						15	15
	82+72	SET						15	15
	114+81	SET						15	15
	114+81	SET						15	15
	146+10	TY H INLET						48	48
TO BE PLACED AS DIRECTED BY THE ENGINEER						111	111		
FROM SUMMARY OF ROADWAY ITEMS			2.8	2.8	2.8				
CSJ: 0069-03-060 PROJECT TOTALS			2.8	2.8	2.8	111	111	201	201
BEGIN PROJECT CSJ: 0069-04-044									
	237+96	TY H INLET						48	48
	281+22	TY H INLET						48	48
	299+61	TY H INLET						48	48
	325+20	TY H INLET						48	48
	345+34	TY H INLET						48	48
	364+24	TY H INLET						48	48
	399+61	TY H INLET						48	48
	411+04	TY H INLET						48	48
	422+65	TY H INLET						48	48
	440+07	SET						15	15
	440+31	SET						15	15
	451+47	SET						15	15
	451+72	SET						15	15
	495+91	TY H INLET						48	48
	539+74	TY H INLET						48	48
	559+81	TY H INLET						48	48
	571+12	TY H INLET						48	48
	632+15	SET						15	15
	641+98	TY H INLET						48	48
	690+88	TY H INLET						48	48
	715+60	TY H INLET						48	48
	739+35	TY H INLET						48	48
	767+42	TY H INLET						48	48
TO BE PLACED AS DIRECTED BY THE ENGINEER						111	111		
FROM SUMMARY OF ROADWAY ITEMS	781+70	TY H INLET	13.6	13.6	13.6			48	48
CSJ: 0069-04-044 PROJECT TOTALS			13.6	13.6	13.6	111	111	987	987

SUMMARY OF EROSION CONTROL ITEMS

DESCRIPTION	LOCATION	STRUCTURE	164 6034 DRILL SEEDING (PERM) (RURAL) (SANDY)	164 6042 DRILL SEEDING (TEMP) (WARM)	164 6044 DRILL SEEDING (TEMP) (COOL)	506 6020 CONSTRUC TION EXITS (INSTALL) (TY 1)	506 6024 CONSTRUC TION EXITS (REMOVE)	506 6041 BIODEG EROSN CONT LOGS (INSTL) (12")	506 6043 BIODEG EROSN CONT LOGS (REMOVE)
	STATION	TYPE	AC	AC	AC	SY	SY	LF	LF
BEGIN PROJECT CSJ: 0069-05-030									
	811+83	TY H INLET						48	48
	836+61	TY H INLET						48	48
	908+05	TY H INLET						48	48
	953+61	SET						15	15
	983+83	SET						48	48
	1047+49	SET						15	15
TO BE PLACED AS DIRECTED BY THE ENGINEER						111	111		
FROM SUMMARY OF ROADWAY ITEMS			5.4	5.4	5.4				
CSJ: 0069-05-030 PROJECT TOTALS			5.4	5.4	5.4	111	111	222	222
BEGIN PROJECT CSJ: 0264-07-034									
	19+08	TY H INLET						48	48
	31+46	SET						15	15
	47+87	SET						15	15
	59+96	SET						15	15
	60+60	SET						30	30
	66+37	SET						15	15
	98+49	SET						15	15
	112+09	SET						15	15
	162+04	SET						15	15
	193+58	SET						15	15
	208+55	TY H INLET						48	48
	245+13	FLUME						24	24
	299+00	TY H INLET						77	77
	299+39	TY H INLET						77	77
	314+28	TY H INLET						77	77
	329+25	TY H INLET						100	100
	334+64	TY H INLET						70	70
TO BE PLACED AS DIRECTED BY THE ENGINEER						111	111		
FROM SUMMARY OF ROADWAY ITEMS			7.3	7.3	7.3				
CSJ: 0264-07-034 PROJECT TOTALS			7.3	7.3	7.3	111	111	671	671
CCSJ: 0069-03-060 etc. PROJECT TOTALS			**29.2**	**29.2**	**29.2**	**444**	**444**	**2081**	**2081**

SHEET 1 OF 1

NO.	REVISIONS	BY	DATE

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Texas Department of Transportation

US87/LP306
SW3P
QUANTITY SUMMARY

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			13
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

4/27/2021 4:54:44 PM

SUMMARY OF TCP ITEMS

SECTION #	6001 6001 PORTABLE CHANGEABLE MESSAGE SIGN DAY	6185 6002 TMA (STATIONARY) DAY
	LENGHT OF SECTION / 1000	
BEGIN PROJECT CCSJ: 0069-03-060 etc.		
BEGIN PROJECT CSJ: 0069-03-060		
CABLE BARRIER SECTION #1	1	1
CABLE BARRIER SECTION #2	2	2
CABLE BARRIER SECTION #3	3	3
CABLE BARRIER SECTION #4	1	1
CABLE BARRIER SECTION #5	1	1
CABLE BARRIER SECTION #6	1	1
CABLE BARRIER SECTION #7	1	1
CABLE BARRIER SECTION #8	2	2
CSJ: 0069-03-060 PROJECT TOTALS	12	12
BEGIN PROJECT CSJ: 0069-04-044		
CABLE BARRIER SECTION #9	4	4
CABLE BARRIER SECTION #10	3	3
CABLE BARRIER SECTION #11	3	3
CABLE BARRIER SECTION #12	2	2
CABLE BARRIER SECTION #13	1	1
CABLE BARRIER SECTION #14	1	1
CABLE BARRIER SECTION #15	1	1
CABLE BARRIER SECTION #16	4	4
CABLE BARRIER SECTION #17	3	3
CABLE BARRIER SECTION #18	1	1
CABLE BARRIER SECTION #19	0	0
CABLE BARRIER SECTION #20	0	0
CABLE BARRIER SECTION #21	3	3
CABLE BARRIER SECTION #22	2	2
CABLE BARRIER SECTION #23	2	2
CABLE BARRIER SECTION #24	2	2
CABLE BARRIER SECTION #25	3	3
CABLE BARRIER SECTION #26	3	3
CABLE BARRIER SECTION #27	1	1
CABLE BARRIER SECTION #28	3	3
CABLE BARRIER SECTION #29	1	1
CABLE BARRIER SECTION #30	2	2
CABLE BARRIER SECTION #31	1	1
CABLE BARRIER SECTION #32	1	1
CABLE BARRIER SECTION #33	1	1
CABLE BARRIER SECTION #34	3	3
CABLE BARRIER SECTION #35	2	2
CABLE BARRIER SECTION #36	2	2
CABLE BARRIER SECTION #37	1	1
CABLE BARRIER SECTION #38	1	1
CSJ: 0069-04-044 PROJECT TOTALS	57	57

SUMMARY OF TCP ITEMS

SECTION #	6001 6001 PORTABLE CHANGEABLE MESSAGE SIGN DAY	6185 6002 TMA (STATIONARY) DAY
	LENGHT OF SECTION / 1000	
BEGIN PROJECT CSJ: 0069-05-030		
CABLE BARRIER SECTION #38	1	1
CABLE BARRIER SECTION #39	5	5
CABLE BARRIER SECTION #40	4	4
CABLE BARRIER SECTION #41	3	3
CABLE BARRIER SECTION #42	1	1
CABLE BARRIER SECTION #43	1	1
CABLE BARRIER SECTION #44	1	1
CABLE BARRIER SECTION #45	1	1
CABLE BARRIER SECTION #46	2	2
CABLE BARRIER SECTION #47	1	1
CABLE BARRIER SECTION #48	2	2
CSJ: 0069-05-030 PROJECT TOTALS	22	22
BEGIN PROJECT CSJ: 0264-07-034		
CABLE BARRIER SECTION #1	1	1
CABLE BARRIER SECTION #2	1	1
CABLE BARRIER SECTION #3	1	1
CABLE BARRIER SECTION #4	1	1
CABLE BARRIER SECTION #5	1	1
CABLE BARRIER SECTION #6	1	1
CABLE BARRIER SECTION #7	1	1
CABLE BARRIER SECTION #8	1	1
CABLE BARRIER SECTION #9	1	1
CABLE BARRIER SECTION #10	1	1
CABLE BARRIER SECTION #11	1	1
CABLE BARRIER SECTION #12	2	2
CABLE BARRIER SECTION #13	2	2
CABLE BARRIER SECTION #14	3	3
CABLE BARRIER SECTION #15	2	2
CABLE BARRIER SECTION #16	2	2
CABLE BARRIER SECTION #17	3	3
CABLE BARRIER SECTION #18	4	4
CABLE BARRIER SECTION #19	2	2
CSJ: 0264-07-034 PROJECT TOTALS	31	31
CCSJ: 0069-03-060 etc. PROJECT TOTALS	122	122

SHEET 1 OF 1

NO.	REVISIONS	BY	DATE

ARREDONDO, ZEPEDA & BRUNZ, LLC
11355 McCree Road - Dallas, Texas 75238
(214) 341-9900
FIRM REGISTRATION No. F-10098

Texas Department of Transportation

US87/LP306
TCP
QUANTITY SUMMARY

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			14
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

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SEQUENCE OF CONSTRUCTION: (Perform work on items 3 and 4 simultaneously)

1.Place advance project warning signs in accordance with BC(1)-14 through BC(12)-14 sheets.

2.Place BMP's as shown in plans.

3.Construct emergency crossovers.

4.Install cable barrier system and construct mow strip. Use TCP(5-1)-18 for traffic control.
Place permanent or temporary seeding in portions of the site no later than 14 days after construction activity has temporarily or permanently ceased.

5.Place permanent seeding on all areas that did not previously receive permanent seeding.

STATE OF TEXAS
JUAN RAMON FLORES
66715
REGISTERED
PROFESSIONAL ENGINEER

P.E. 4-27-2021

SHEET 1 OF 1

NO.	REVISIONS	BY	DATE

POZNECKI CAMARILLO INC
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SAN ANTONIO, TEXAS, 78228
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AZ&B
ARREDONDO, ZEPEDA & BRUNZ, LLC
11355 McCree Road - Dallas, Texas 75238
(214) 341-9900
FIRM REGISTRATION No. F-10098

Texas Department of Transportation

US87/LP306
TCP
SEQUENCE OF CONSTRUCTION

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			15
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

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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. 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.

TCP(1-1)	0	TCP(2-4)	0	TCP(6-1)	0
TCP(1-2)	0	TCP(2-5)	0	TCP(6-2)	0
TCP(1-3)	0	TCP(2-6)	0	TCP(6-3)	0
TCP(1-4)	0	TCP(3-1)	0	TCP(6-4)	0
TCP(1-5)	0	TCP(3-2)	0	TCP(6-5)	0
TCP(1-6)	0	TCP(3-3)	0	TCP(6-8)	0
TCP(2-1)	0	TCP(3-4)	0	TCP(6-9)	0
TCP(2-2)	0	TCP(3-5)	0	WZ(BTS-1)	0
TCP(2-3)	0	TCP(5-1)	1		
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					1
TRAFFIC CONTROL PLAN CROSSOVER CLOSURE					1
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

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(6-3)	0	TCP(6-8)	0
TCP(6-2)	0	TCP(6-4)	0	TCP(6-9)	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					0
TRAFFIC CONTROL PLAN LANE CLOSURES WITH TRAFFIC SIGNAL					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.

SHEET 1 OF 1

Texas Department of Transportation | San Angelo District

TRAFFIC CONTROL PLAN GENERAL REQUIREMENTS

SHEET 1 OF 1 NOT TO SCALE

REVISIONS
05-18

CONT	SECT	JOB	HIGHWAY
0069	03	060, ETC.	US 87, ETC.
DIST	COUNTY		SHEET NO.
SJT	STERLING, ECT.		16

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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. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.

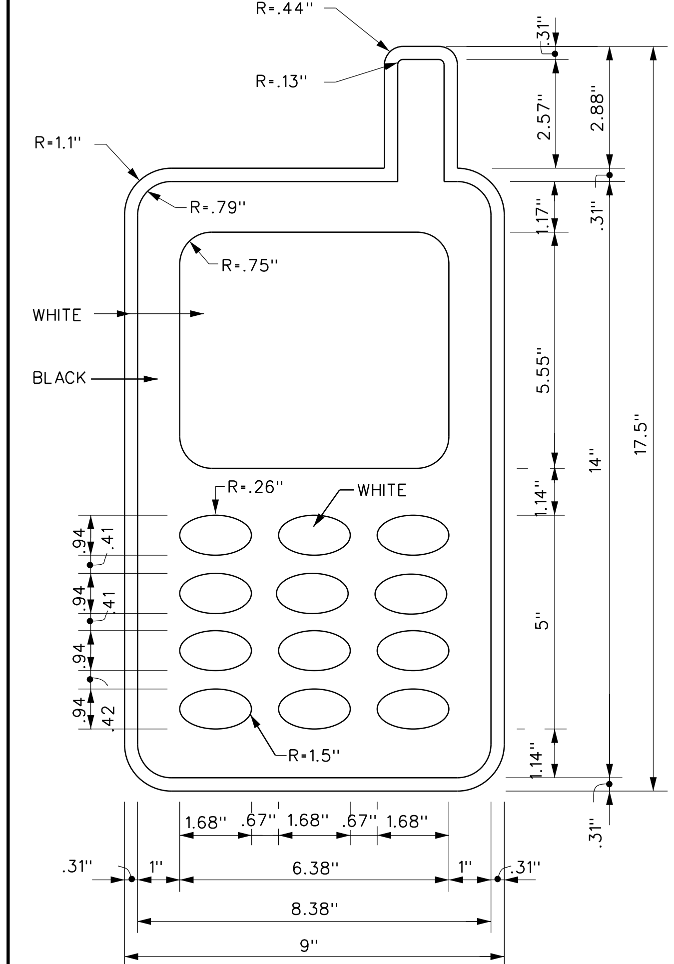
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

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 APPAREL 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.



3.0" Radius, 1.25" Border, 0.75" Indent, Black on Yellow;
[STAY ALERT] Font: D
3.0" Radius, 1.25" Border, 0.75" Indent, Black on Orange;
[TALK OR TEXT LATER] Font: C specified length;

SIGN DETAIL (G20-10T)

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation
Traffic Operations Division - TE
Phone (512) 416-3118

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

SHEET 1 OF 12

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

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©TxDOT November 2002	CONT 0069	SECT 03	JOB 060, ETC.	HIGHWAY US 87, ETC.
REVISIONS: 4-03 5-10 8-14 9-07 7-13	DIST SJT	COUNTY STERLING, ECT.		SHEET NO. 17

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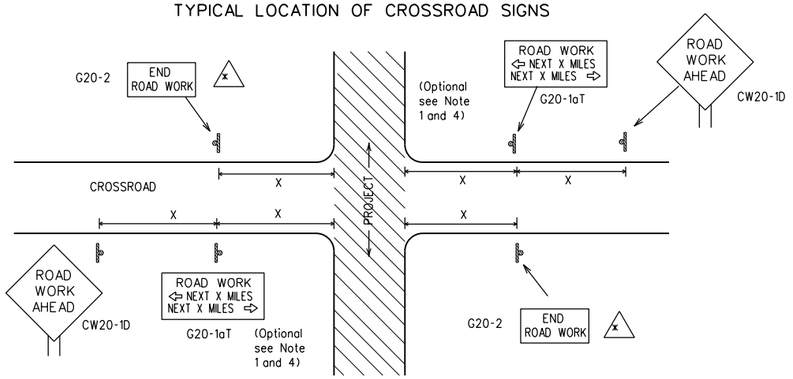
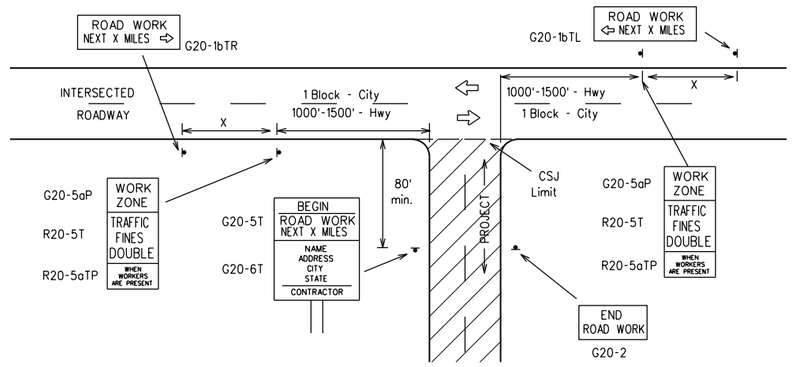
TYPICAL LOCATION OF CROSSROAD SIGNS



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

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume. 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]

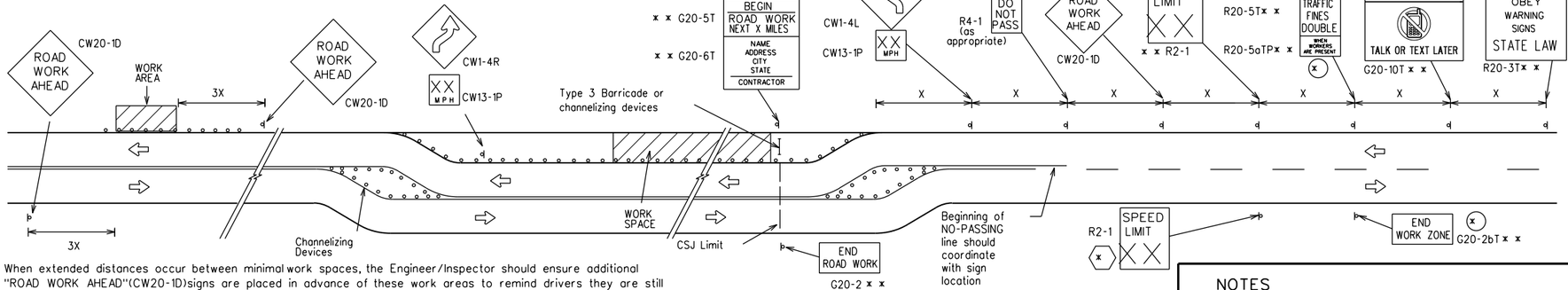
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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. 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.

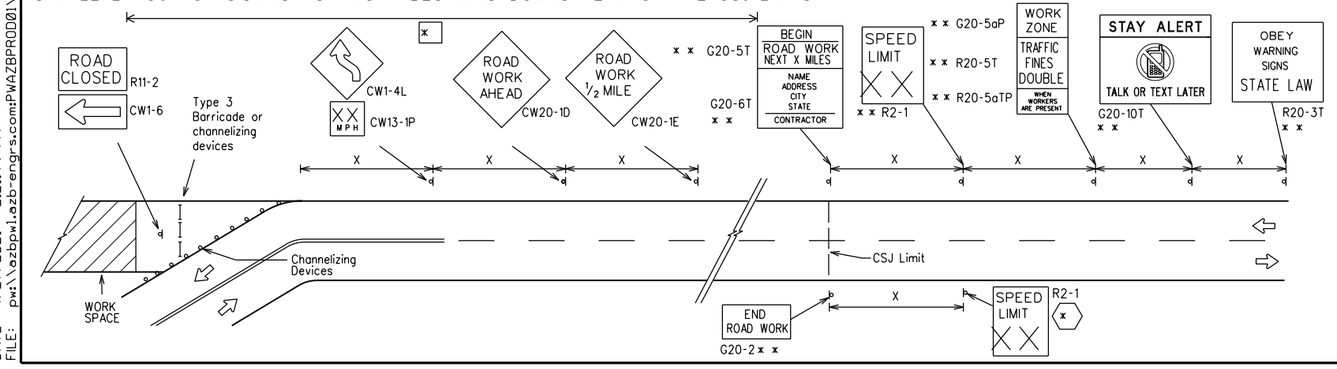
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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.

(x) 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.

x x Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.

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

(x) Contractor will install a regulatory speed limit sign at the end of the work zone.

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

SHEET 2 OF 12

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	0069	03	060, ETC.	US 87, ETC.
	DIST	COUNTY		SHEET NO.
	SJT	STERLING, ECT.		18

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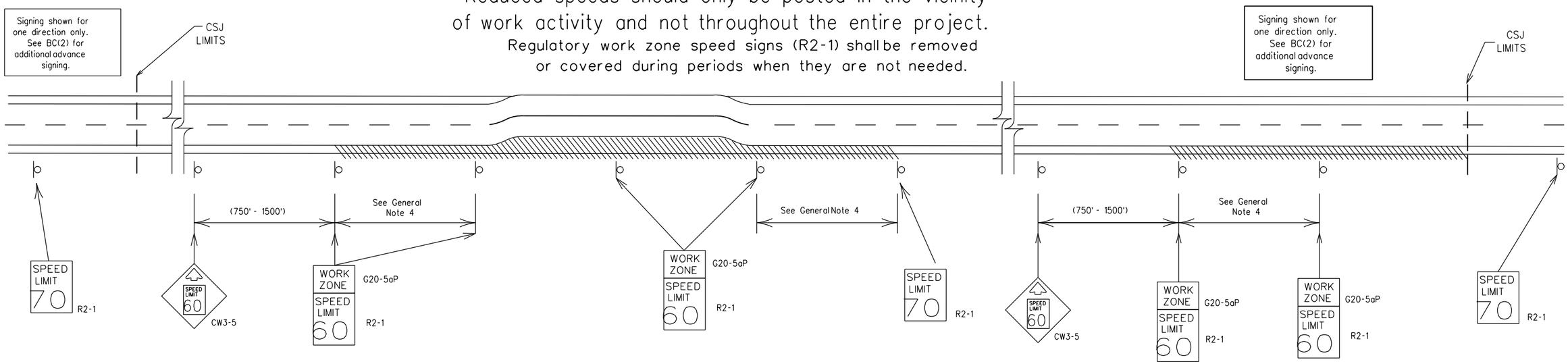
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.
Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	0069	03	060, ETC.	US 87, ETC.
	DIST	COUNTY		SHEET NO.
	SJT	STERLING, ECT.		19

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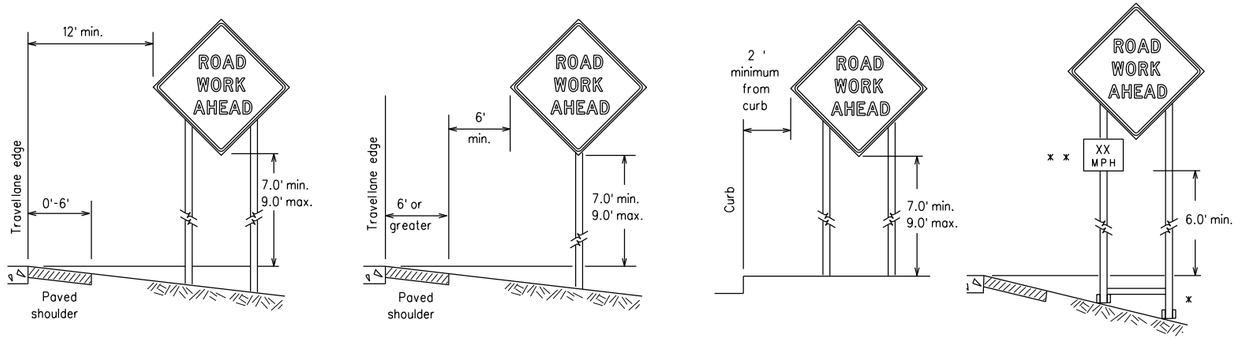
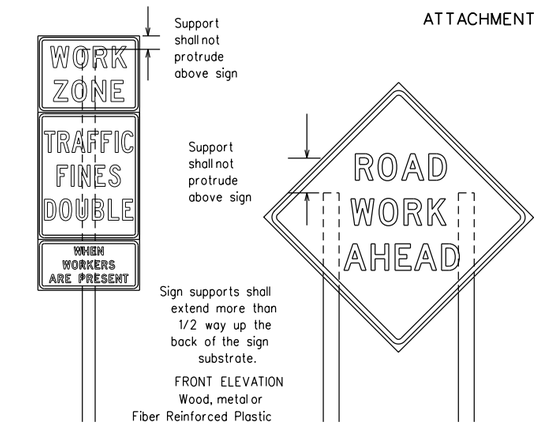
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



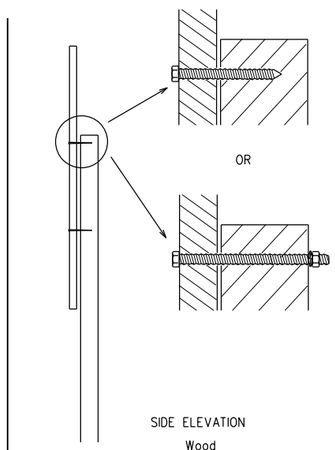
x When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

x x 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



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.

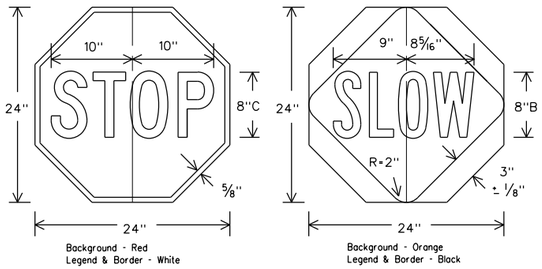


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

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" as detailed below.
2. When used at night, the STOP/SLOW paddle shall be retroreflectorized.
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.



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, 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.
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 sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards 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). 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 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 Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

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REVISIONS	0069	03	060, ETC.	US 87, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	SJT	STERLING, ECT.		20

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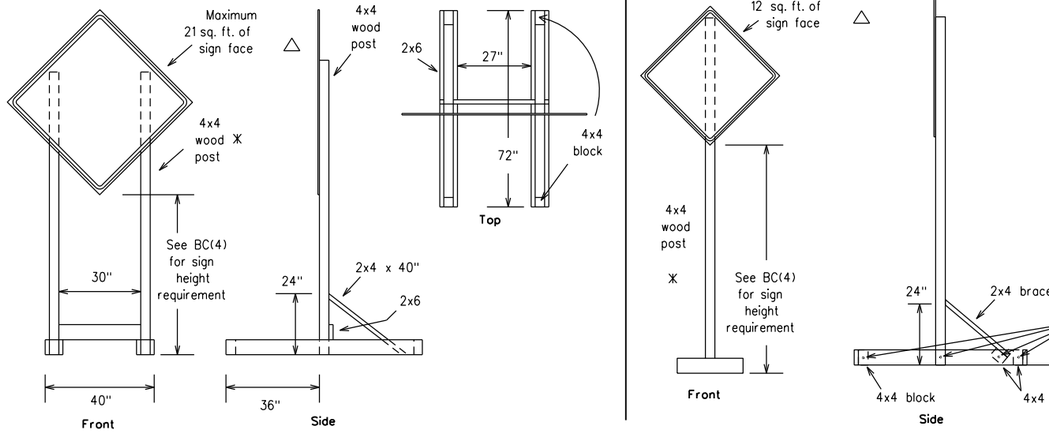
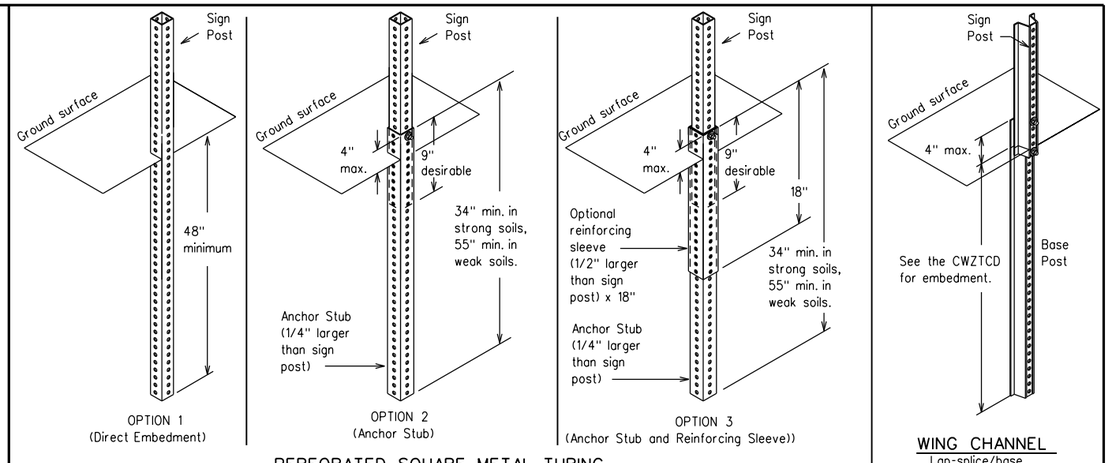


SKID MOUNTED WOOD SIGN SUPPORTS

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

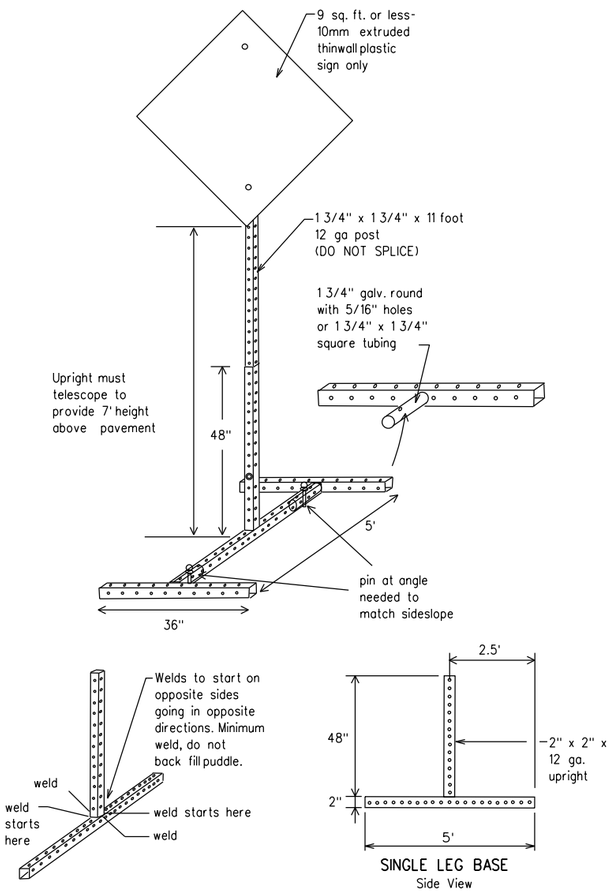


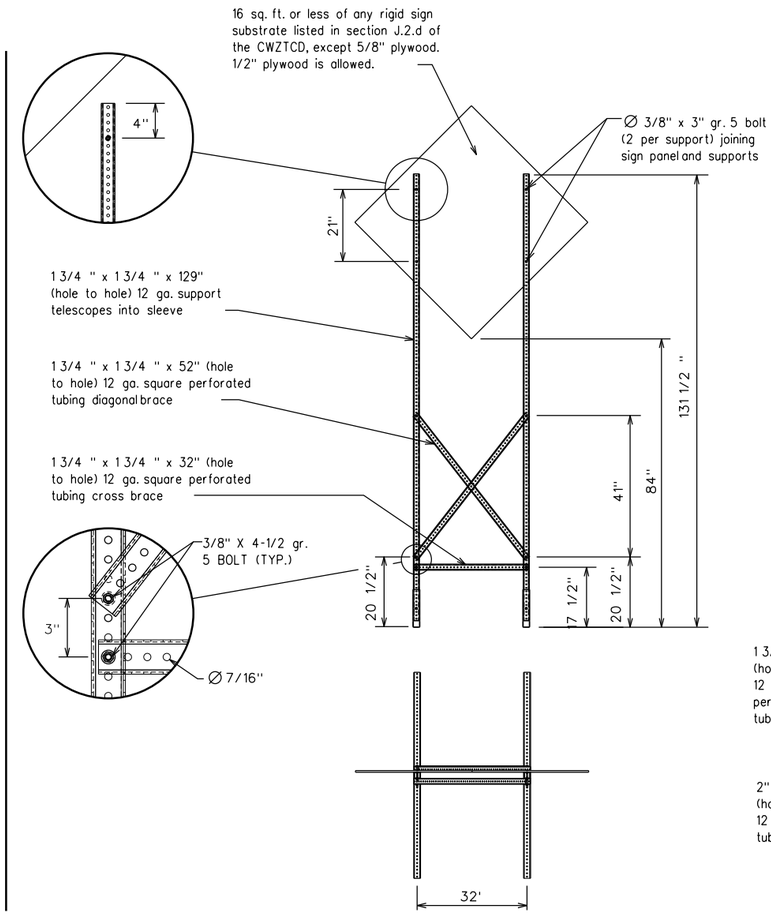
PERFORATED SQUARE METAL TUBING

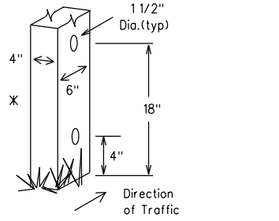
WING CHANNEL
Lap-splice/base bolted anchor

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.

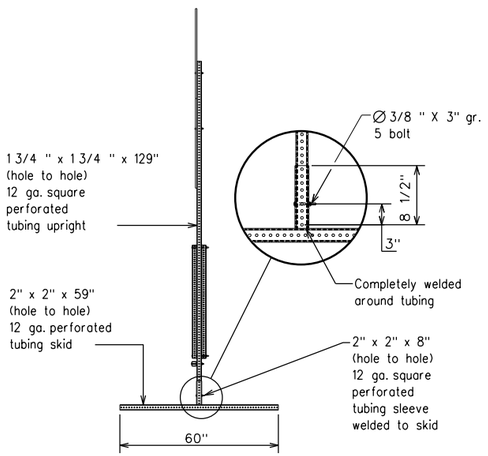






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



SKID MOUNTED PERFORATED SQUARE STEEL TUBING 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 Operations Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

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REVISIONS	0069	03	060, ETC.	US 87, ETC.
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	SJT	STERLING, ECT.		21

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	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Cannot	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle	EMER VEH	South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Ahead	FOG AHD	Telephone	PHONE
Freeway	FRWY, FWY	Temporary	TEMP
Freeway Blocked	FWY BLKD	Thursday	THURS
Friday	FRI	To Downtown	TO DWNTN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLRS
High-Occupancy	HOV	Tuesday	TUES
Vehicle Highway	HWY	Time Minutes	TIME MIN
Hour(s)	HR, HRS	Upper Level	UPR LEVEL
Information	INFO	Vehicles (s)	VEH, VEHS
It Is	ITS	Warning	WARN
Junction	JCT	Wednesday	WED
Left	LFT	Weight Limit	WT LIMIT
Left Lane	LFT LN	West	W
Lane Closed	LN CLOSED	Westbound	(route) W
Lower Level	LWR LEVEL	Wet Pavement	WET PVMT
Maintenance	MAINT	Will Not	WONT

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation — Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

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© TxDOT November 2002	CONT 0069	SECT 03	JOB 060, ETC.	HIGHWAY US 87, ETC.
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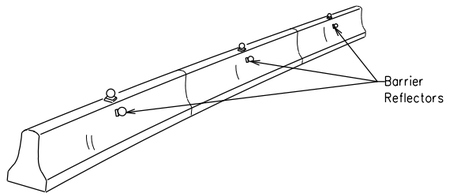
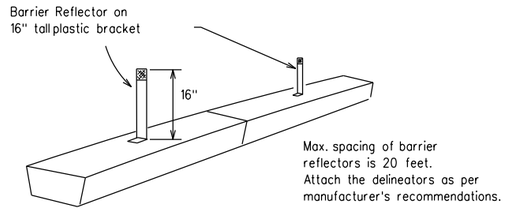
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost of the reflectors shall be considered subsidiary to Item 512.

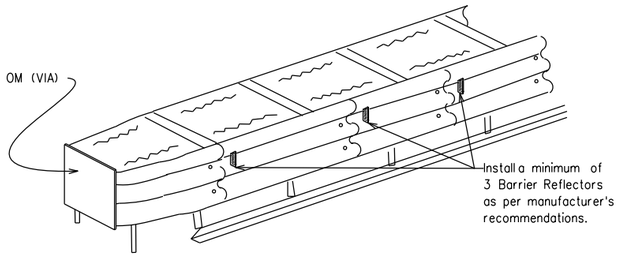


CONCRETE TRAFFIC BARRIER (CTB)

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.



LOW PROFILE CONCRETE BARRIER (LPCB)

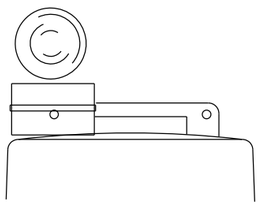


DELINEATION OF END TREATMENTS

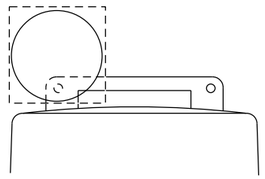
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. 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 or C Sheeting FL meeting the requirements of Departmental Material Specification DMS-8300.
4. Type-C and Type D 360 degree Steady Burn Lights are intended to be used in a series for delineation to supplement other traffic control devices. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "SB".
5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
6. When required by the Engineer, the Contractor shall furnish a copy of the warning lights certification. The warning light manufacturer will certify the warning lights meet the requirements of the latest ITE Purchase Specifications for Flashing and Steady-Burn Warning Lights.
7. When used to delineate curves, Type-C and Type D Steady Burn Lights should only be placed on the outside of the curve, not the inside.
8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

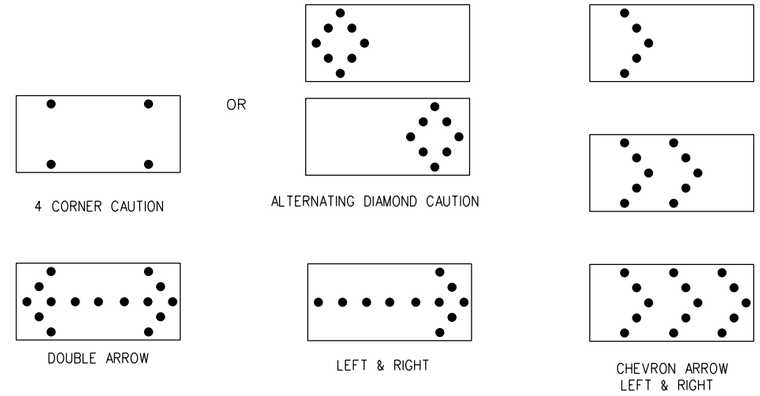
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION
Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or 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 Operations Division Standard

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

BC(7)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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	SJT	STERLING, ECT.		23

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

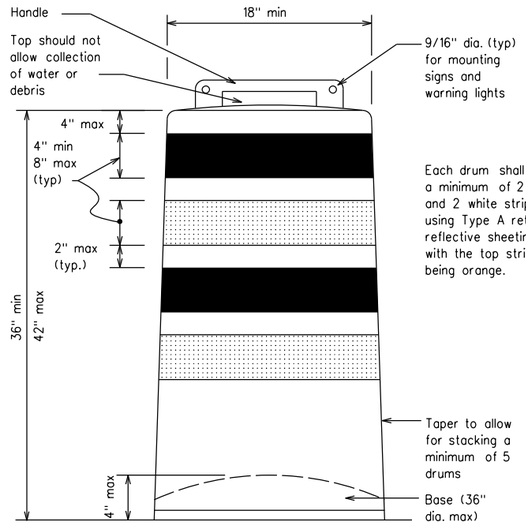
1. Plastic drums shall be a two-piece design: the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

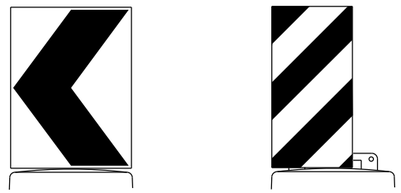
RETROREFLECTIVE SHEETING

1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A 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.

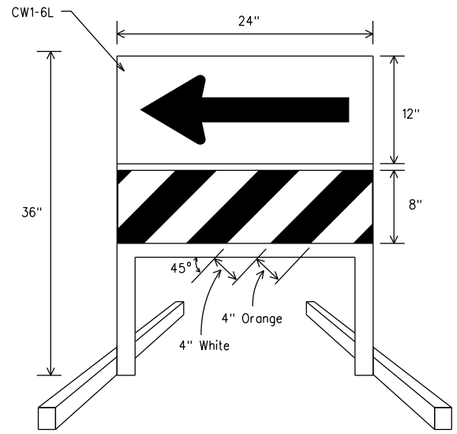




Plywood, Aluminum or Metal sign substrates shall NOT be used on plastic drums

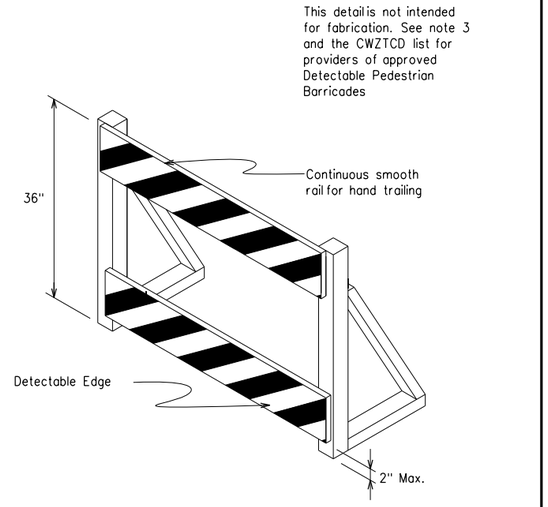
SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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 or Type C Orange$_{FL}$ 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 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.



DIRECTION INDICATOR BARRICADE

1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3. The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B or Type C Orange$_{FL}$ retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
4. Double arrows on the Direction Indicator Barricade will not be allowed.
5. Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.



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.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
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 for Buildings and Facilities (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 may 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.

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SHEET 8 OF 12

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

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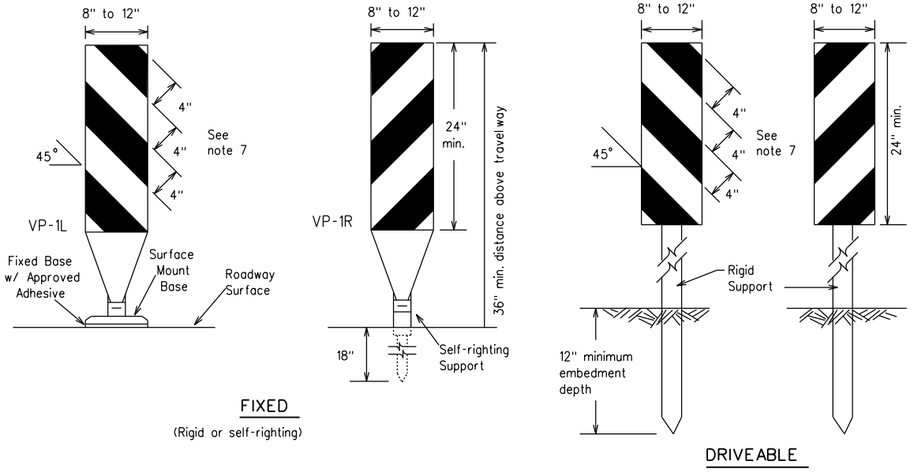
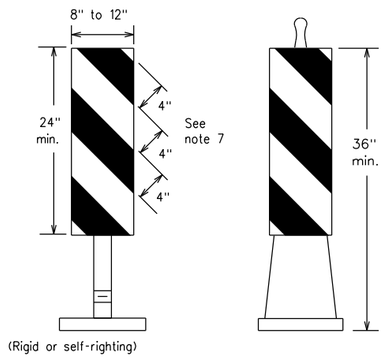


FIXED
(Rigid or self-righting)

DRIVEABLE



(Rigid or self-righting)

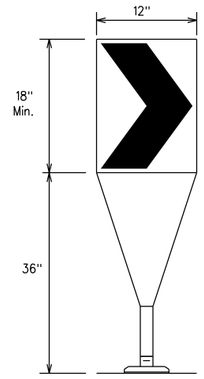
PORTABLE

VERTICAL PANELS (VPs)

1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of 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 conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



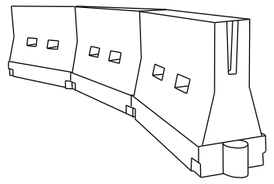
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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 or Type C conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.
6. For Long Term Stationary use on tapers or transitions on freeways and divided highways self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10) placed 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 NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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REVISIONS 9-07 8-14 7-13	0069	03	060, ETC.	US 87, ETC.
	DIST	COUNTY		SHEET NO.
	SJT	STERLING, ECT.		25

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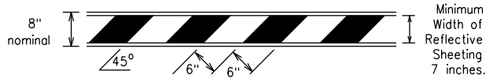
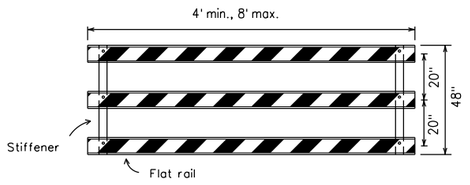
TYPE 3 BARRICADES

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 conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



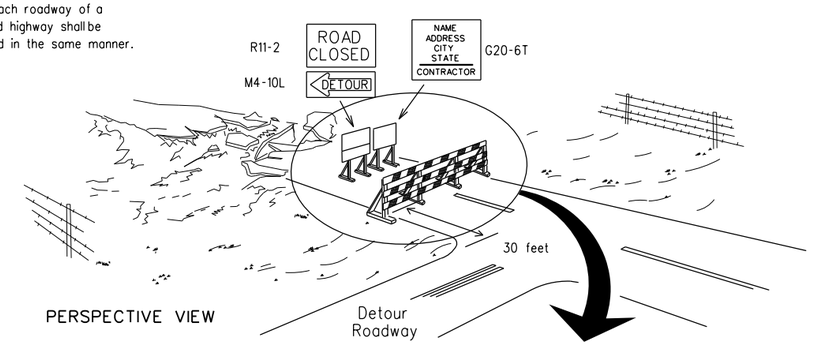
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

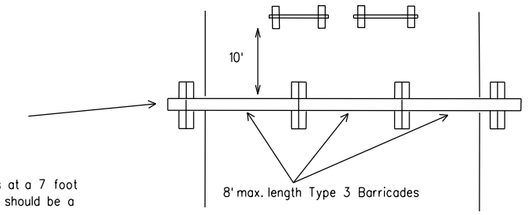
Each roadway of a divided highway shall be barricaded in the same manner.



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.

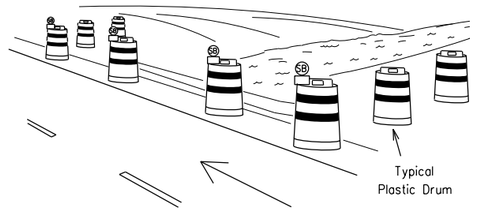
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

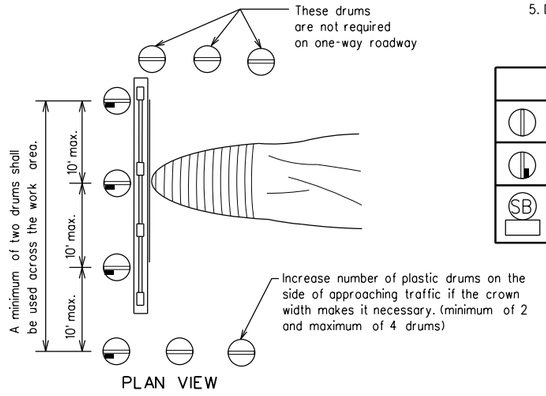
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

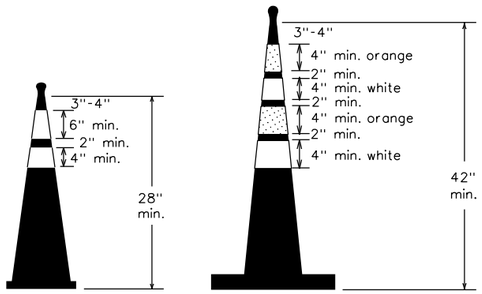
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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

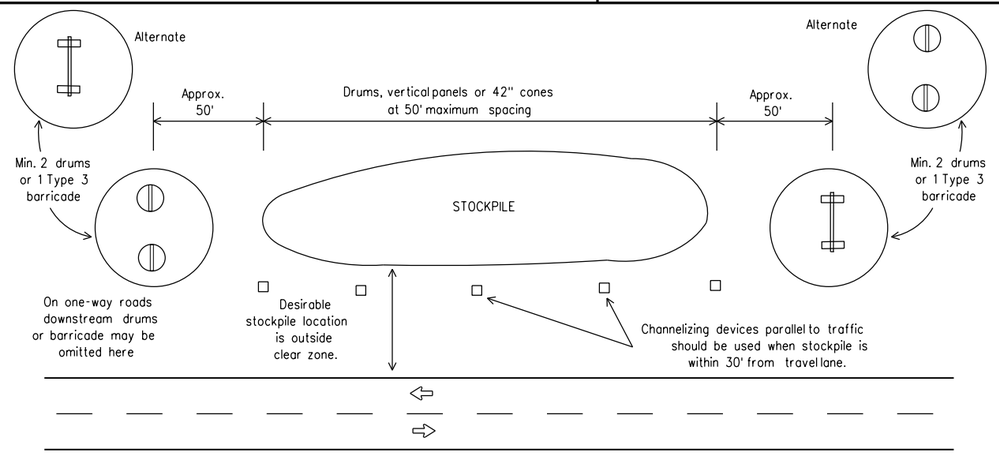
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

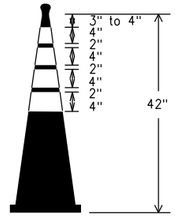
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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 used at night 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.
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

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



EDGELINE CHANNELIZER

1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

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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.

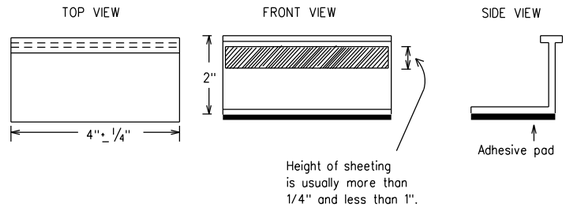
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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).

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BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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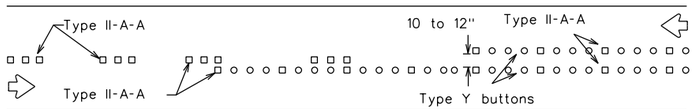
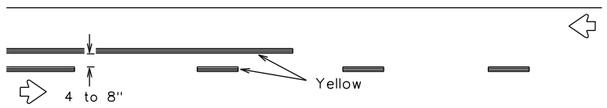
PAVEMENT MARKING PATTERNS

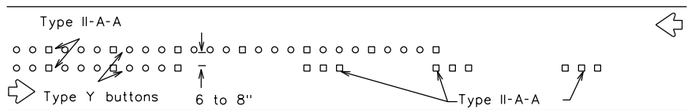
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



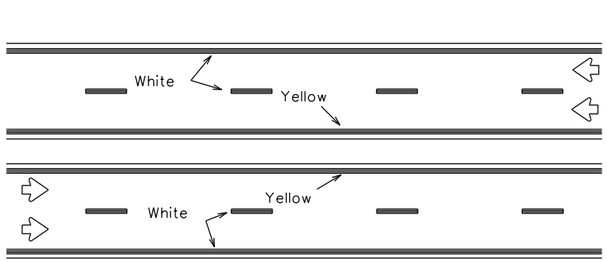
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



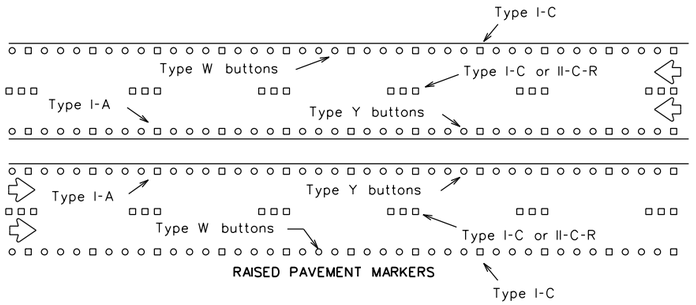
RAISED PAVEMENT MARKERS - PATTERN B

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

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



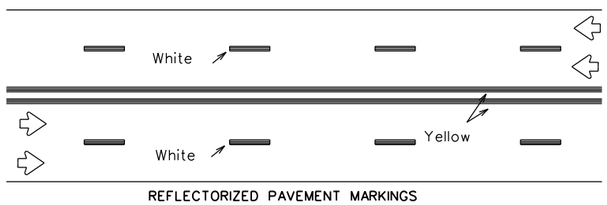
REFLECTORIZED PAVEMENT MARKINGS



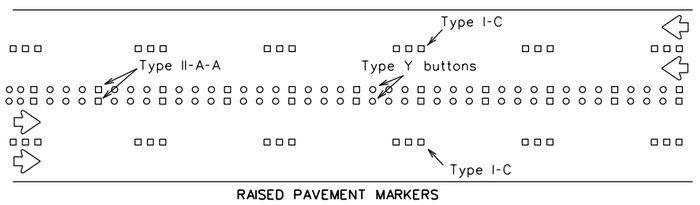
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



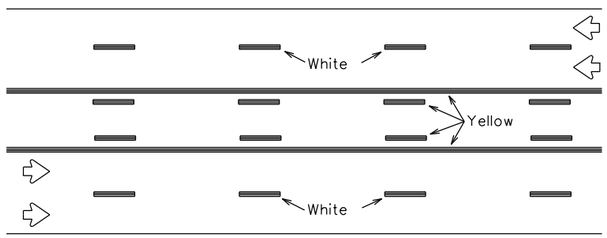
REFLECTORIZED PAVEMENT MARKINGS



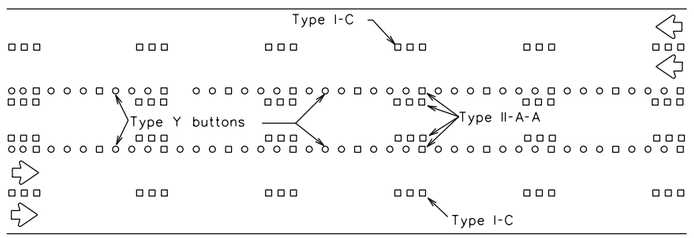
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

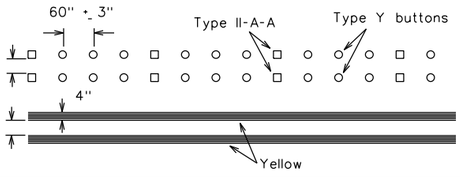
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

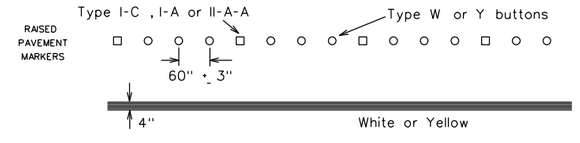
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

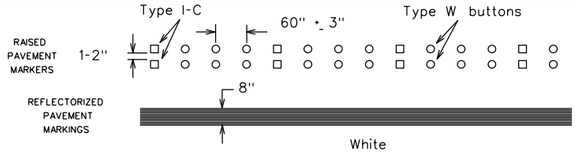


EDGE LINE OR SINGLE NO-PASSING LINE



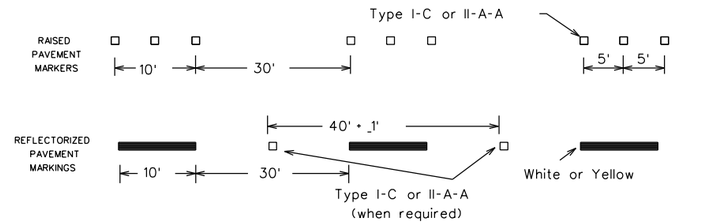
WIDE LINE

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

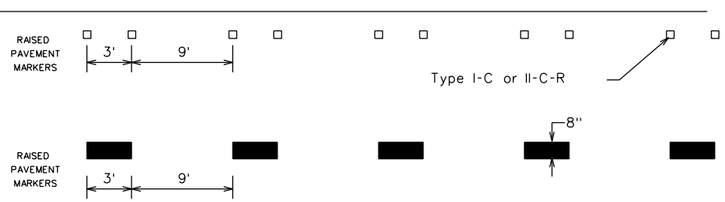


BROKEN LINES

CENTER LINE OR LANE LINE

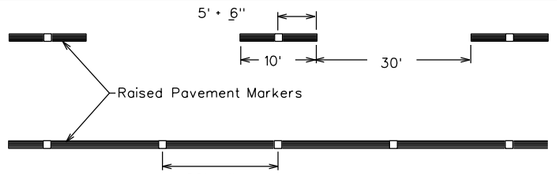


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Operations Division Standard

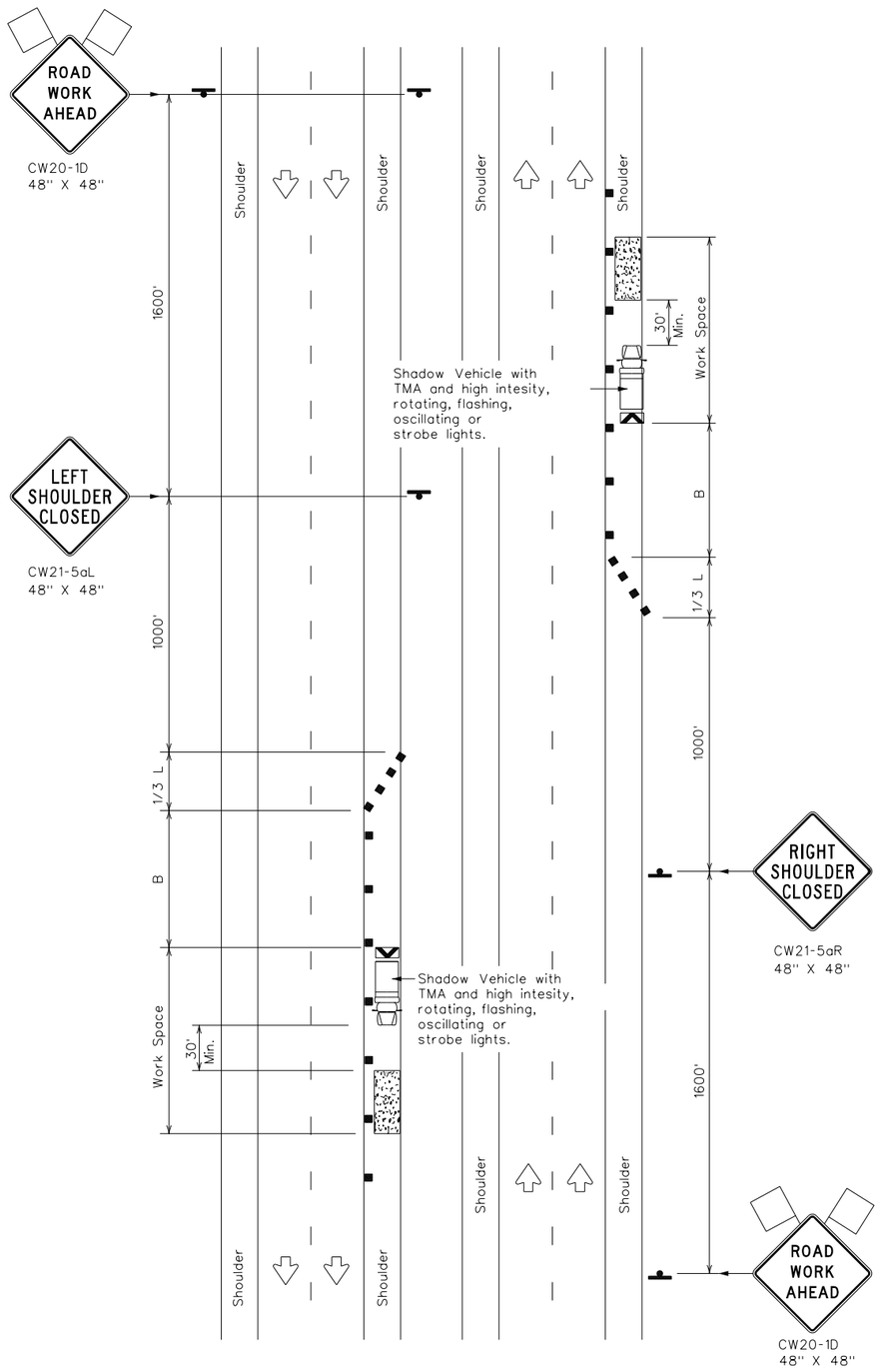
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0069	03	060, ETC.	US 87, ETC.
1-97 9-07	DIST	COUNTY		SHEET NO.
2-98 7-13	SJT	STERLING, ECT.		28
11-02 8-14				

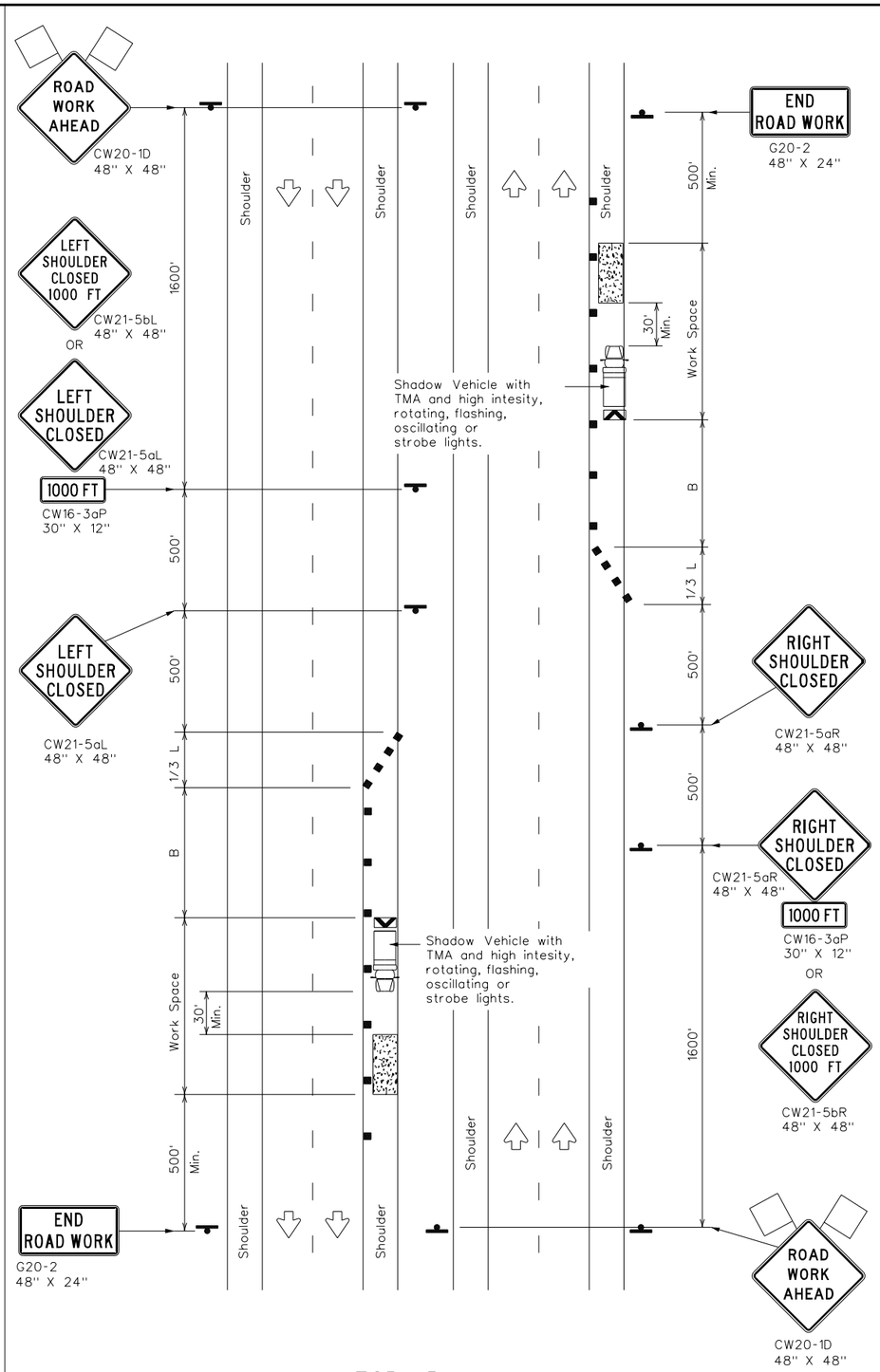
106

DATE: 4/27/2021 2:22:09 PM
FILE: pw:\\azbpw1.azb-engrs.com:PWAZBPR0001\Documents\Collaboration Projects\TxDOT\[tcp5-1-18.dgn]



TCP (5-1a)

WORK AREA ON SHOULDER



TCP (5-1b)

WORK AREA ON SHOULDER

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

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

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

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

GENERAL NOTES

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

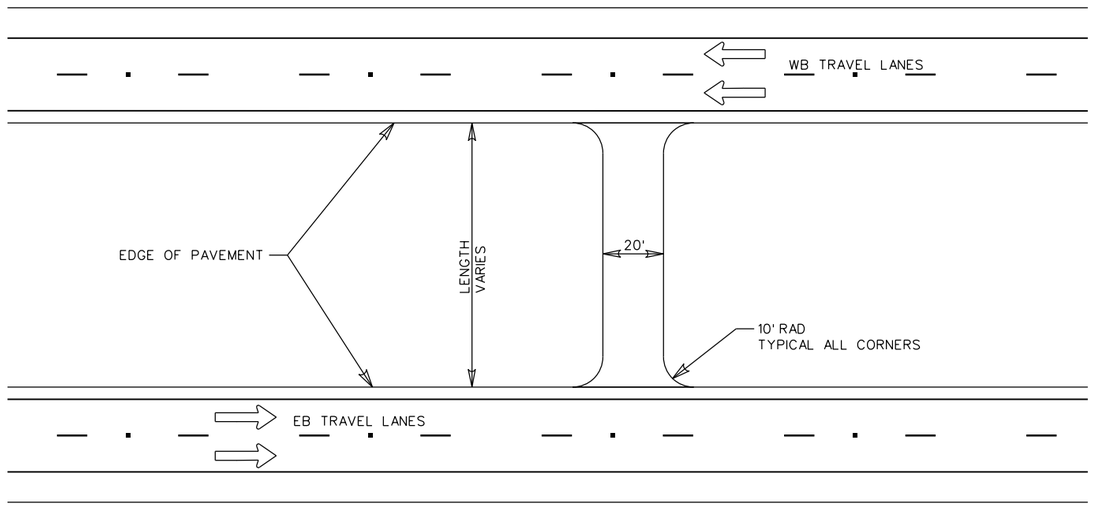
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN SHOULDER WORK FOR FREEWAYS / EXPRESSWAYS

TCP(5-1)-18

FILE: tcp5-1-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0069	03	060, ETC.	US 87, ETC.
2-18	DIST	COUNTY		SHEET NO.
	SJT	STERLING, ECT.		29



CROSSOVER CONSTRUCTION:
EXCAVATE 8" AND PROOF ROLL.
PLACE 8" LRA.
MATCH EXISTING.
GRADE AT CROSSOVER EDGES.
USE ORDINARY COMPACTION. CONSIDER.
EXCAVATION SUBSIDIARY TO ITEM 330.

EMERGENCY CROSSOVER DETAIL (NTS)

SUMMARY OF EMERGENCY CROSSOVERS

CROSSOVER NUMBER	STATION	LENGTH	WIDTH	RADIUS	AREA	330 6002 LRA PAV TY-I GR-A
		LF	LF	LF	SY	TON
BEGIN PROJECT CCSJ: 0069-03-060 etc.						**
BEGIN PROJECT CSJ: 0069-03-060 (US-87)						
CSJ: 0069-03-060 PROJECT TOTALS						0
BEGIN PROJECT CSJ: 0069-04-044						
CROSSOVER #414	414+69	64	20	10	152	64
CSJ: 0069-04-044 PROJECT TOTALS						64
BEGIN PROJECT CSJ: 0069-05-030						
CROSSOVER #874	876+76	64	20	10	152	64
CSJ: 0069-05-030 PROJECT TOTALS						64
BEGIN PROJECT CSJ: 0264-07-034 (LP-306)						
CROSSOVER #289	289+05	64	20	10	152	64
CSJ: 0264-03-034 (LP-306) PROJECT TOTALS						64
CCSJ: 0069-03-060 etc. PROJECT TOTALS						192

** 105 LBS / SY
(AREA X 840(105 X 8) / 2000)

CROSSOVER CONSTRUCTION:
EXCAVATE 8" AND PROOF ROLL.
PLACE 8" LRA.
MATCH EXISTING
GRADE AT CROSSOVER EDGES.
USE ORDINARY COMPACTION. CONSIDER
EXCAVATION SUBSIDIARY TO ITEM 330.

STATE OF TEXAS
JUAN RAMON FLORES
66715
REGISTERED PROFESSIONAL ENGINEER

P.E. 4-27-2021

SHEET 1 OF 1

NO.	REVISIONS	BY	DATE

POZNECKI CAMARILLO INC
(210) 349-3273
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http://www.pozcom.com/

AZ&B
ARREDONDO, ZEPEDA & BRUNZ, LLC
11355 McCree Road - Dallas, Texas 75238
(214) 341-9900
FIRM REGISTRATION No. F-10098

Texas Department of Transportation

US87/LP306 CROSSOVER DETAILS

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			30
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

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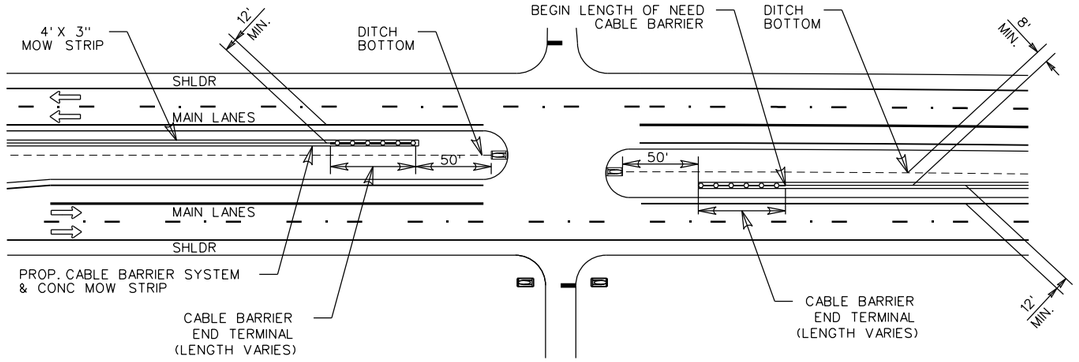
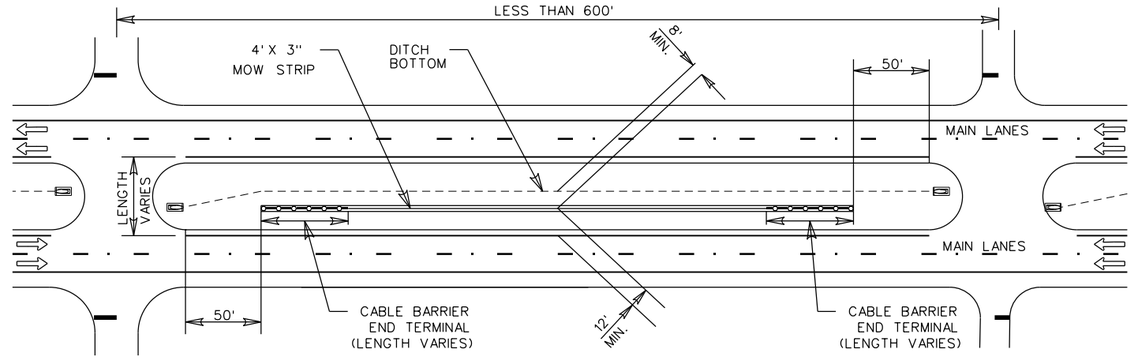
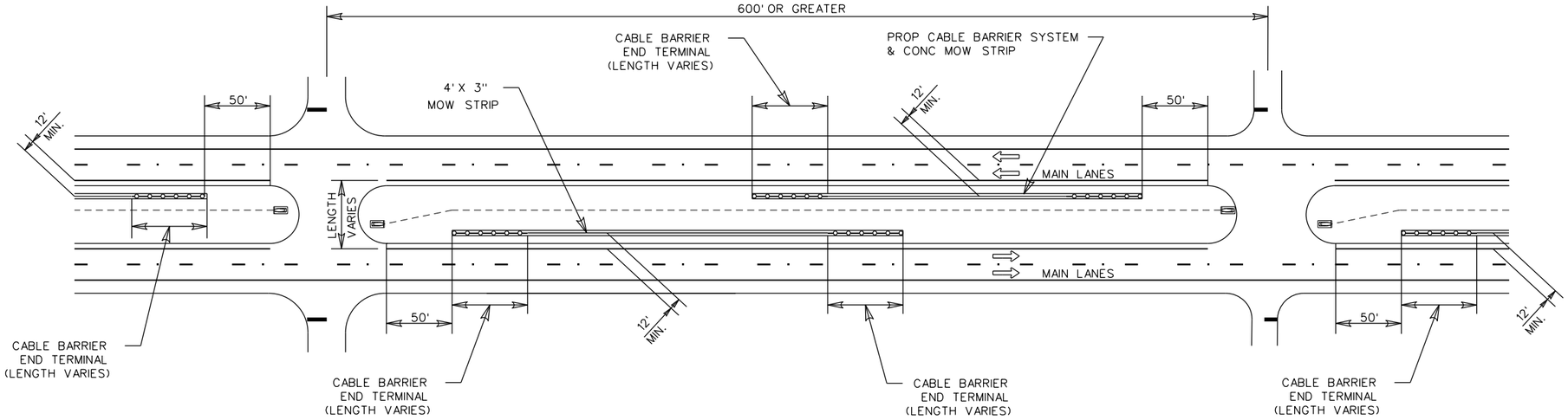


TYPICAL CABLE BARRIER TERMINATION AT CROSSOVERS



PROPOSED CABLE BARRIER LAYOUT IN SHORT MEDIAN
SHOWING TYPICAL EXISTING MEDIAN CONDITIONS



PROPOSED CABLE BARRIER LAYOUT IN LONG MEDIAN SHOWING
TYPICAL EXISTING MEDIAN CONDITIONS TERMINATION AT CROSSOVERS

RADIUS (FT)	ITEM NO.	POST SPACING
> 5500	650-2500	6'8" (STANDARD RECOMMENDATION)
< 5500	2501-5500	10' (STANDARD RECOMMENDATION)

NOTES:

1. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS ON THE FIELD PRIOR TO COMMENCEMENT OF WORK.

2. CABLE BARRIER LENGTHS MAY NEED TO BE ADJUSTED ON THE FIELD DEPENDING ON ANCHOR SECTION TYPE SELECTED A 51.25' TERMINAL SECTION LENGTH WAS USED FOR QUANTITY AND STATION CALCULATIONS.

* FOR DISTANCE BETWEEN TRAVEL LANE TO CABLE BARRIER SEE TYPICAL SECTIONS.

0 50 100 150 200
HORIZ. SCALE IN FEET

STATE OF TEXAS
JUAN RAMON FLORES
66715
REGISTERED PROFESSIONAL ENGINEER

P.E. 4-27-2021

SHEET 1 OF 2

NO.	REVISIONS	BY	DATE

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FIRM REGISTRATION No. F-10098

US87/LP306
CABLE BARRIER TERMINATION DETAILS

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			31
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

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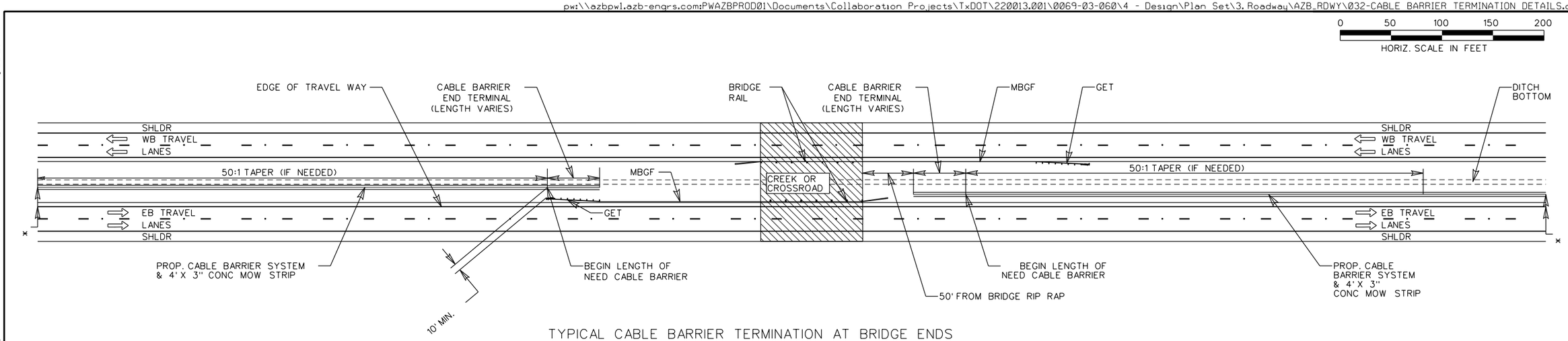
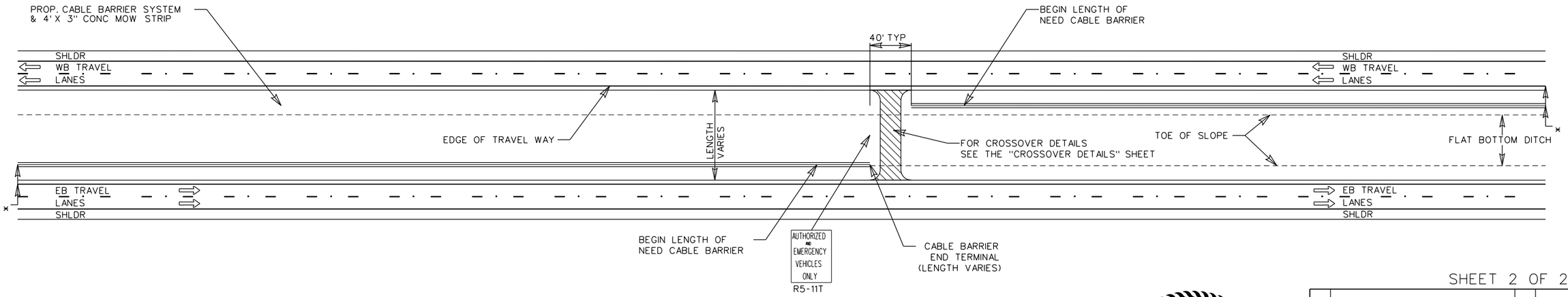


TYPICAL CABLE BARRIER TERMINATION AT BRIDGE ENDS



TYPICAL CABLE BARRIER TERMINATION AT EMERGENCY CROSSOVERS

RADIUS (FT)	ITEM NO.	POST SPACING
> 5500	650-2500	6'8" (STANDARD RECOMMENDATION)
< 5500	2501-5500	10' (STANDARD RECOMMENDATION)

NOTES:

1. THE CONTRACTOR SHALL VERIFY ALL CONDITIONS AND DIMENSIONS ON THE FIELD PRIOR TO COMMENCEMENT OF WORK.

2. CABLE BARRIER LENGTHS MAY NEED TO BE ADJUSTED ON THE FIELD DEPENDING ON ANCHOR SECTION TYPE SELECTED A 51.25' TERMINAL SECTION LENGTH WAS USED FOR QUANTITY AND STATION CALCULATIONS.

* FOR DISTANCE BETWEEN TRAVEL LANE TO CABLE BARRIER SEE TYPICAL SECTIONS.

STATE OF TEXAS
JUAN RAMON FLORES
66715
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P.E. 4-27-2021

SHEET 2 OF 2

NO.	REVISIONS	BY	DATE

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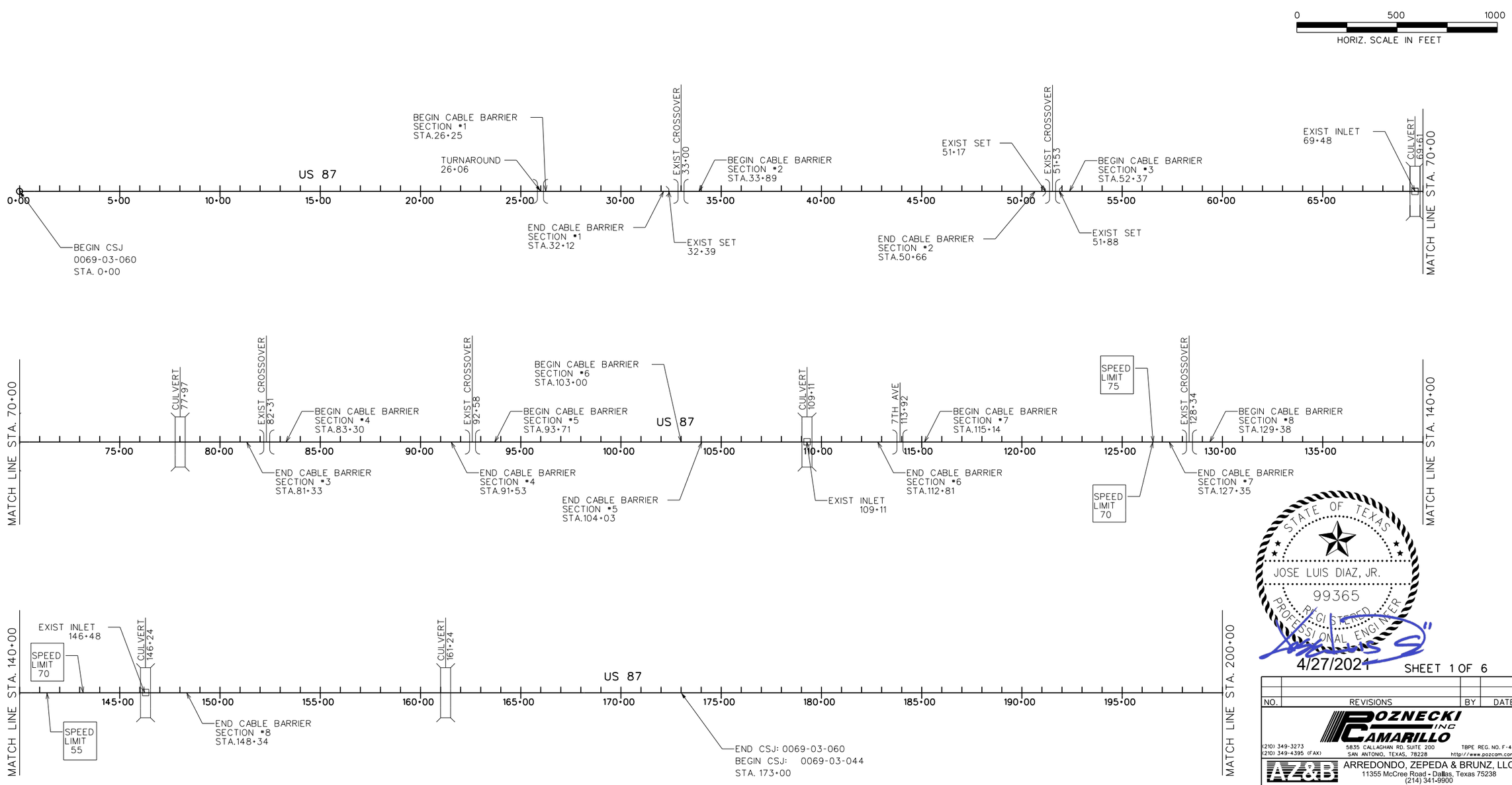
Texas Department of Transportation

US87/LP306
CABLE BARRIER TERMINATION DETAILS

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			32
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.



LEGEND

- EXISTING DRAINAGE STRUCTURE
- EROSION CONTROL LOG
- PROPOSED SMALL SIGN (R5-11T)
- CROSSOVER

NOTES:

1. EXISTING UTILITIES ARE SHOWN IN AN APPROXIMATE LOCATION BASED ON THE AVAILABLE INFORMATION.
2. CONSTRUCTION ACTIVITY IN CLOSE PROXIMITY TO UTILITIES. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION PRIOR TO CONSTRUCTION.
3. REDUCED POST SPACING OF 10'-0" MAX TO BE INSTALLED ALONG HORIZONTAL CURVES. SEE QUANTITY SUMMARY SHEETS FOR LOCATION OF CURVES.

STATE OF TEXAS
JOSE LUIS DIAZ, JR.
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4/27/2021

SHEET 1 OF 6

NO.	REVISIONS	BY	DATE

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Texas Department of Transportation

US87
STRAIGHT LINE DIAGRAM
STA 0+00 TO STA 200+00

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			33
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

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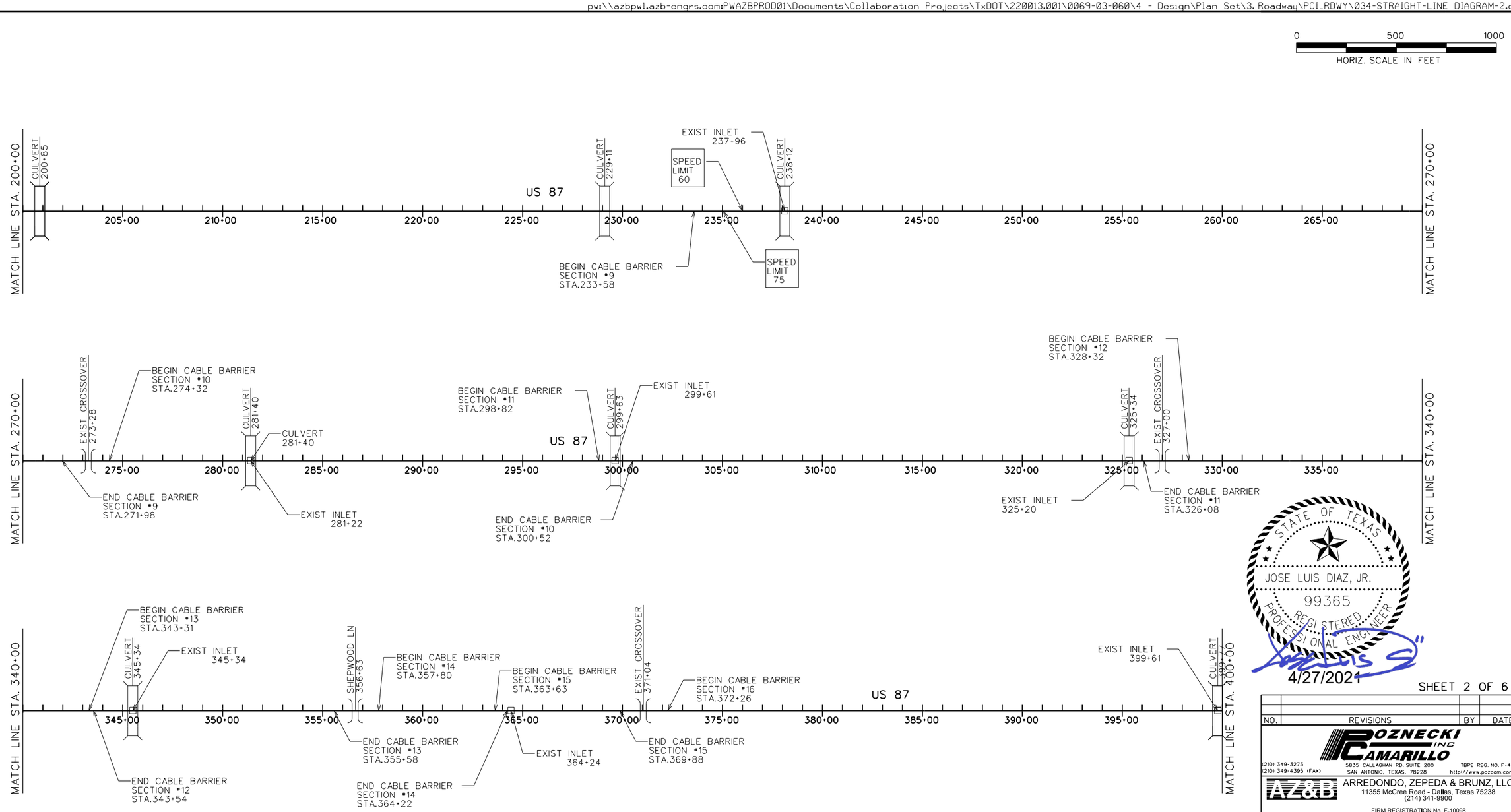

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LEGEND

- EXISTING DRAINAGE STRUCTURE
- EROSION CONTROL LOG
- PROPOSED SMALL SIGN (R5-11T)
- CROSSOVER

STATE OF TEXAS
JOSE LUIS DIAZ, JR.
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4/27/2021

SHEET 2 OF 6

NO.	REVISIONS	BY	DATE

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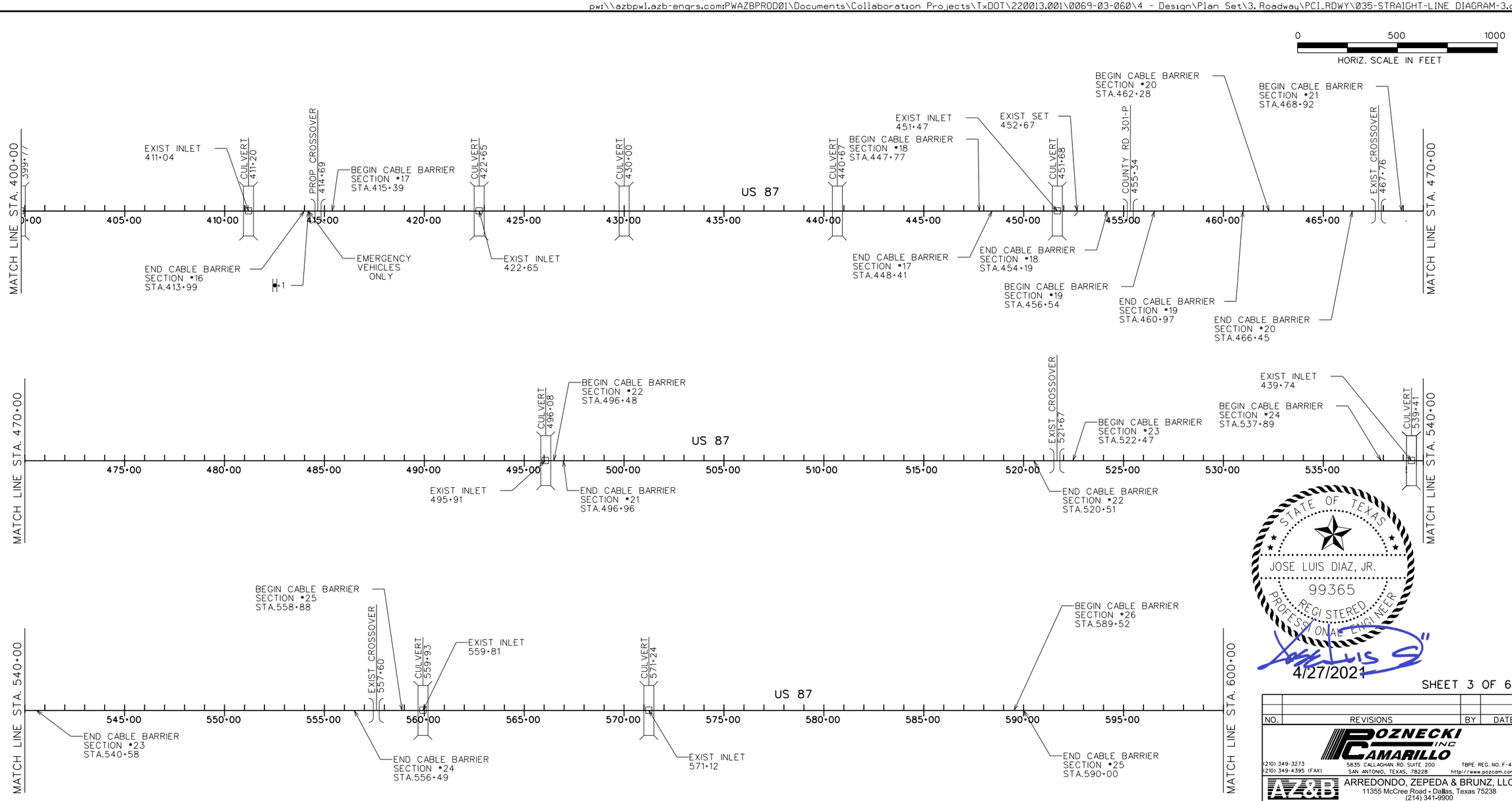
(214) 341-9900
FIRM REGISTRATION No. F-10098

Texas Department of Transportation

US87
STRAINGHT LINE DIAGRAM
STA 200+00 TO STA 400+00

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			34
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.



NOTES:
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LEGEND

- EXISTING DRAINAGE STRUCTURE
- EROSION CONTROL LOG
- PROPOSED SMALL SIGN (R5-11T)
- CROSSOVER

STATE OF TEXAS
JOSE LUIS DIAZ, JR.
99365
REGISTERED
PROFESSIONAL ENGINEER
4/27/2021

SHEET 3 OF 6

NO.	REVISIONS	BY	DATE

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FIRM REGISTRATION No. F-10098

Texas Department of Transportation

US87

STRAIGHT LINE DIAGRAM

STA 400+00 TO STA 600+00

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			35
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

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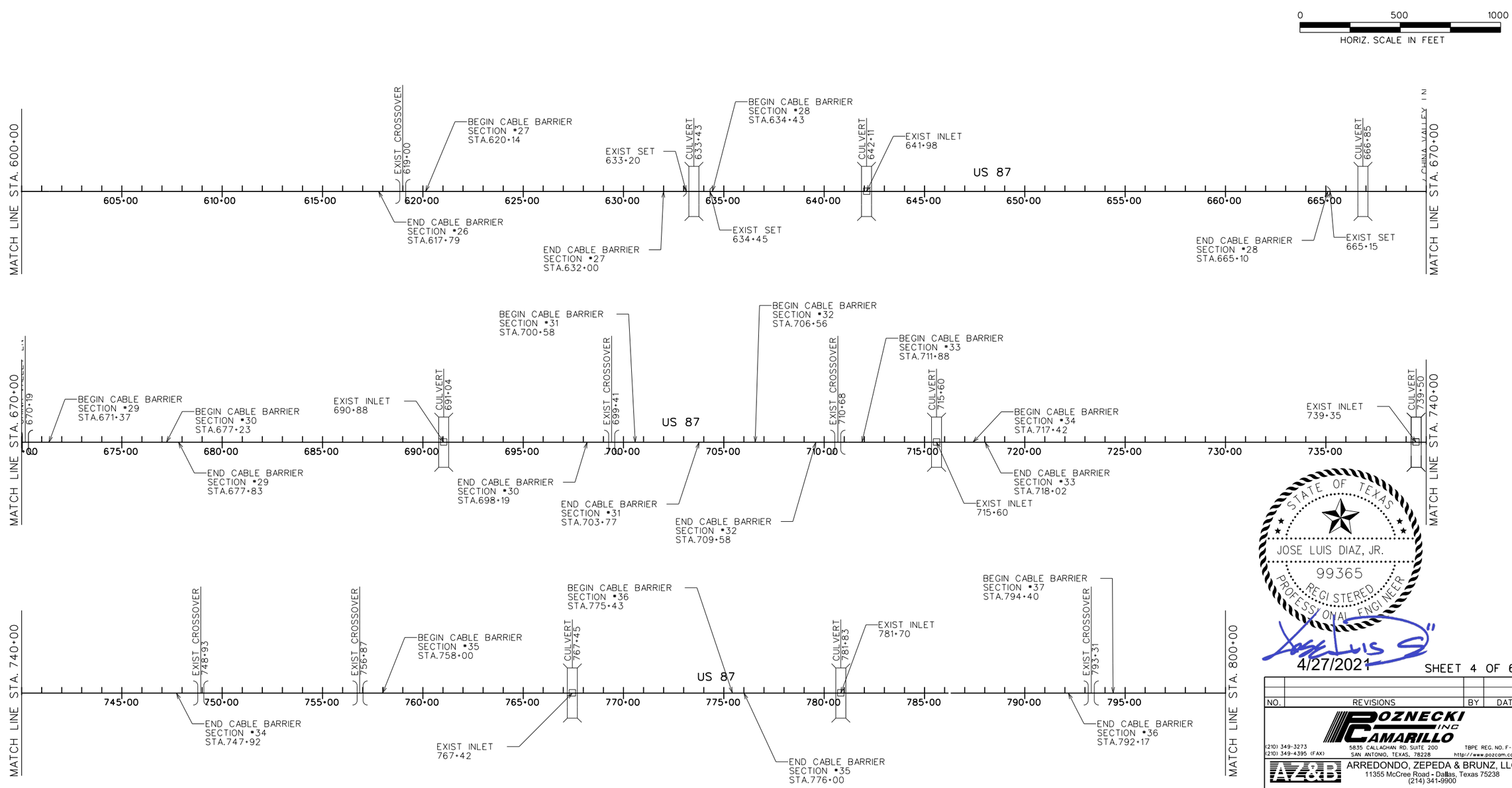

LEGEND

- EXISTING DRAINAGE STRUCTURE
- EROSION CONTROL LOG
- PROPOSED SMALL SIGN (R5-11T)
- CROSSOVER

NOTES:

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STATE OF TEXAS
JOSE LUIS DIAZ, JR.
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REGISTERED PROFESSIONAL ENGINEER
4/27/2021

SHEET 4 OF 6

NO.	REVISIONS	BY	DATE

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(214) 341-9900
FIRM REGISTRATION No. F-10098

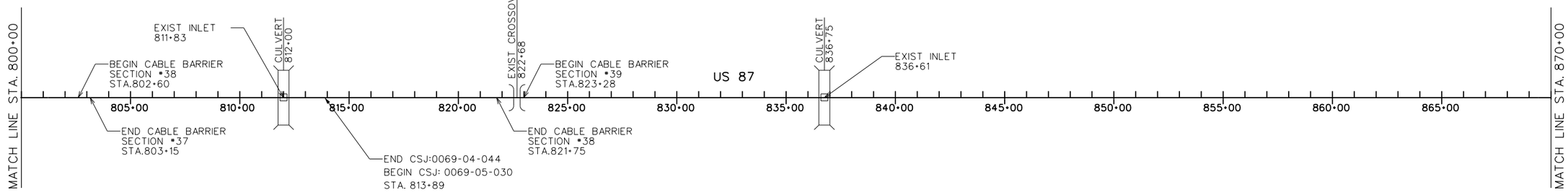
US87

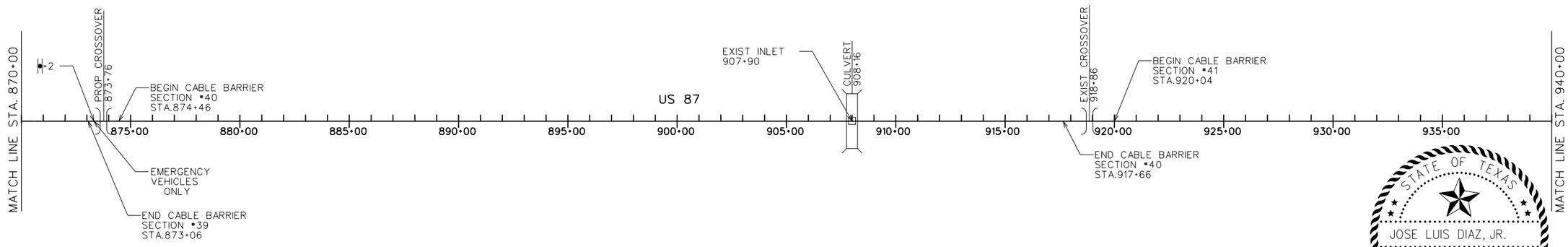
STRAIGHT LINE DIAGRAM

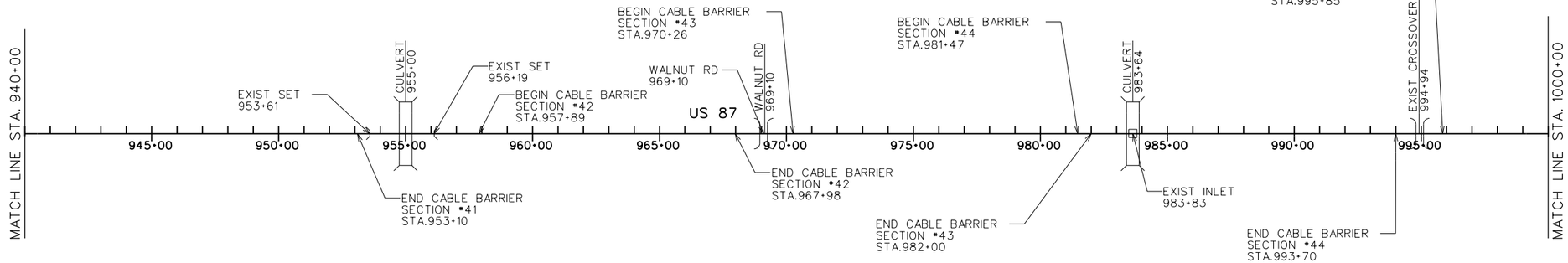
STA 600+00 TO STA 800+00

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			36
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

0 500 1000
HORIZ. SCALE IN FEET







LEGEND

- EXISTING DRAINAGE STRUCTURE
- EROSION CONTROL LOG
- PROPOSED SMALL SIGN (R5-11T)
- CROSSOVER

NOTES:
1. EXISTING UTILITIES ARE SHOWN IN AN APPROXIMATE LOCATION BASED ON THE AVAILABLE INFORMATION.
2. CONSTRUCTION ACTIVITY IN CLOSE PROXIMITY TO UTILITIES. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION PRIOR TO CONSTRUCTION.
3. REDUCED POST SPACING OF 10'-0" MAX TO BE INSTALLED ALONG HORIZONTAL CURVES. SEE QUANTITY SUMMARY SHEETS FOR LOCATION OF CURVES.

STATE OF TEXAS
JOSE LUIS DIAZ, JR.
99365
REGISTERED
PROFESSIONAL ENGINEER
4/27/2021

SHEET 5 OF 6

NO.	REVISIONS	BY	DATE

POZNECKI INC CAMARILLO
(210) 349-3273
(210) 349-4395 (FAX)
5835 CALLAGHAN RD. SUITE 200
SAN ANTONIO, TEXAS, 78228
TBPE REG. NO. F-483
http://www.pozcam.com/

AZ&B
ARREDONDO, ZEPEDA & BRUNZ, LLC
11355 McCree Road - Dallas, Texas 75238
(214) 341-9900
FIRM REGISTRATION No. F-10098

Texas Department of Transportation

US87

STRAIGHT LINE DIAGRAM

STA 800+00 TO STA 1000+00

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			37
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

Design Filename: pw:\\azbpw1.azb-engrs.com:PWAZBPROD01\Documents\Collaboration Projects\TxDOT\220013.001\0069-03-060\4 - Design\Plan Set\3. Roadway\PCI_RDWY\037-STRAIGHT-LINE DIAGRAM-5.dgn

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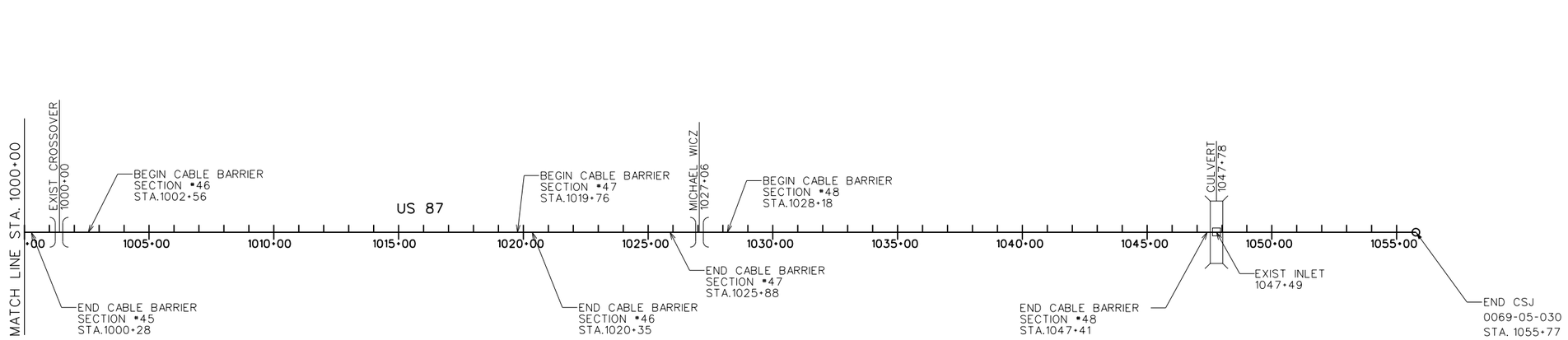

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LEGEND

- EXISTING DRAINAGE STRUCTURE
- EROSION CONTROL LOG
- PROPOSED SMALL SIGN (R5-11T)
- CROSSOVER

SHEET 6 OF 6

NO.	REVISIONS	BY	DATE

POZNECKI CAMARILLO INC
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5835 CALLAGHAN RD. SUITE 200
SAN ANTONIO, TEXAS, 78228
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11355 McCree Road - Dallas, Texas 75238
(214) 341-9900
FIRM REGISTRATION No. F-10098

Texas Department of Transportation

US87

STRAIGHT LINE DIAGRAM

STA 1000+00 TO STA 1055+77

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			38
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

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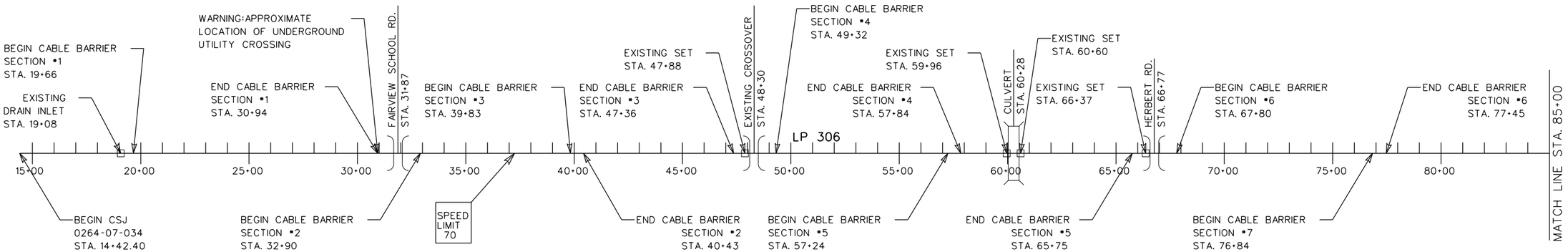
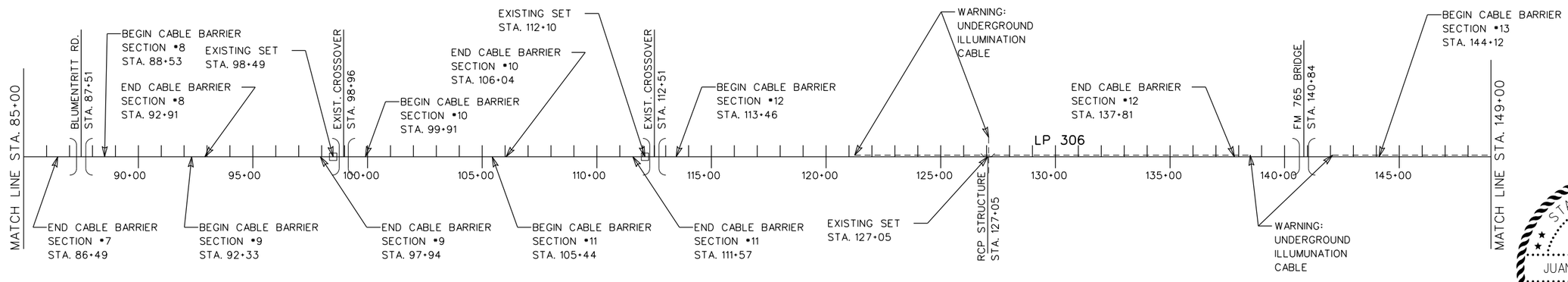
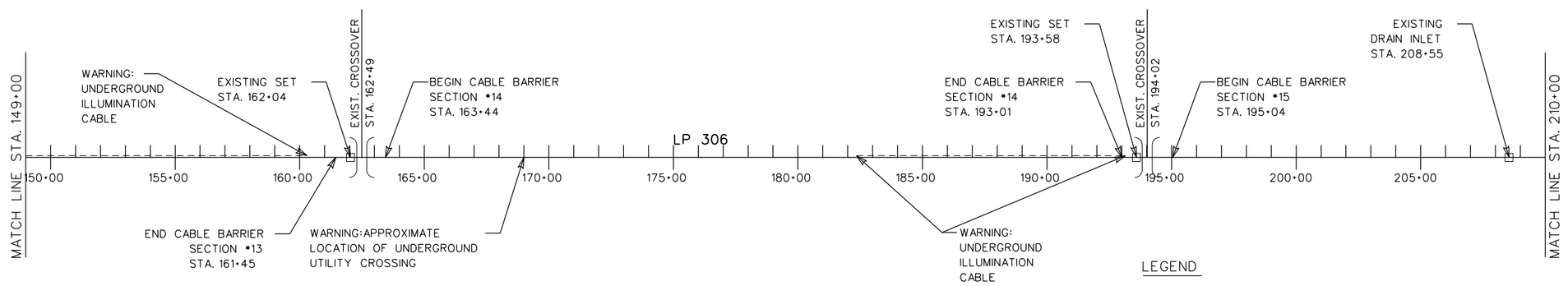
0 500 1000
HORIZ. SCALE IN FEET







LEGEND

- EXISTING DRAINAGE STRUCTURE
- EROSION CONTROL LOG
- PROPOSED SMALL SIGN (R5-11T)
- CROSSOVER

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STATE OF TEXAS
JUAN RAMON FLORES
66715
REGISTERED PROFESSIONAL ENGINEER

JUAN RAMON FLORES P.E. 4-27-2021

SHEET 1 OF 2

NO.	REVISIONS	BY	DATE

ARREDONDO, ZEPEDA & BRUNZ, LLC
11355 McCree Road - Dallas, Texas 75238
(214) 341-9900
FIRM REGISTRATION No. F-10098

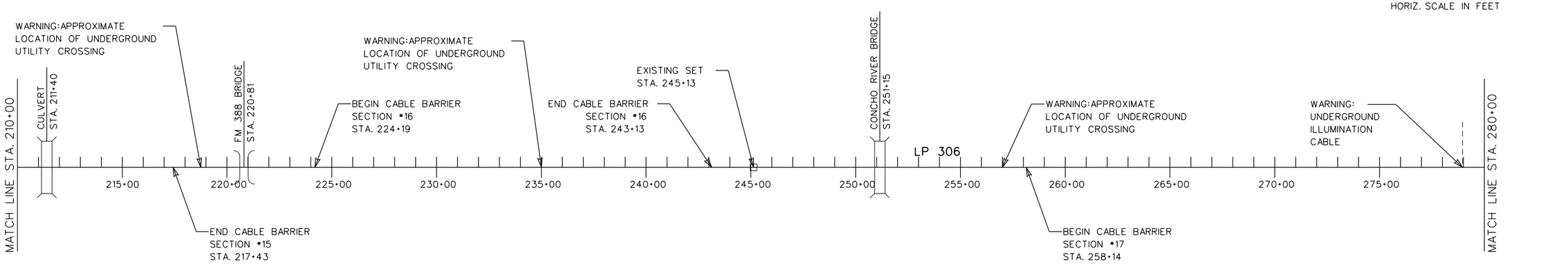
Texas Department of Transportation

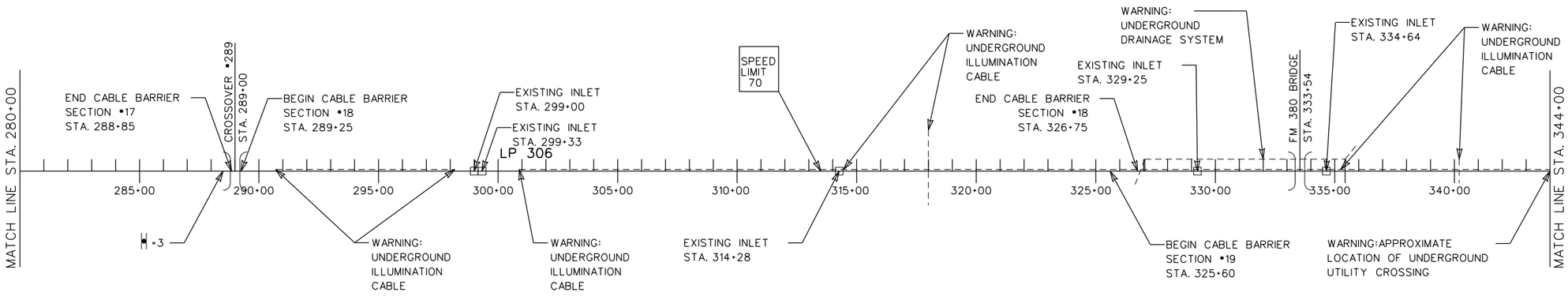
LP-306
STRAIGHT LINE DIAGRAM
STA 14•42.40 TO STA 210•00

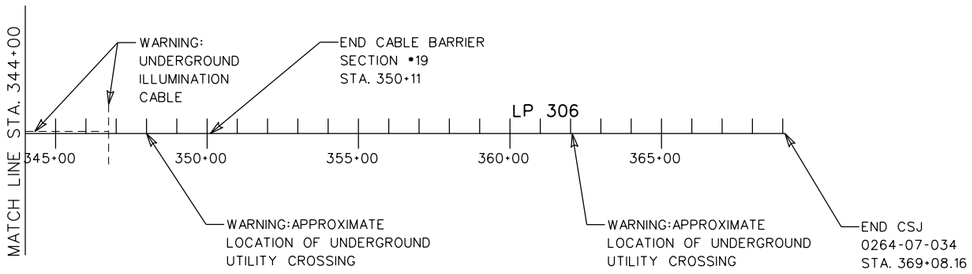
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			39
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, Etc.	US 87, ETC.

4/27/2021 2:22:33 PM

0 500 1000
HORIZ. SCALE IN FEET







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LEGEND

- EXISTING DRAINAGE STRUCTURE
- EROSION CONTROL LOG
- PROPOSED SMALL SIGN (R5-11T)
- CROSSOVER

STATE OF TEXAS
JUAN RAMON FLORES
66715
REGISTERED PROFESSIONAL ENGINEER
P.E. 4-28-2021

SHEET 2 OF 2

NO.	REVISIONS	BY	DATE

ARREDONDO, ZEPEDA & BRUNZ, LLC
11355 McCree Road - Dallas, Texas 75238
(214) 341-9900
FIRM REGISTRATION No. F-10098

Texas Department of Transportation

LP-306
STRAIGHT LINE DIAGRAM
STA 210+00.00 TO STA 369+08.16

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			40
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, Etc.	US 87, ETC.

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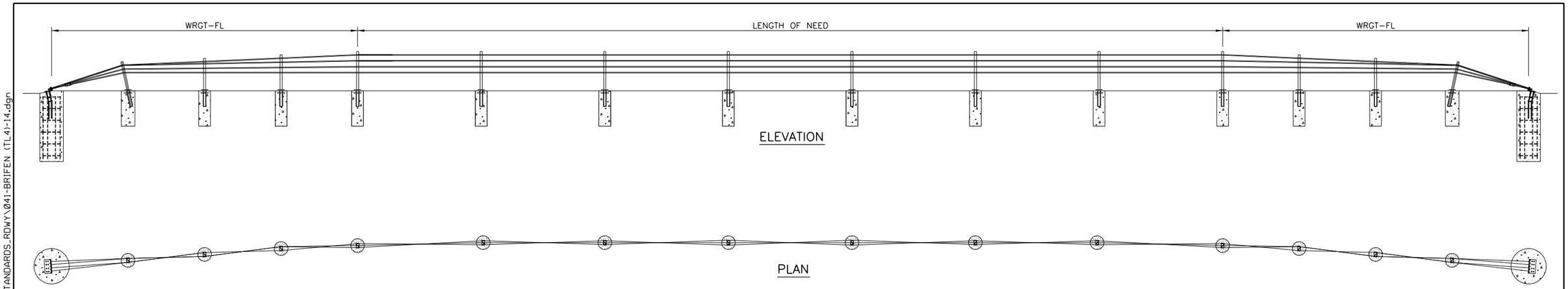
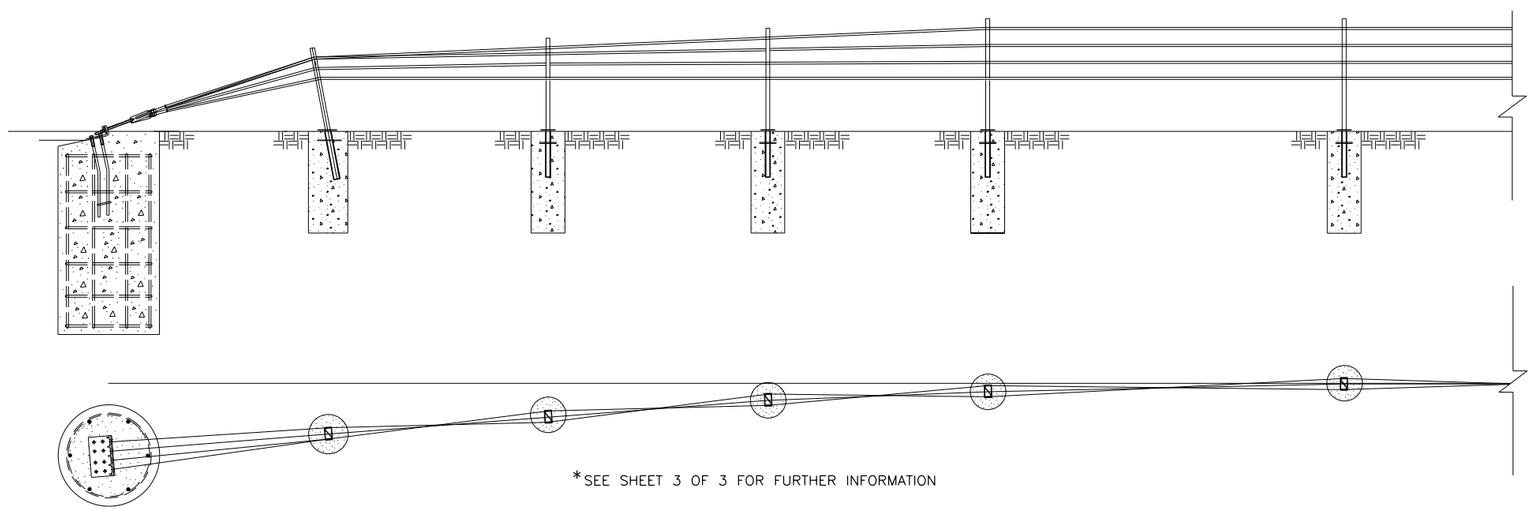


ELEVATION

PLAN

WRGT-FL END ANCHOR



*SEE SHEET 3 OF 3 FOR FURTHER INFORMATION

ROPE TENSION TABLE		
ROPE TEMP (°F)	TENSION (LBS)	TENSION (kN)
0	5700	25.4
5	5550	24.7
10	5400	24.0
15	5250	23.4
20	5100	22.7
25	4950	22.0
30	4800	21.4
35	4650	20.74
40	4500	20.0
45	4350	19.3
50	4200	18.7
55	4050	18.0
60	3900	17.3
65	3750	16.7
70	3600	16.0
75	3450	15.3
80	3300	14.7
85	3150	14.0
90	3000	13.3
95	2850	12.7
100	2700	12.0
105	2550	11.3
110	2400	10.7
115	2250	10.0
120	2100	9.3
125	1950	8.7
130	1800	8.0
135	1650	7.3
140	1500	6.7

*ROPE TENSION: ± 20% AFTER 2-WEEK INTERVAL

GENERAL NOTES:

1. BRIFEN DRAWINGS, SPECIFICATIONS, AND PRODUCT MANUAL SHOULD BE REVIEWED PRIOR TO STARTING AN INSTALLATION. FOR ADDITIONAL INFORMATION OR QUESTIONS, CONTACT BRIFEN USA, INC. AT 1-866-427-4336.
2. THE BRIFEN WRSF HAS BEEN SUCCESSFULLY TESTED TO NCHRP 350 TL-4 CONDITIONS ON SLOPES 6:1 OR FLATTER AND NCHRP 350 TL-3 CONDITIONS ON SLOPES 4:1 TO 6:1.
3. THE POST SPACING SHALL BE DETERMINED BY THE SPECIFYING AGENCY. POST SPACING MAY BE DECREASED TO AVOID OBSTRUCTIONS OR UTILITIES. IN NO EVENT SHALL THE POST SPACING EXCEED 21'-0".
4. BRIFEN WRSF SHALL BE PLACED ON A SMOOTH SURFACE, WITHOUT HUMPS, DROP-OFFS, HOLES, ETC THAT WOULD INTERFERE WITH THE STABILITY OF THE ERRANT VEHICLE. GRADING, FILL AND COMPACT MAY BE REQUIRED TO ASSURE THAT ROPES ARE INSTALLED AT THE DESIGN HEIGHT.
5. THE WRGT-FL END ANCHOR HAS BEEN SUCCESSFULLY TESTED TO NCHRP 350 TL-3 CONDITIONS. THE LENGTH OF NEED BEGINS 31'-0" FROM THE END ANCHOR. POSTS A THROUGH POST B3, SPACED 6'-6" APART, HAVE WEAKENED CUTS AT THE GROUND THAT SHALL FACE THE ANCHOR.
6. ANCHOR AND LINE POST DIMENSIONS AND STEEL REINFORCEMENT WILL BE DETERMINED ON PROJECT SPECIFIC SOIL CLASSIFICATION, PROPERTIES AND TEMPERATURE EXTREMES. CONTACT BRIFEN USA, INC. FOR ADDITIONAL INFORMATION.
7. ALL REINFORCEMENT AND CONCRETE FOR THE ANCHORS AND LINE POSTS PROVIDED BY OTHERS.
8. REINFORCEMENT AND CONCRETE PROPERTIES SHALL MEET AGENCY SPECIFICATIONS.
9. FOR PLACEMENT NEAR GUARDRAIL OR OTHER OBSTACLES CONTACT BRIFEN USA, INC. FOR ADDITIONAL DRAWINGS AND SUPPORT.
10. TAPER RATES FOR THE BRIFEN WRSF ARE AS FOLLOWS:
    HORIZONTAL: 25:1 MAXIMUM, 50:1 PREFERABLE
    VERTICAL: 25:1 MAXIMUM, 50:1 PREFERABLE

SHEET 1 OF 3

Texas Department of Transportation

Design Division Standard

BRIFEN
WIRE ROPE SAFETY FENCE
(TL-4)

BRIFEN(TL4)-14

FILE: brifentl414.dgn	DN: TxDOT	CK: RM	DW: VP	CK:
© TxDOT: MARCH 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0069	03	060, ETC.	US 87, ETC.
	DIST	COUNTY		SHEET NO.
	SJT	STERLING, ECT.		41

DATE: 4/27/2021
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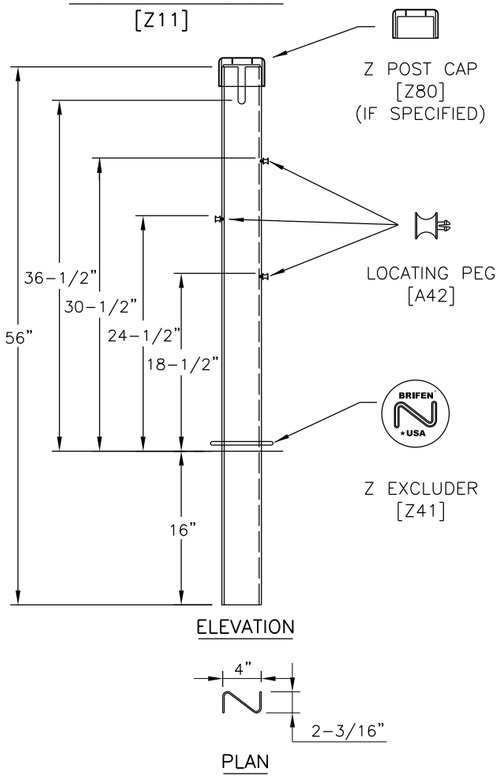
LINE POST ASSEMBLY
[Z11]



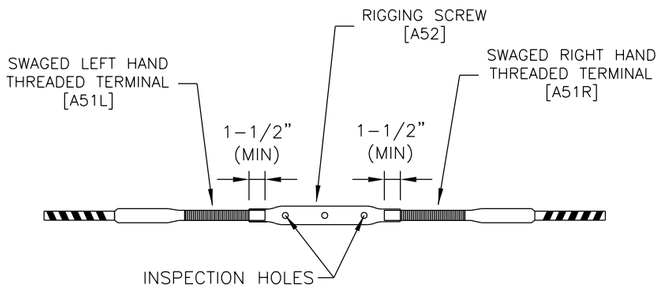
ELEVATION

PLAN

NOTES SPECIFIC TO LINE POST ASSEMBLY

1. ROPE HEIGHTS SHALL BE ±1" TO GROUND LINE.
2. POST SHALL BE ±4" FROM VERTICAL PLUMB.
3. POST CAPS SHALL BE USED IF SPECIFIED.
4. REFLECTORS SHALL BE SPACED ACCORDING TO AGENCY SPECIFICATIONS.
5. REFLECTORS CAN BE PLACED ON THE POST CAP OR POST.

ROPE CONNECTION DETAIL

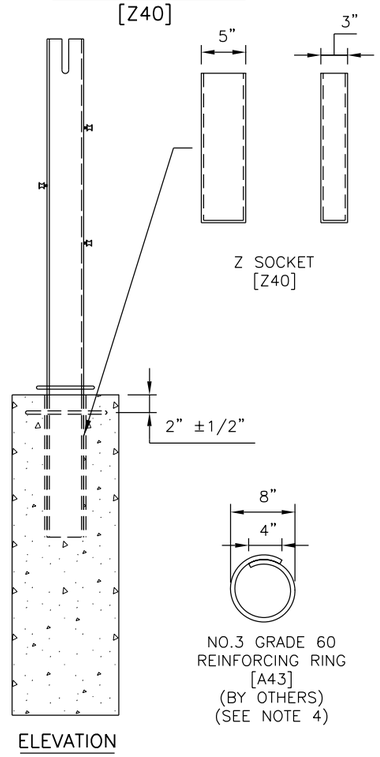


NOTES SPECIFIC TO ROPE CONNECTION DETAIL

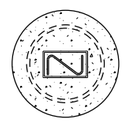
1. THE WIRE ROPE TERMINALS SHALL BE THREADED A MINIMUM OF 1-1/2" INTO RIGGING SCREW.
2. AFTER FINAL TENSIONING, THE TERMINALS SHALL BE VISIBLE IN THE INSPECTION HOLES.

SOCKET ASSEMBLY

CONCRETE FOOTING
[Z40]



ELEVATION

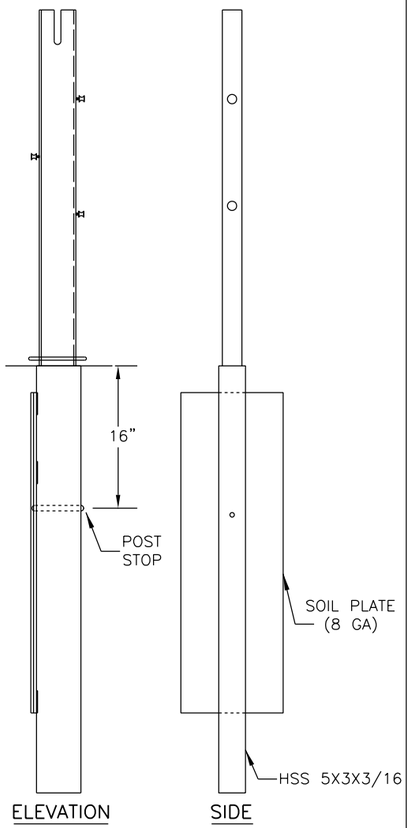


PLAN

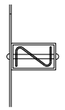
NOTES SPECIFIC TO CONCRETE FOOTING

1. SIZE OF FOOTING WILL BE DETERMINED BY SOIL CONDITIONS, FOUNDATION TYPE AND PROJECT CONDITIONS.
2. CONCRETE BASED ON AGENCY SPECIFICATIONS.
3. CONCRETE BY OTHERS.
4. REINFORCING RING (BY OTHERS) WILL BE USED ACCORDING TO FOUNDATION SIZE AND TYPE. THE REINFORCEING RING MAY BE OMITTED IF THE FOOTING IS PLACED IN A CONTINOUS CONCRETE MOW STRIP.
5. FOOTING SHALL BE FLUSH WITH THE GROUND LINE, TO A MAXIMUM OF 1 INCH BELOW OR ABOVE GROUND LINE.
6. SOCKET SHALL BE ±2° OF VERTICAL PLUMB.

DRIVE SOCKET
[Z44]



ELEVATION SIDE



PLAN

NOTES SPECIFIC TO DRIVE SOCKETS

1. SIZE OF SOIL PLATE WILL BE DETERMINED BY SOIL CONDITIONS AND PROJECT CONDITIONS.
2. THE SOIL PLATE SHALL BE PARALLEL TO ROADWAY AND CAN FACE TOWARD OR AWAY FROM THE TRAVEL LANE.
3. FOOTING SHALL BE FLUSH WITH THE GROUND LINE, TO A MAXIMUM OF 1 INCH BELOW OR ABOVE GROUND LINE.
4. SOCKET SHALL BE ±2° OF VERTICAL PLUM.
5. SOCKETS SHALL BE DRIVEN IN A MANNER TO NOT DISTORT OR DESTROY THE TOP OF SOCKET TO A DEGREE THAT PLACES THE SOCKET OR LINE POST OUT OF CONSTRUCTION TOLERANCES.

GENERAL NOTES:

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Texas Department of Transportation

Design Division Standard

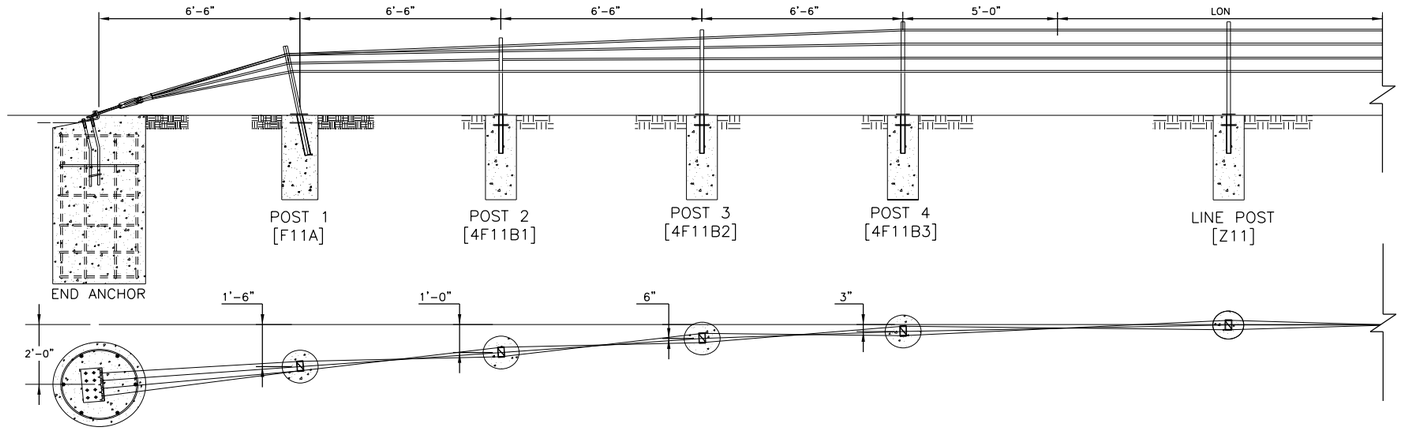
BRIFEN
WIRE ROPE SAFETY FENCE
(TL-4)

BRIFEN(TL4)-14

FILE: brifentl414.dgn	DN: TxDOT	CK: RM	DW: VP	CK:
© TxDOT: MARCH 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0069	03	060, ETC.	US 87, ETC.
	DIST	COUNTY		SHEET NO.
	SJT	STERLING, ECT.		42

DATE: 4/27/2021
FILE: pw:\\azbpw1.azb-engrs.com:PWAZBPROD01\Documents\Collaboration Projects\TxDOT\220013.001\0069-03-060\4 - Design\Plan Set\3. Roadway\STANDARDS_RDWY\043-BRIFEN (TL4)-14.dgn

WRGT-FL END ANCHOR LAYOUT



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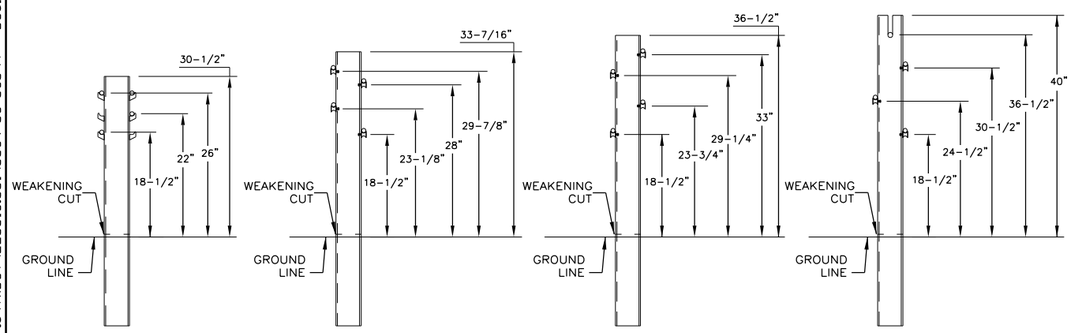
WRGT-FL POST DETAILS

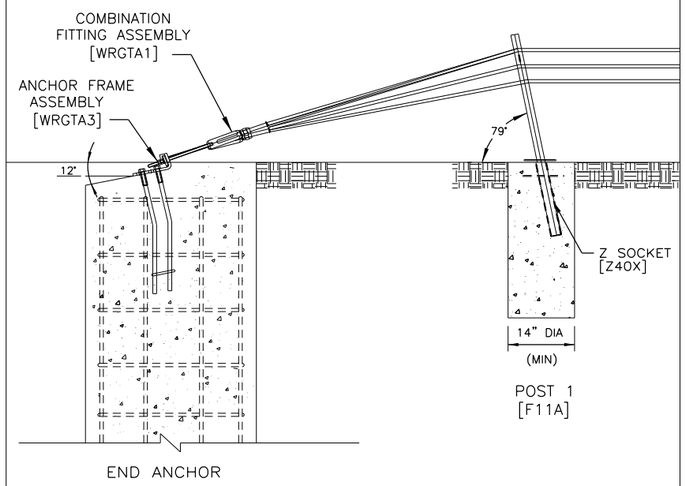


POST 1 [F11AL] | POST 2 [4F11B1L] | POST 3 [4F11B2L] | POST 4 [4F11B3L]

NOTES SPECIFIC TO WRGT-FL POST DETAIL

1. ROPE HEIGHTS SHALL BE ±1" TO GROUND LINE.
2. POST SHALL BE ±4" FROM VERTICAL PLUMB.
3. POST CAPS SHALL BE USED IF SPECIFIED.
4. REFLECTORS SHALL BE SPACED ACCORDING TO AGENCY SPECIFICATIONS.
5. REFLECTORS CAN BE PLACED ON THE POST CAP OR POST.
6. Z EXCLUDER (Z41) SHALL BE USED.
7. POST A & SOCKET SHALL BE PLACED 79° (±4°) TOWARD END ANCHOR FROM THE HORIZONTAL PLANE.
8. POST A SOCKET SHALL BE PLACED IN 14" (MIN) CONCRETE FOUNDATION. DEPTH TO BE DETERMINED FROM SOIL CONDITIONS AND PROJECT CONDITIONS.
9. FOUNDATIONS FOR POST 2 THRU 4 SHALL BE THE SAME AS THE LINE POST ASSEMBLY'S FOR THE PROJECT.
10. WEAKENED CUTS SHALL FACE END ANCHOR.

END ANCHOR DETAILS

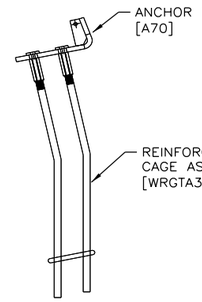


NOTES SPECIFIC TO END ANCHOR DETAIL

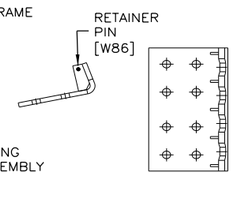
1. THE END ANCHOR ASSEMBLY SHALL BE PLACED 12" (+3", −1") BELOW HORIZONTAL PLANE.
2. POST 1 & SOCKET SHALL BE PLACED 79° (±4°) TOWARD END ANCHOR FROM THE HORIZONTAL PLANE.
3. POST 1 SOCKET SHALL BE PLACED IN 14" (MIN) CONCRETE FOUNDATION. DEPTH TO BE DETERMINED FROM SOIL CONDITIONS AND PROJECT CONDITIONS.

END ANCHOR COMPONENTS

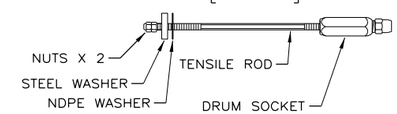
ANCHOR FRAME ASSEMBLY



ANCHOR FRAME [A70]



COMBINATION FITTING [WRGTA1]



SHEET 3 OF 3

Texas Department of Transportation | Design Division Standard

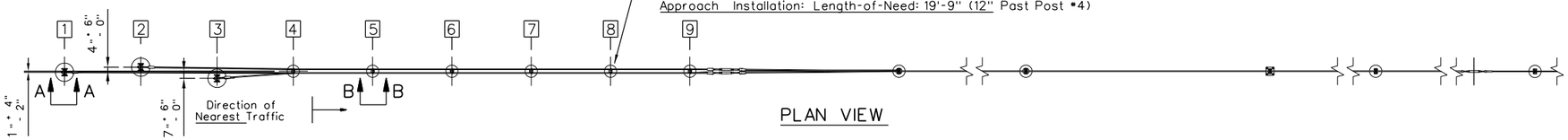
BRIFEN
WIRE ROPE SAFETY FENCE
(TL-4)

BRIFEN(TL4)-14

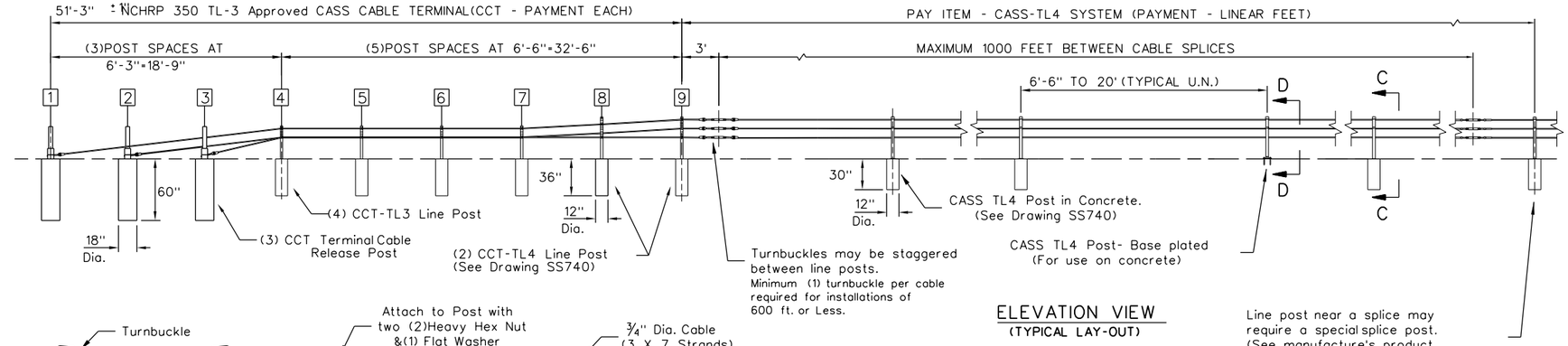
FILE: brifentl414.dgn	DN: TxDOT	CK: RM	DW: VP	CK:	
©TxDOT: MARCH 2014	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0069	03	060, ETC.	US 87, ETC.	
	DIST	COUNTY		SHEET NO.	
	SJT	STERLING, ECT.		43	

Preferred Installation: Locate post #2 away from nearest traffic.
System has been succesfully tested with opposite installation.

Length-of-Need Cass Cable Terminal (CCT):
Departure Installation: Length-of-Need: 44'-9" (At Post #8)
Approach Installation: Length-of-Need: 19'-9" (12" Past Post #4)

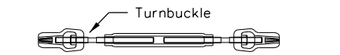


PLAN VIEW

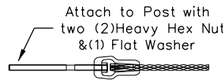


ELEVATION VIEW
(TYPICAL LAY-OUT)

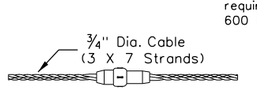
Line post near a splice may require a special splice post. (See manufacture's product manual for details)



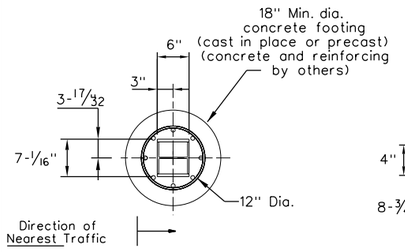
CABLE SPLICE WITH TURNBUCKLE
(OPEN BODY STYLE)



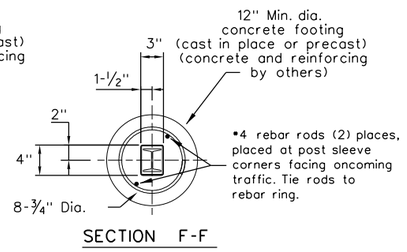
CABLE STUD ASSEMBLY



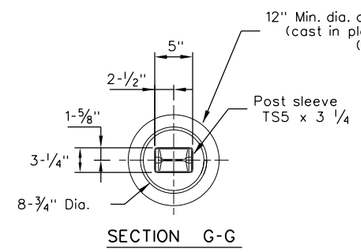
TORPEDO CABLE SPLICE



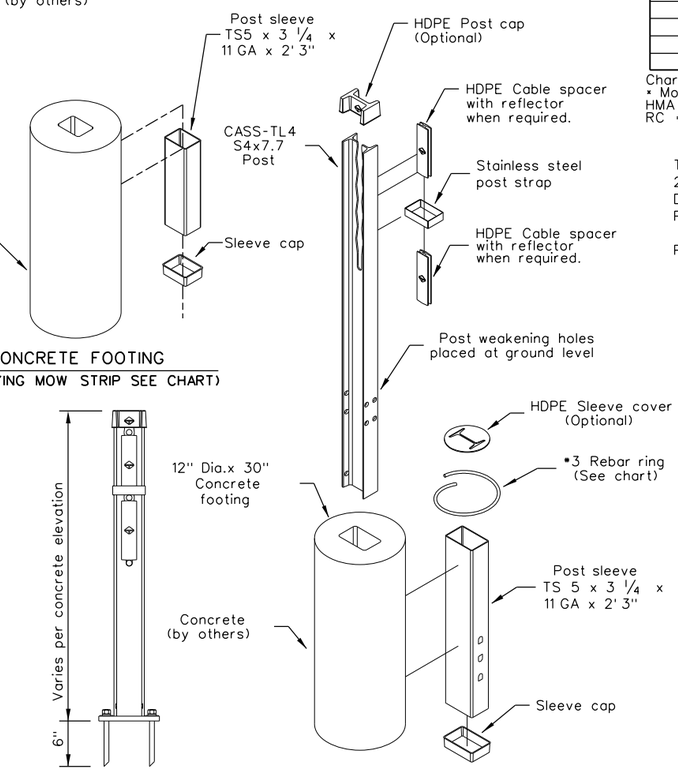
SECTION E-E

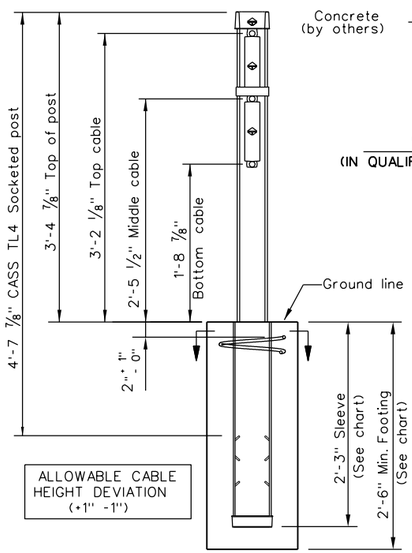


SECTION F-F



SECTION G-G



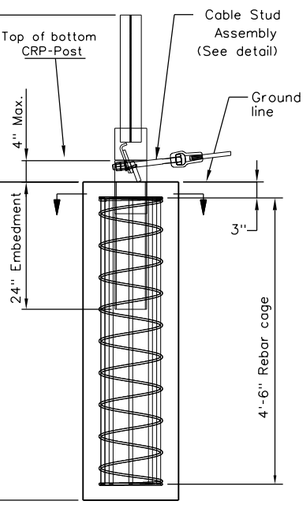


SECTION C-C
(SOCKETED POST)

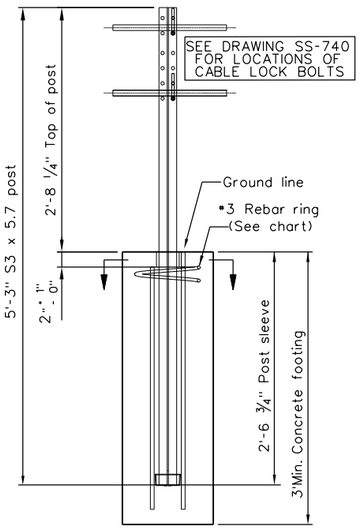
CONCRETE FOOTING
(IN QUALIFYING MOW STRIP SEE CHART)

SECTION D-D
(BASE PLATED POST)

STANDARD POST & CONCRETE FOOTING
(SOCKETED POST)



VIEW A-A
(CABLE RELEASE POST 1-3)



VIEW B-B
(TERMINAL LINE POST 4-7)

GENERAL NOTES

1. This drawing is a general overview of CASS TL-4 Barrier System. See SS-740 (latest version) for specific details of CASS cable terminal (CCT) and cable safety system (CASS) requirements, proper installation, options and specification.
2. CASS is designed for bi-directional traffic flows and can be installed on either side of the median. Contact Trinity (800-527-6050) or consult the design, installation, or repair manual(s) for additional information.
3. All concrete for CASS footings shall be TxDOT class A. If class A or stronger concrete is utilized for the mowstrip, please see chart below for allowable footing depth and sleeve deviations.
4. All posts shall be socketed unless otherwise specified. All cables shall be pre-stretched unless otherwise specified.
5. For payment see Special Specification "Cable Barrier System".
6. CASS-TL4 shall be installed on shoulders or medians with slopes of 6:1 or flatter without obstructions, depressions, etc. That may significantly affect the stability of an errant vehicle. Grading of site and/or appropriate fill materials may be required. The designer/installer shall "Flatten" or "Round" various topographical inconsistencies that could interfere with the ability of the installer to consistently maintain the design height (in relation to the terrain) of the cables. Please consult manual(s) and / or TxDOT Memo(s) for installations in "Ditch Sections".
7. CASS TL-4 post spacing may be modified to avoid obstacles that conflict with the installation of cass-tl4 line posts or to reduce deflection on radiuses. No post space can exceed the maximum post TxDOT space limit of 20'. Reducing or increasing post spacing affects deflection. CASS TL-4 may be laterally transferred at a rate not to exceed 30:1.
8. Post foundations may be drilled through existing pavement. Please see line post foundation chart for minimum footing requirements in various applications.
9. For aesthetic purposes Trinity recommends all sleeves, driven posts, and lower cable release posts to be installed reasonably plumb (approximately 1/8" per foot).
10. CASS TL-4 shall be installed in well-drained, compacted, NCHRP Report 350 Standard soil. If soil does not meet this classification, if solid rock/concrete is encountered below grade or if soil is susceptable to severe freeze/thaw cycles, please contact Trinity about alternate footing design(s). Trinity suggests the use of "Mow strips" for erosion prevention and ease of maintenance / installation.
11. See the Texas MUTCD for proper "Barrier" Delineation.

MOW STRIP DETAIL*			CONCRETE FOOTING CHART		
MOW STRIP	DEPTH	WIDTH	FOOTING	TUBE SLEEVE	REBAR RING
NONE			30" Min.	27" Min.	YES
HMA	6" Min.	3' Min.	27" Min.	15" Min.	NO
HMA	8" Min.	3' Min.	24" Min.	15" Min.	NO
RC	3" Min.	3' Min.	24" Min.	15" Min.	NO

Chart does not apply to Terminal Posts 1 thru 9.
* Mow strip or pavement.
HMA = Hot Mix Asphalt (Not Recycled Asphalt Pavement).
RC = Reinforced Concrete (TxDOT Class A Minimum).

CABLE TENSION CHART	
FAHRENHEIT	PRE-STRETCHED
DEGREES	LB / FORCE
-10	7300
0	7000
10	6600
20	6300
30	6000
40	5600
50	5300
60	5000
70	4600
80	4300
90	4000
100	3600
110	3300
120	3000
130	2700
140	2500
150	2300

Allowable deviation from chart in tangent sections: +800, -200 pounds/force. Cable tension readings are typically higher in curved cable sections.

Trinity Highway Products, LLC.
2525 Stemmons Freeway
Dallas,TX 75207
Phone: (800) 644-7976

Product.INFO@TRIN.NET

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TRINITY CABLE SAFETY SYSTEM (TL-4)

CASS(TL4)-14

FILE: casstl414.dgn	DN: TxDOT	CK: RM	DW: VP	CK:
©TxDOT: March 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0069	03	060, ETC.	US 87, ETC.
	DIST	COUNTY		SHEET NO.
	SJT	STERLING, ECT.		44

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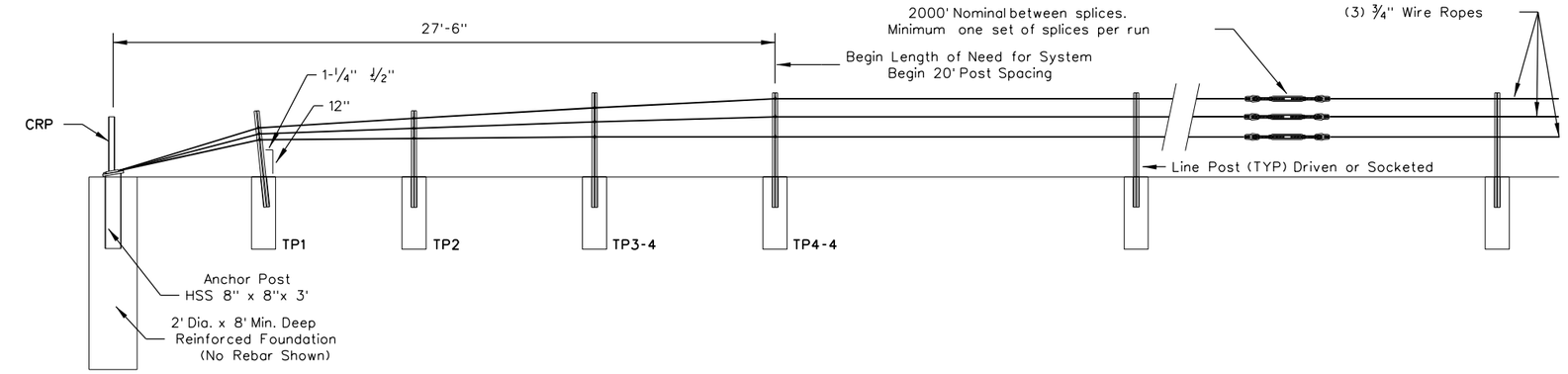
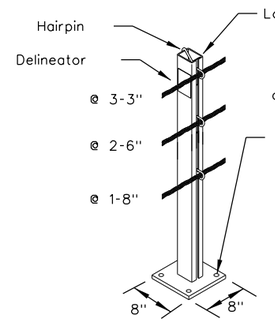
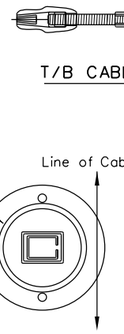
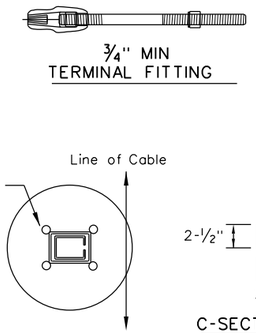
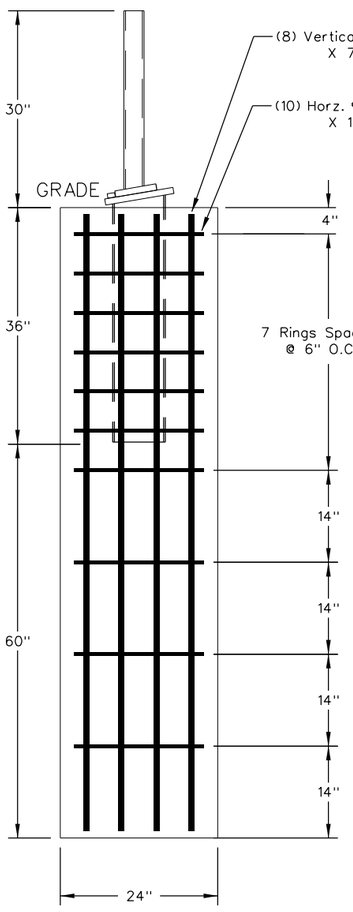




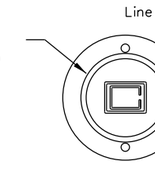
LINE POST
(BASE-PLATED OPTION)
Low-Fill Box Culvert Less than 15" Fill





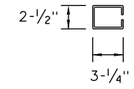


CABLE RELEASE AND ANCHOR POST

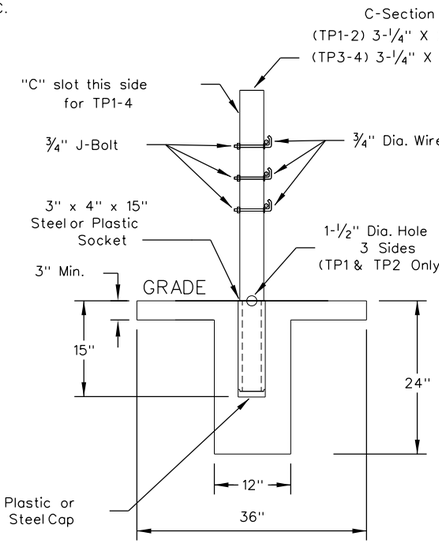


SECTION A

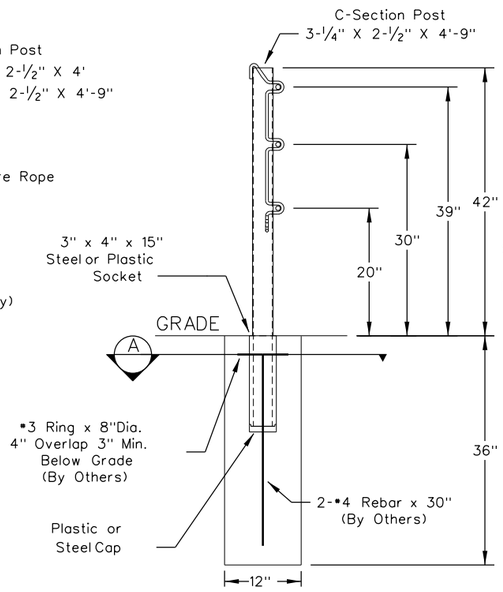
SECTION B



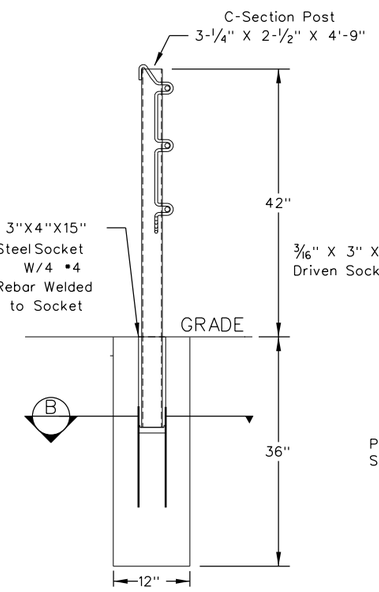
C-SECTION POST



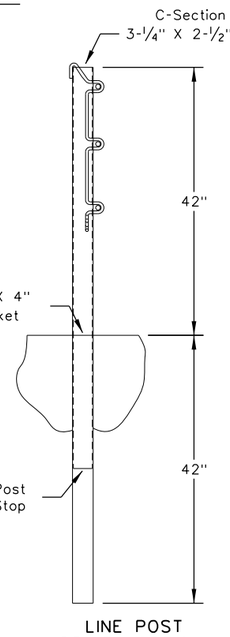
TERMINAL POST
(SHOWN WITH CONCRETE MOWSTRIP)
(Shown with Tube Plate Option)
(See Note 10)



LINE POST SOCKETED
(Shown with Rebar Ring/Bars Socket Option)
(See Note 9)



LINE POST SOCKETED
(Shown with Welded Rebar Socket Option)
(See Note 9)



LINE POST
(DRIVEN OPTION)
(Shown with Driven
Socket Option)
(See Note 9)

GENERAL NOTES

1. For additional information contact Gibraltar, Inc. at 1-800-495-8957, 830-798-5444, or see the manufacturer's product manual.
2. All concrete shall be CLASS A.
3. The Cable Barrier System shall be installed on shoulders or on medians with slopes of 6:1 or flatter. If installed on slopes steeper than 6:1 up to 4:1 the TL-4 system performs as a TL-3 and Gibraltar must be contacted for various guidelines related to placement.
4. The Cable Barrier System is accepted by the FHWA Test Level - 4.
5. See the Texas MUTCD for proper "Barrier" delineation.
6. Rock Clause: Where solid rock is encountered:
   A. For socketed post, continue digging 12" diameter, 15" deep into rock or the required plan depth, whichever comes first.
   B. For driven post, core drill a 4" diameter hole 18" deep into rock or the required plan depth, whichever comes first.
   C. For Anchor post, continue digging 24" diameter, 30" deep into rock or the required plan depth, whichever comes first.
7. Tolerances:
   - LP = 3" out of plumb, at top
   - Cable height = 1"
   - Anchor Post = 5" off of Cable Reference Line
8. The Gibraltar cable barrier system shall be installed in NCHRP Report 350 standard compacted soil. Soil must be well drained.
9. All non-welded rebar by others.
10. Minimum recommended line post foundation.
    A. Without mowstrip, 36" Deep x 12" diameter foundations with #3 rebar ring x 8" diameter with two #4 rebar vertical bars 30" long
    B. With 4" minimum depth hot mix asphalt, 30" deep x 12" diameter foundations with #3 rebar ring x 8" diameter with two #4 rebar vertical bars 30" long.
    C. With 3" minimum depth concrete mowstrip, 24" deep x 12" diameter foundations. (No rebar required)
    D. Direct drive post 42" deep.

CABLE TENSION CHART*	
-10 °F	8000
0 °F	7600
10 °F	7200
20 °F	6800
30 °F	6400
40 °F	6000
50 °F	5600
60 °F	5200
70 °F	4800
80 °F	4400
90 °F	4000
100 °F	3600
110 °F	3200

DEFLECTION	
Deflection	Post Spacing
8'-0"	20 FT
7'-0"	12 FT
6'-8"	10 FT

* Allowable Deviation from Chart +/- 10%

Texas Department of Transportation

Design Division Standard

GIBRALTAR
CABLE BARRIER SYSTEM
(TL-4)

GBRLTR(TL4)-14

FILE: gbrltrtl414.dgn	DN: TxDOT	CK: RM	DW: VP	CK:
©TxDOT: March 2014	CONT	SECT	JOB	HIGHWAY
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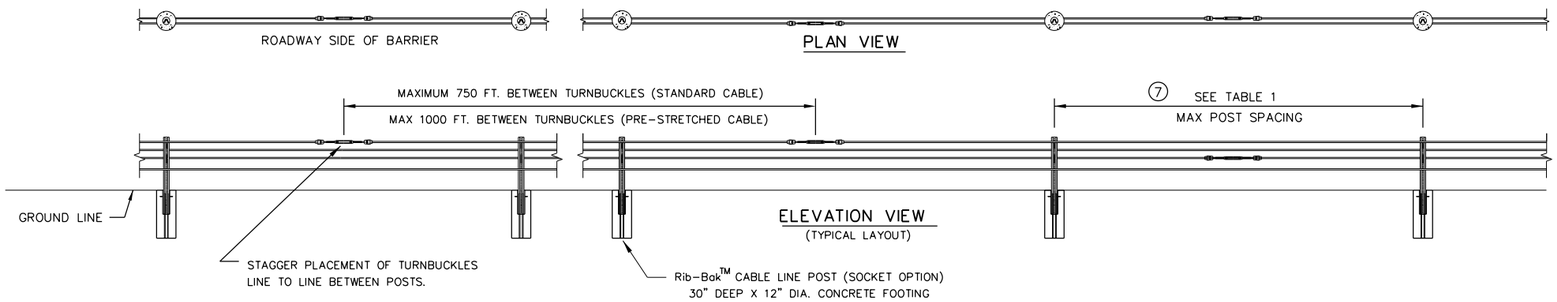
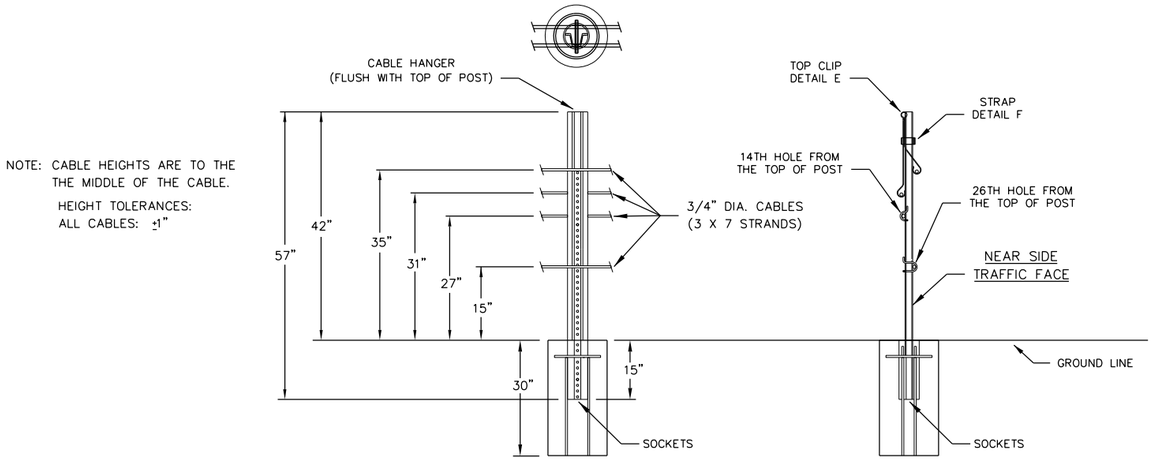
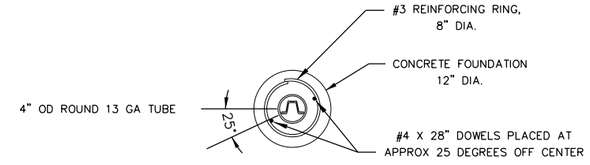
	SJT	STERLING, ECT.		45



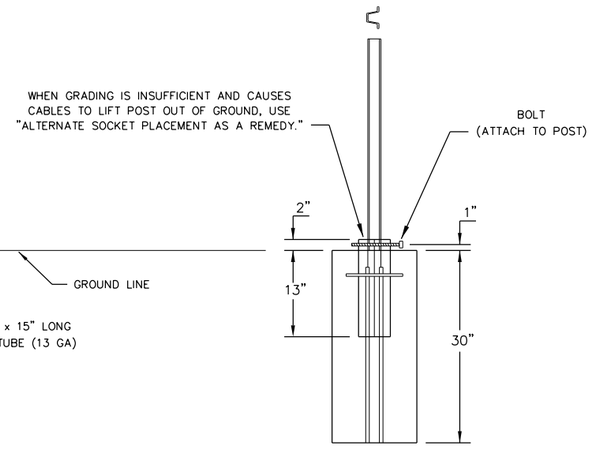


LENGTH OF NEED POSTS
MEDIAN CONFIGURATION

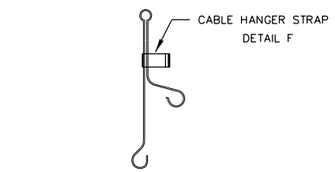
INSTALLATION DETAIL
4 CABLE 6:1



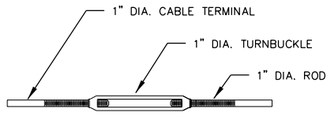
⑪ SOCKETED POST OPTION
(TYPE S POST)



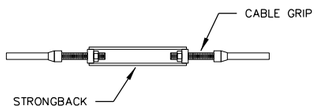
ALTERNATE SOCKET PLACEMENT
(TYPE S POST)



CABLE HANGER BRACKET
DETAIL E
(SUBJECT TO MANUFACTURER'S TOLERANCES)



WEDGED FITTING
TURNBUCKLE DETAIL
(TYPICAL)



STRONGBACK (SELF-SWAGING)
TURNBUCKLE DETAIL
(OPTIONAL)

GENERAL NOTES

1. FOR ADDITIONAL INFORMATION CONTACT YOUR DISTRIBUTOR OR NUCOR STEEL MARION, INC. AT (740) 383-4011.
2. FOR PAYMENT SEE SPECIAL SPECIFICATION "CABLE BARRIER SYSTEM".
3. FOR ADDITIONAL INFORMATION SEE THE MANUFACTURER'S PRODUCT MANUAL.
4. THE NU-CABLE SYSTEM IS DESIGNED FOR BI-DIRECTIONAL TRAFFIC FLOWS. SEE THE MANUFACTURER'S PRODUCT MANUAL FOR PLACEMENT ADJACENT TO GUARDRAIL END TREATMENTS.
5. THE NU-CABLE SYSTEM SHALL BE INSTALLED ON MEDIANS WITH SLOPES OF 6:1 OR FLATTER WITHOUT OBSTRUCTIONS, DEPRESSIONS, ETC; THAT MAY SIGNIFICANTLY AFFECT THE STABILITY OF AN ERRANT VEHICLE.
6. THE NU-CABLE SYSTEM MAY BE INSTALLED ON EITHER SIDE OF THE ROADWAY. Rib-Bak™ CABLE LINE POSTS MAY BE SOCKETED OR DRIVEN DESIGN.
7. THE TL-4 FOR 6:1 SLOPES CAN USE 4# / LF POST. SEE TABLE #1 FOR POST SIZE PER SPACING.
8. SEE (TABLE 2) FOR TENSION AMOUNT AT SPECIFIC CABLE TEMPERATURE FOR INITIAL INSTALLATION.
9. SEE (TABLE 3) FOR TENSION AMOUNT AT SPECIFIC CABLE TEMPERATURE FOR MAINTENANCE.
10. FOURTH (LOWEST) CABLE IS NOT OPTIONAL ON THE TL-4 SYSTEM.
11. CONSULT YOUR PROJECT PLAN SHEETS AND CABLE BARRIER SPECIFICATIONS FOR DESIRED SOCKET MATERIAL.
12. ALL FOUNDATION DESIGNS ARE BASED ON NCHRP 350 STRONG (S1) SOIL. CONSULT THE MANUFACTURER FOR SPECIFIC FOUNDATION DESIGN IF SOIL TYPES DIFFER.

⑦ TABLE 1

POST SIZE TABLE	
POST SPACING	POST SIZE
0' – 17'-6"	4# / LF X 4' OR 6' POST
17'-6" – 20'	5# / LF X 4' POST

POST SPACING IS PER 8 FOOT DEFLECTION REQUIRMENTS.
CONSULT PRODUCT MANUAL IF GREATER DEFLECTION IS PERMISSIBLE.

⑧ TABLE 2

CABLE TENSION CHART	
INITIAL INSTALL	
F	LBF
120	4624
110	4986
100	5350
90	5713
80	6077
70	6440
60	7167
50	7894
40	8619
30	9346
20	10073
10	10800
0	11525
-10	12252
-20	12979
-30	13706

⑨ TABLE 3

CABLE TENSION CHART	
MAINTENANCE	
F	LBF
120	4021
110	4336
100	4652
90	4968
80	5284
70	5600
60	6232
50	6864
40	7495
30	8127
20	8759
10	9391
0	10022
-10	10654
-20	11286
-30	11918

DATE: 4/27/2021
FILE: pw:\\azbpw1.azb-engrs.com:PWAZBPR0061\Documents\Collaboration Projects\TxDOT\220013.001\0069-03-060\4 - Design\Plan Set\3. Roadway\STANDARDS_RDWY\046-NU-CABLE (TL4)-14.dgn

SHEET 1 OF 2

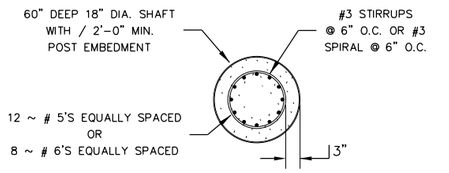
Texas Department of Transportation | Design Division Standard

NU-CABLE BARRIER SYSTEM
(TL-4)
(4 CABLE)

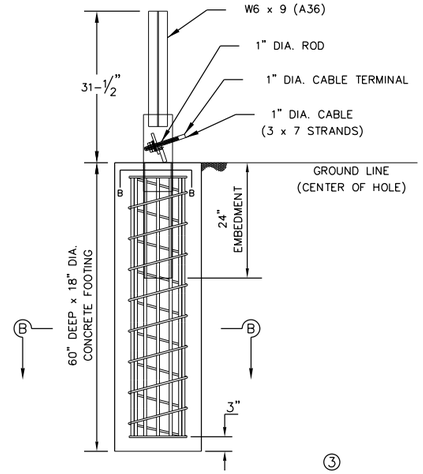
NU-CABLE(TL4)-14

FILE: nucabletl414	DN: TxDOT	CK: RM	DW: VP	CK:
© TxDOT: March 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0069	03	060, ETC.	US 87, ETC.
	DIST	COUNTY		SHEET NO.
	SJT	STERLING, ECT.		46

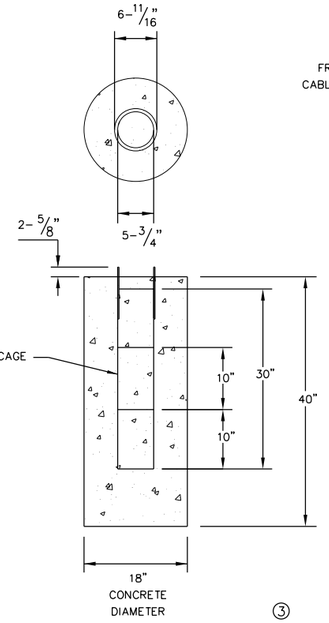
DATE: 4/27/2021
FILE: pw:\\azbpwl.azb-engrs.com:PWAZBPROD01\Documents\Collaboration Projects\TxDOT\220013.001\0069-03-060\4 - Design\Plan Set\3, Roadway\STANDARDS_ROWY\047-NU-CABLE (TL4)-14.dgn



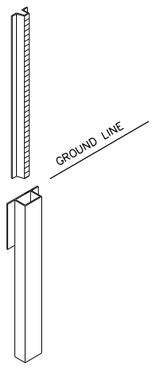
SECTION B-B
(CABLE RELEASE POST)



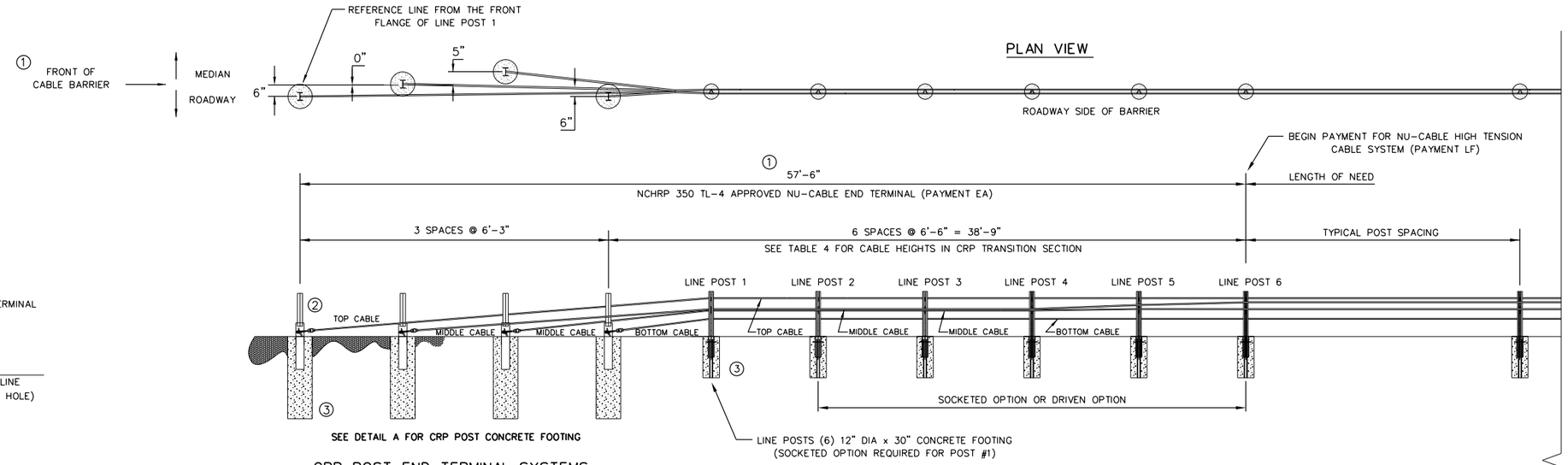
DETAIL A – CRP IN CONCRETE FOOTING
(3000 PSI MIN CONCRETE) ③



NU-TEN CONCRETE FOOTING DETAIL ③



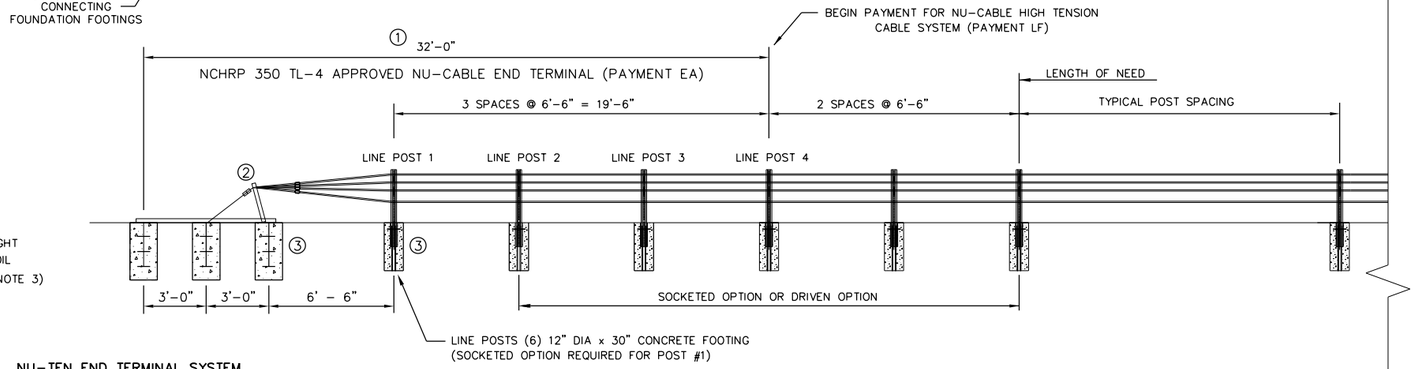
DRIVEN SOCKET OPTION



CRP POST END TERMINAL SYSTEMS

ELEVATION VIEW

① THE OPPOSING END TREATMENTS ON A PARTICULAR RUN ARE MIRRORED IN THEIR LAYOUT.



CONCRETE HEIGHT STANDARD SOIL (MAY VARY, SEE NOTE 3)

NU-TEN END TERMINAL SYSTEM

ELEVATION VIEW

④ TABLE 4

CRP END TERMINAL CABLE HEIGHTS - TL-4						
	LP 1	LP 2	LP 3	LP 4	LP 5	LP 6
TOP CABLE	34"	34"	34"	34"	34"	34"
UPPER-MIDDLE CABLE	27"	27"	27"	27"	28"	31"
BOTTOM-MIDDLE CABLE	24"	24"	24"	24"	24"	24"
BOTTOM CABLE	15"	15"	15"	15"	15"	15"

NOTES

1. THE OPPOSING END TREATMENTS ON A PARTICULAR RUN ARE MIRRORED IN THEIR LAYOUT. SYSTEM PAYMENT IS PER EACH (EA). REFER TO PROJECT SPECIFICATIONS FOR ADDITIONAL PAYMENT INFORMATION
2. REFER TO INSTALLATION MANUAL FOR CABLE END ASSEMBLY DETAIL.
3. ALL FOUNDATION DESIGNS ARE BASED ON NCHRP 350 STRONG (S1) SOIL. CONSULT THE MANUFACTURER FOR SPECIFIC FOUNDATION DESIGNS IF SOIL TYPES DIFFER.
4. SEE TABLE 4 CABLE HEIGHTS IN CRP TRANSITION SECTION.

Texas Department of Transportation

Design Division Standard

NU-CABLE BARRIER SYSTEM (TL-4) (4 CABLE)

NU-CABLE(TL4)-14

FILE: nucabletl414	DN: TxDOT	CK: RM	DW: VP	CK:
© TxDOT: March 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0069	03	060, ETC.	US 87, ETC.
	DIST	COUNTY		SHEET NO.
	SJT	STERLING, ECT.		47

SUMMARY OF SMALL SIGNS

SMA RD SGN ASSM TY XXXXX (X) XX (X-XXXX)
Post Type | Anchor Type | Mounting | Designation

PLAN SHEET NO.	SIGN NO.	SIGN DESIGNATION	SIGN CONTENT	SIGN DIMENSIONS (See above Note)	ALUMINUM TYPE A	ALUMINUM TYPE G	Post Type: FRP = Fiberglass TWT = Thin-wall 10BWG = 10 BWG S80 = Sched 80	Posts (1 or 2)	Anchor Type: UA = Univer-Conc UB = Univer-Bolt SA = Slip-Conc SB = Slip-Bolt WS = Wedge Steel WP = Wedge Plstic	Mounting: P = Prefb."Plain" T = Prefab. "T" U = Prefab. "U"	Designation: 1EXT or 2EXT = # of Ext. BM = Extruded Beam WC = 1.12 #/ft Wing Chan. EXAL = Extruded Alum. Signs	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY N = Type N TY S = Type S
37	1	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	30 x 30	X		10BWG	1	SA	P		
		R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	30 x 30	X							
39	2	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	30 x 30	X		10BWG	1	SA	P		
		R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	30 x 30	X							
42	3	R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	30 x 30	X		10BWG	1	SA	P		
		R5-11T	FOR OFFICIAL OR EMERGENCY VEH USE ONLY	30 x 30	X							

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).

STATE OF TEXAS
JUAN RAMON FLORES
66715
REGISTERED
PROFESSIONAL ENGINEER

Juan Flores P.E. 4-28-2021

SHEET 1 OF 1

Texas Department of Transportation | Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

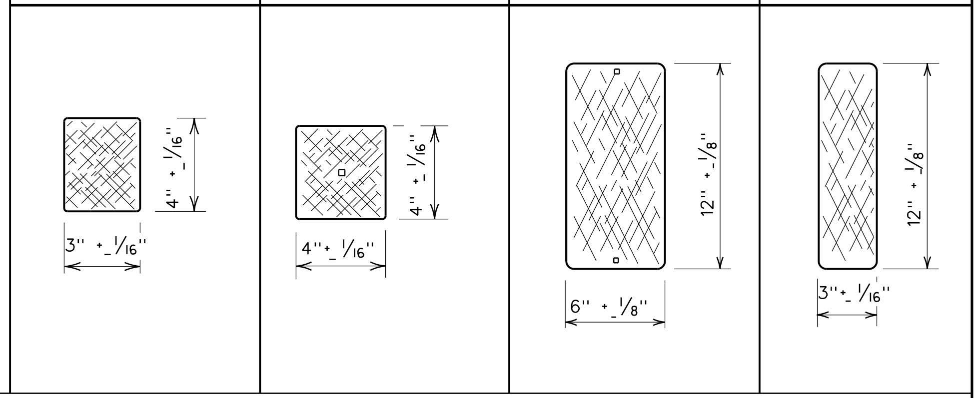
SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0069	03	060, ETC.	US 87, ETC.
4-16	DIST	COUNTY		SHEET NO.
8-16	SJT	STERLING, ECT.		48

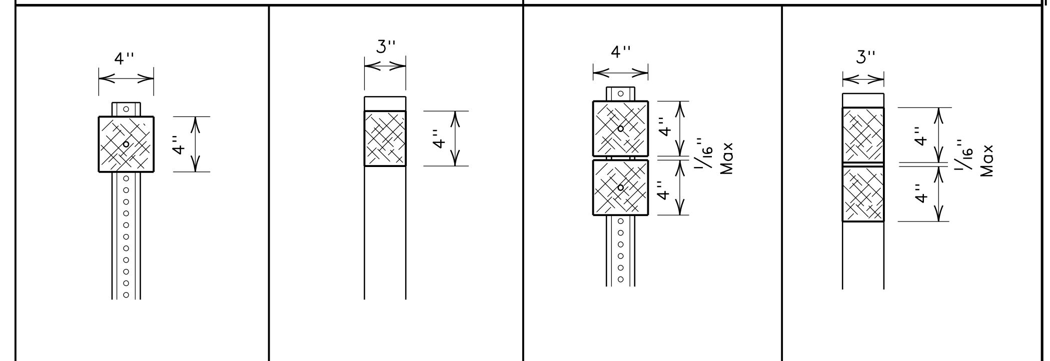
18

4/28/2021 5:42:33 PM

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)

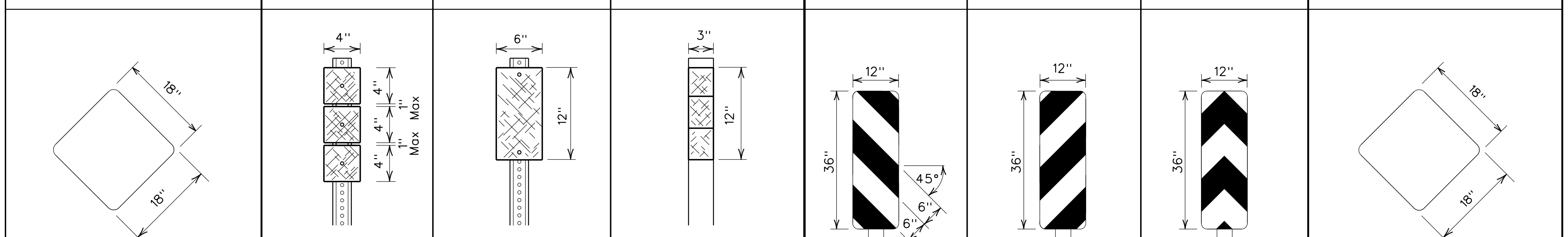
TYPE OF POST
- WC = Wing Channel Post
- WFLX = White Flexible Post
- TWT = Thin Walled Tubing

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

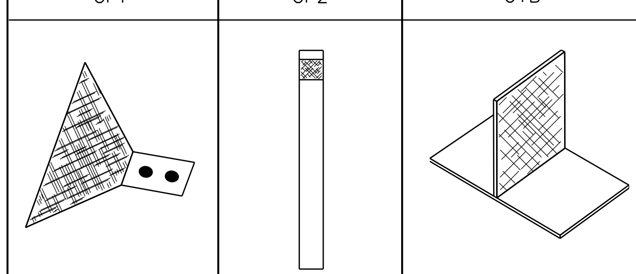
DIRECTION
- If Required
- BI = Bi-Directional

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

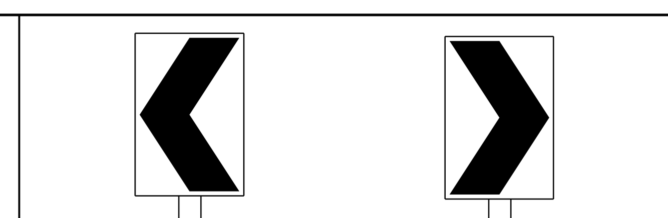
OBJECT MARKERS

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

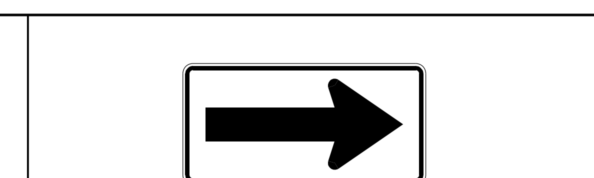
BARRIER REFLECTORS (BRF)

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

CHEVRONS

DEVICE	 W1-8			
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

ONE DIRECTION LARGE ARROW

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

NOTE

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

NOTE:

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0069	03	060, ETC.	US 87, ETC.
10-09 3-15 / 4-10 7-20	DIST		COUNTY	SHEET NO.
	SJT		STERLING, ECT.	49

20A

DATE: 4/27/2021 3:28:40 PM
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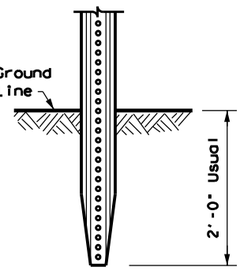
POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

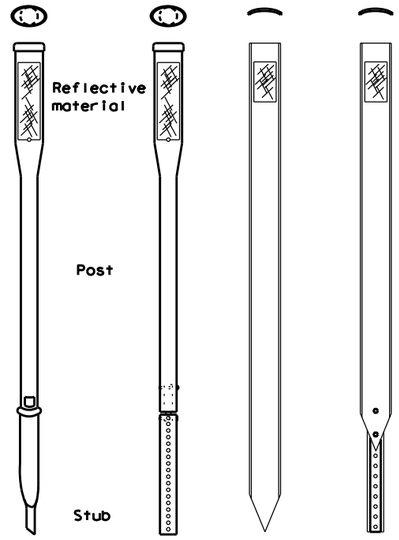


NOTES

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.

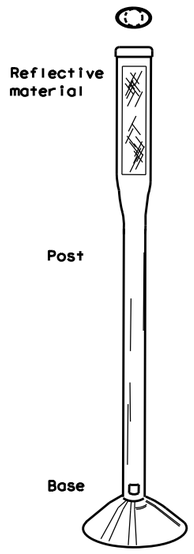
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



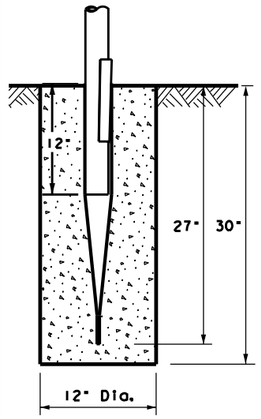
SURFACE MOUNT

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.

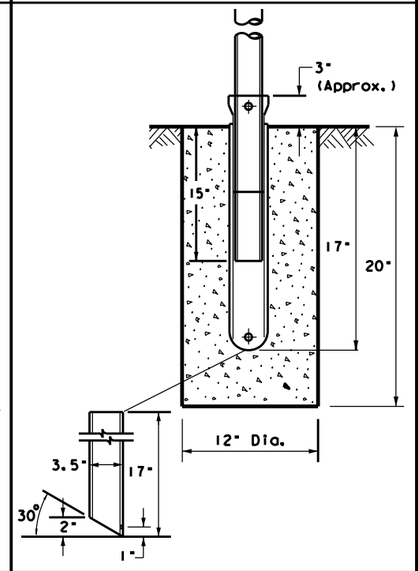
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

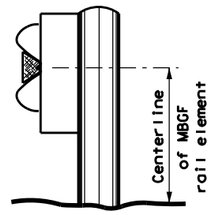
NOTE

1. Install per manufacturer's recommendations.

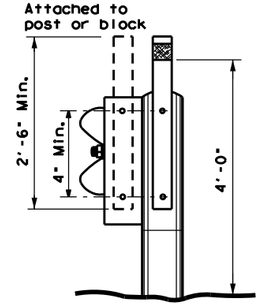
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

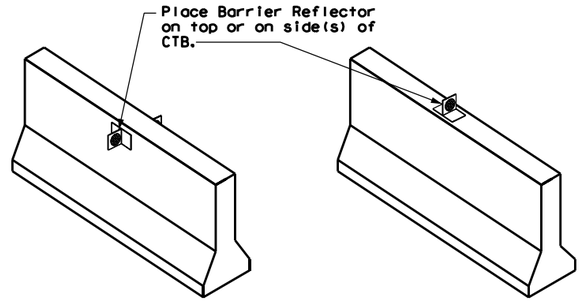
GF1



GF2



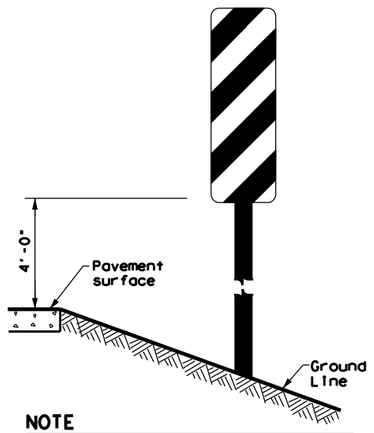
CONCRETE TRAFFIC BARRIER (CTB)



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.

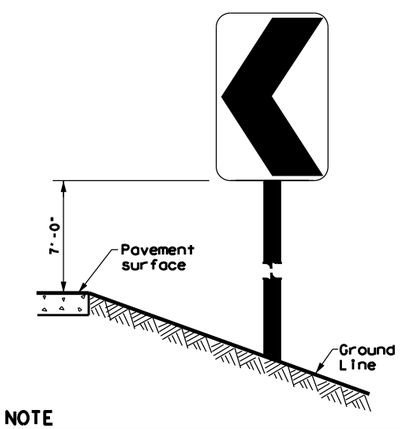
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

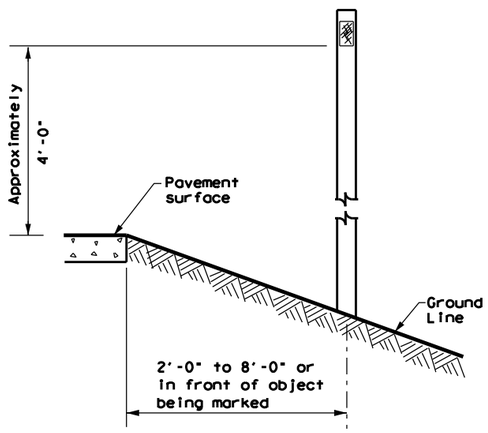
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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	0069	03	060, ETC.	US 87, ETC.
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	SJT	STERLING, ECT.		50

20B

DATE: 4/27/2021 2:23:04 PM
FILE: pw:\\azdpw1.azb-engrs.com:PWAZBPROD01\Documents\Collaboration Projects\TxDOT\220013.001\0069-03-060\14 - Design\Plan Set\8. Traffic\STANDARDS_TRAFFIC\051-SMD(GEN)-08.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

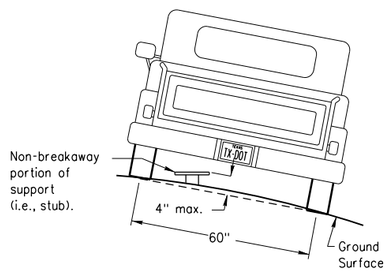
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1) to (SLIP-3))

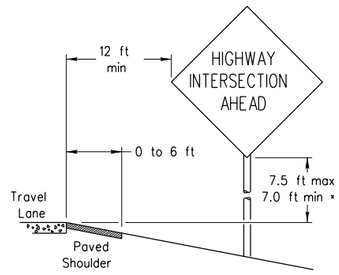
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

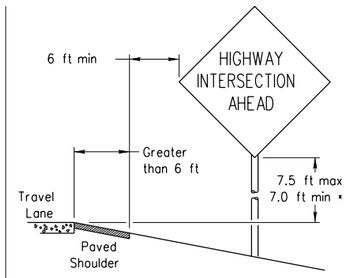
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

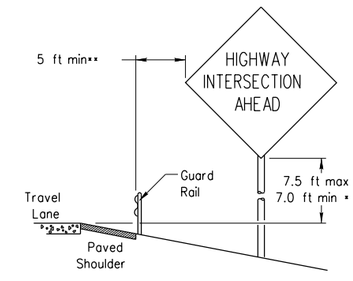
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



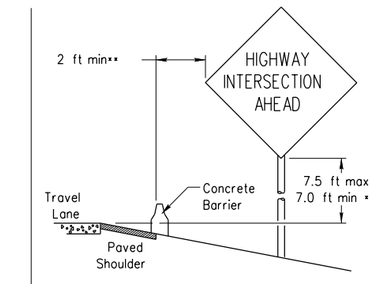
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

BEHIND BARRIER



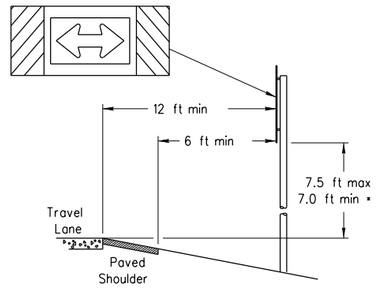
BEHIND GUARDRAIL



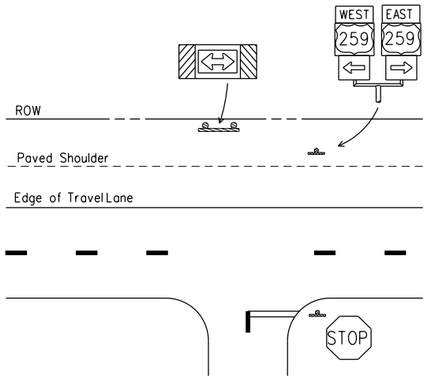
BEHIND CONCRETE BARRIER

**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

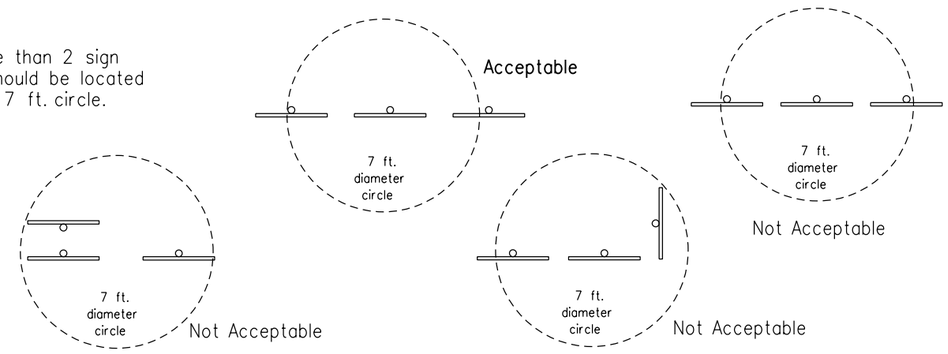
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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.

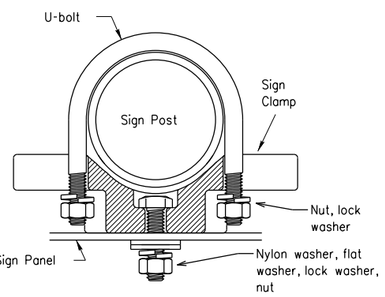
The website address is:
http://www.txdot.gov/publications/traffic.htm

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

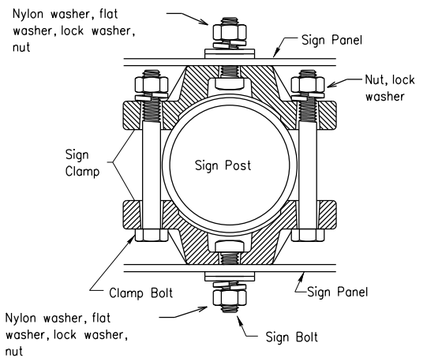


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

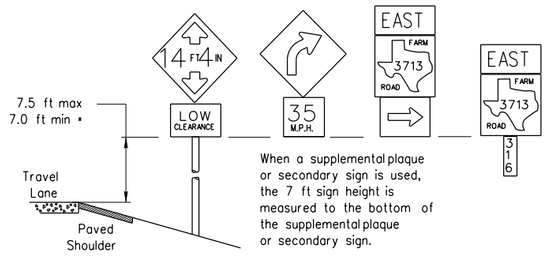
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



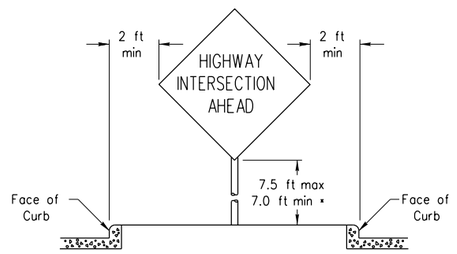
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



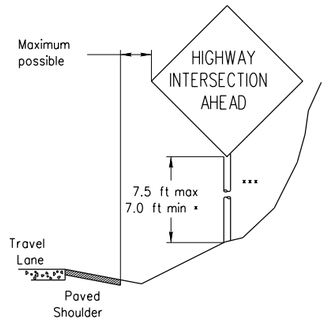
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

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
	0069	03	060, ETC.	US 87, ETC.
	DIST	COUNTY		SHEET NO.
	SJT	STERLING, ECT.		51

DATE: 4/27/2021 2:23:05 PM
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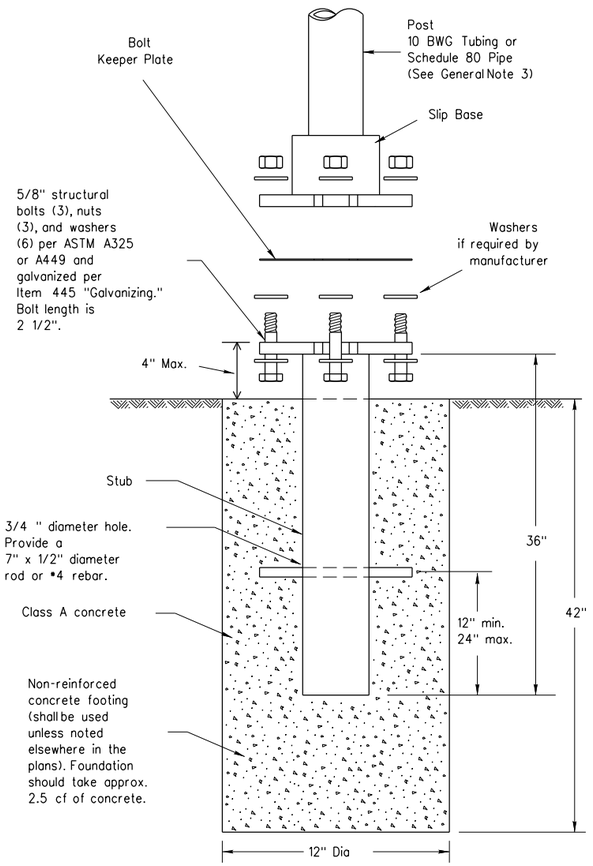
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

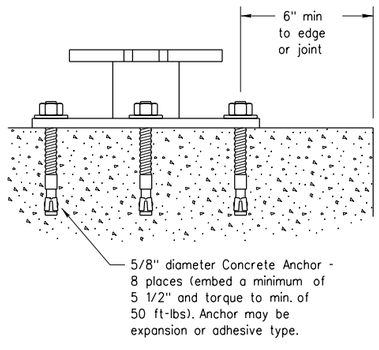
Foundation

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
9-08 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0069	03	060, ETC.	US 87, ETC.
	DIST	COUNTY		SHEET NO.
	SJT	STERLING, ECT.		52

DATE: 4/27/2021 2:23:06 PM
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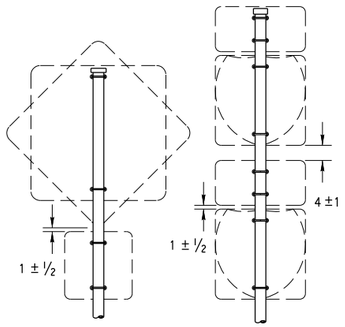
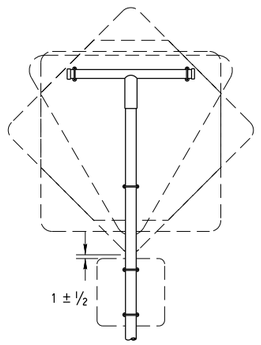
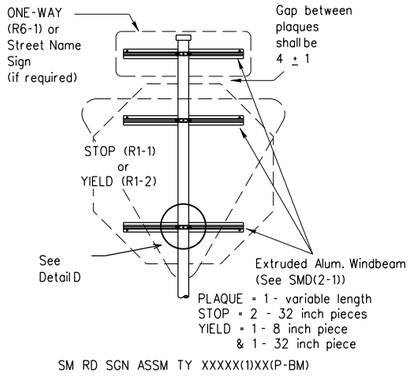


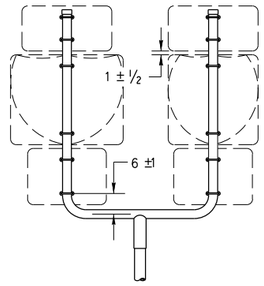
SM RD SGN ASSM TY XXXXX(1)XX(P)



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



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



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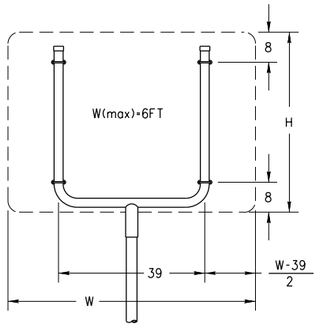

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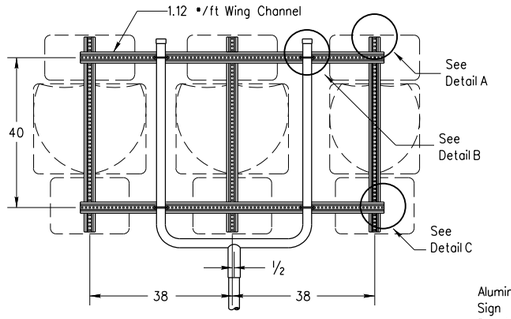
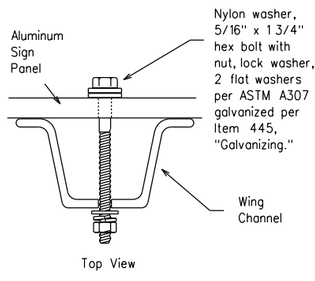
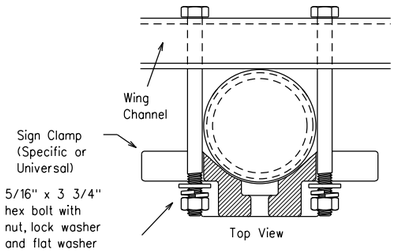


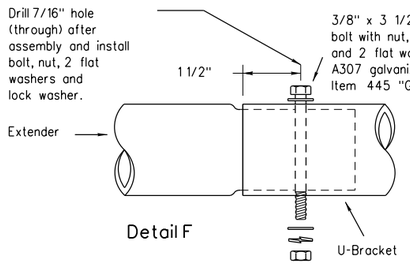
SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)



Detail A

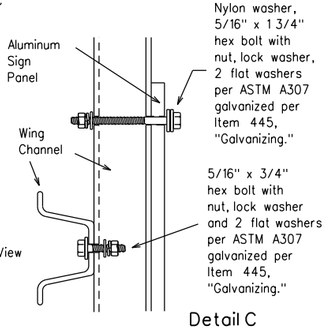


Detail B

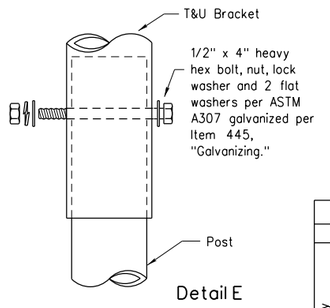


Detail F

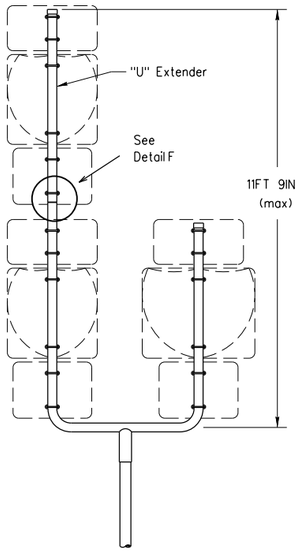
Splices shall only be allowed behind the sign substrate.



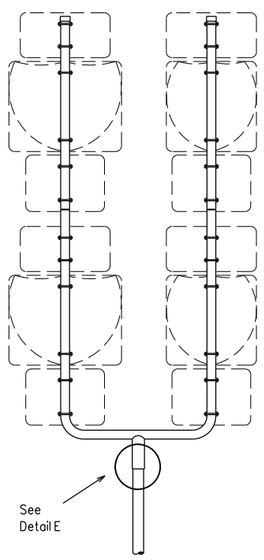
Detail C



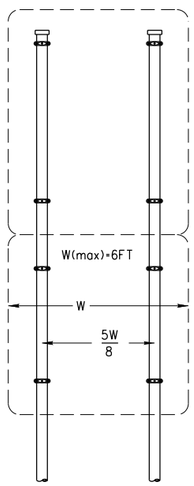
Detail E



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

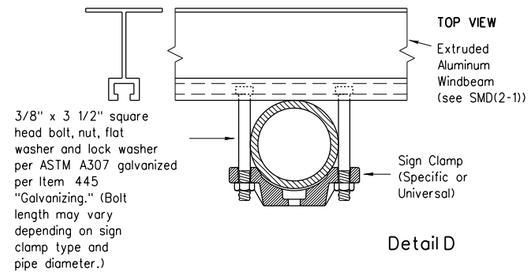


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

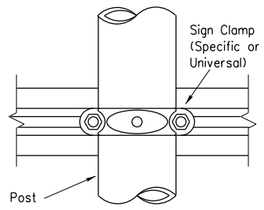


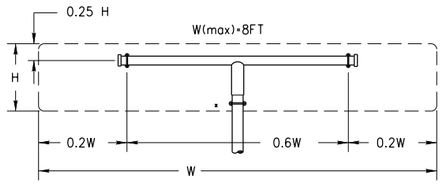
SM RD SGN ASSYM TY XXXXX(2)XX(P)

SIDE VIEW



Detail D

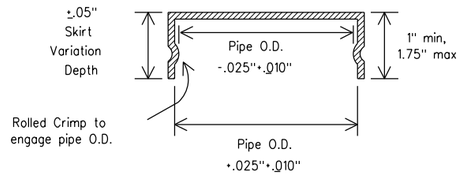




SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)

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.

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
10. 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.
11. Post open ends shall be fitted with Friction Caps.
12. Sign blanks shall be the sizes and shapes shown on the plans.

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-2)-08

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

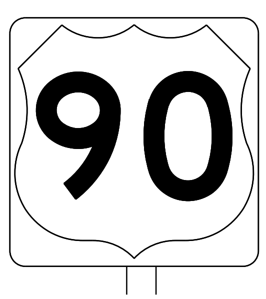
9-08 REVISIONS

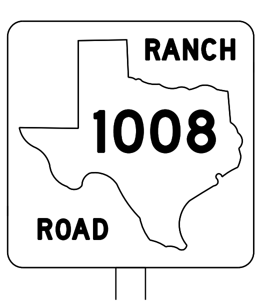
CONT	SECT	JOB	HIGHWAY
0069	03	060, ETC.	US 87, ETC.
DIST	COUNTY		SHEET NO.
SJT	STERLING, ECT.		53

26C

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

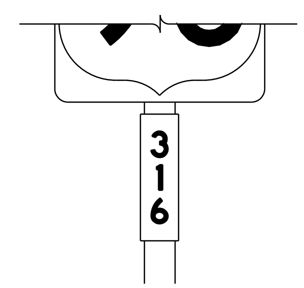


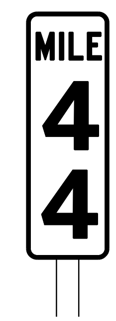


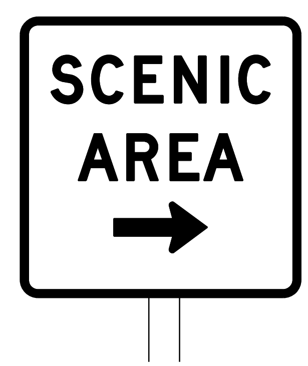
TYPICAL EXAMPLES

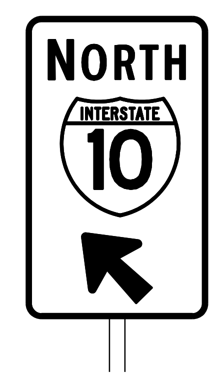
REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

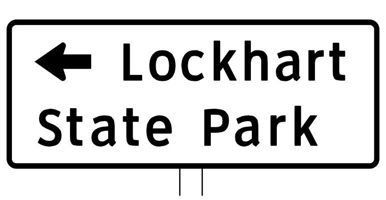
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING

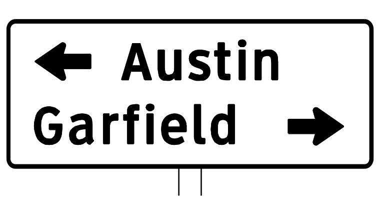












TYPICAL EXAMPLES

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

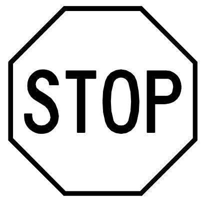
FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0069	03	060, ETC.	US 87, ETC.
12-03 7-13 9-08	DIST		COUNTY	SHEET NO.
	SJT		STERLING, ECT.	54

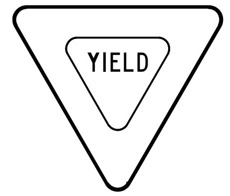
3

DATE: 4/27/2021 2:23:08 PM
FILE: pw:\\ozbpw1.ozb-engrs.com:PWAZBPROD01\Documents\Collaboration Projects\TxDOT\12017001\0069-03-060\4 Design\Plan Sets\8. Traffic\STANDARDS_TRAFFIC\055-TSR(4)-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

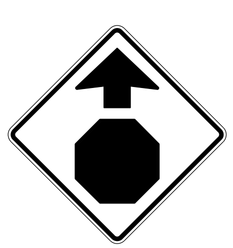
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(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

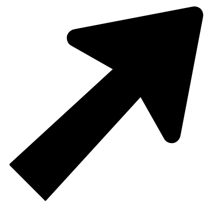
TSR(4)-13

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	0069	03	060, ETC.	US 87, ETC.
	DIST		COUNTY	SHEET NO.
	SJT		STERLING, ECT.	55

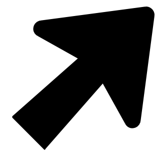
4

ARROW DETAILS

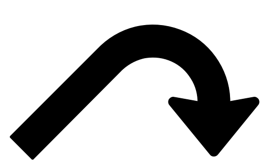
for Large Ground-Mounted and Overhead Guide Signs



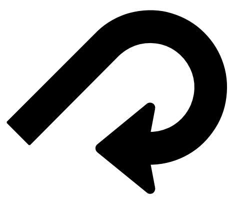
Type A



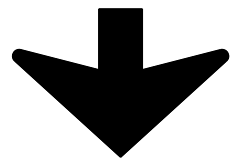
Type B



E-3



E-4



Down Arrow

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

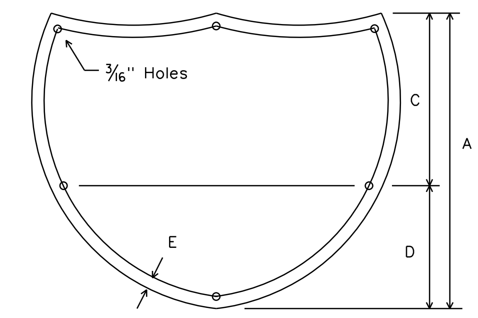
NOTE

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.

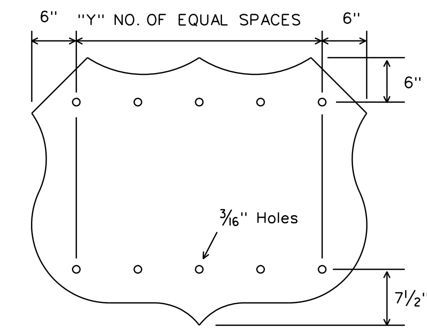
http://www.txdot.gov/

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



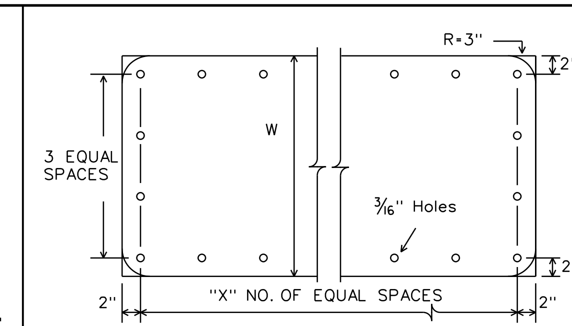
INTERSTATE ROUTE MARKERS

A	C	D	E
36	21	15	1½
48	28	20	1¾



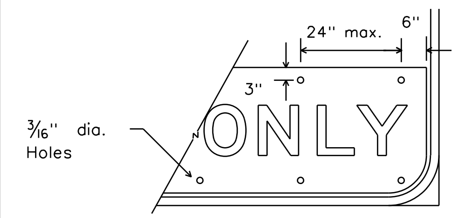
U.S. ROUTE MARKERS

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



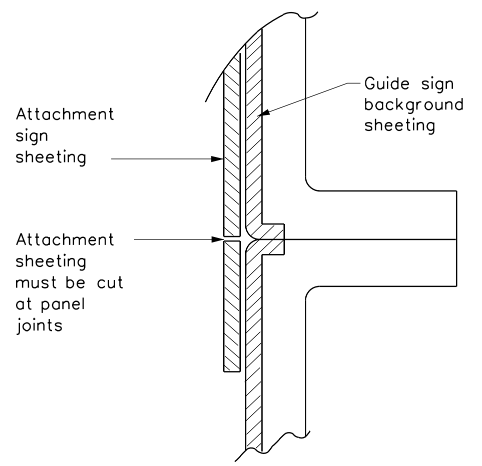
STATE ROUTE MARKERS

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

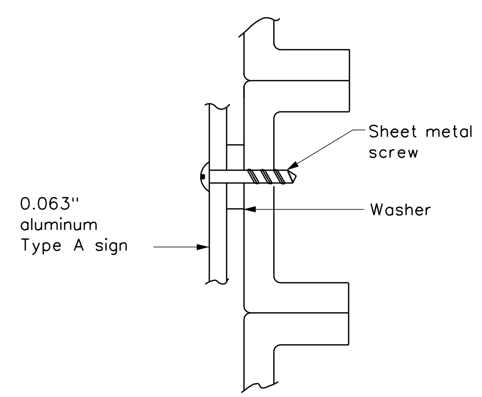


EXIT ONLY PANEL

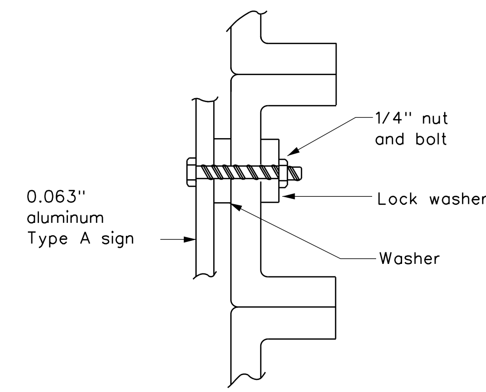
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



DIRECT APPLIED ATTACHMENT



SCREW ATTACHMENT



NUT/BOLT ATTACHMENT

NOTE:

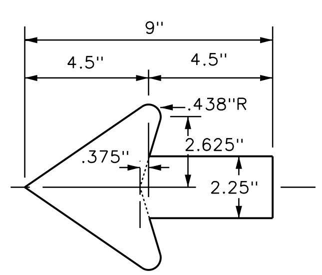
1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

NOTE:

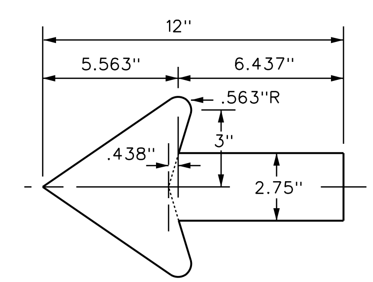
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

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 0069	SECT 03	JOB 060, ETC.	HIGHWAY US 87, ETC.
REVISIONS 12-03 7-13 9-08	DIST SJT		COUNTY STERLING, ECT.	SHEET NO. 56

5

DATE: 4/27/2021 2:23:09 PM
FILE: pw:\\azbpw1.azb-engrs.com:PWAZBPROD01\Documents\Collaboration Projects\TxDOT\...\056-TSR(5)-13.dgn

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DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1. City of San Angelo

2.

☐ No Action Required ☑ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000

2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.

3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.

4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☑ No Permit Required
☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)
☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)
☐ Individual 404 Permit Required
☐ Other Nationwide Permit Required: NWP•

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

1.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☑ Seeding and Sodding	☐ Silt Fence	☐ Vegetative Filter Strips
☑ Biodegradable Erosion Control Logs	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Sodding	☑ Biodegradable Erosion Control Logs	☐ Extended Detention Basin
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Constructed Wetlands
☐ Diversion Dike	☐ Brush Berms	☐ Wet Basin
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Erosion Control Compost
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☑ Biodegradable Erosion Control Logs
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☑ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☑ No Action Required ☐ Required Action

Action No.

1.

2.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☐ No Action Required ☑ Required Action

Action No.

1. 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 ☑ Required Action

Action No.

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 polices 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 bird from building nests March 1 to August 31.In the event that nigartory birds are encountered on-site during project construction, avoid adverse impacts on pritected birds, active nests,eggs, and/or young.

1. Endangered plant "Texas Poppy Mallow" is present in the US 87 or Loop 306 right of way in Sterling, Coke and Tom Green counties at locations identified Straight Line Diagram plan sheets. Do not allow vehicles, equipment, materials stockpiles and foot traffic to enter the right of way between the edge of pavement and edge of right of way in this locations.

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
- Dead or distressed vegetation (not identified as normal)
- Trash piles, drums, canister, barrels, etc.
- Undesirable smells or odors
- Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☑ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☑ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

☑ No Action Required ☐ Required Action

Action No.

1.

2.

3.

PREPARED BY: JUAN R. FLORES P.E.

DATE: 4-27-2021

SHEET 1 OF 1

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
© TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0069	03	060, ETC.	US 87, ETC.
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.
05-07-14 ADDED NOTE SECTION IV.	SJT	STERLING, ECT.		57
01-23-2015 SECTION I CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.				

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:

Total project area (acres): Approximately 90.79 ac.

Total area to be disturbed (acres): 29.0 ac.

Pre- construction weighted runoff coefficient: 0.35

Post- construction weighted runoff coefficient: 0.45

Existing condition of soil and vegetative cover: The existing soils consist primarily of complex and heavily covered native grass and weeds.

Percent of existing vegetative cover: 85%

Name and segment number of receiving waters: Segment Number: n/a
Segment Name: _____.

Storm water management: Storm water runoff will be managed along grassed channels, culverts, and riprap drains. Erosion control logs will be utilized as necesary to control runoff from project area.

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:

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.

Describe construction and waste materials expected to be stored on site and proposed controls to reduce pollutants from these materials (include storage practices, spill prevention and response):
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
JUAN RAMON FLORES
66715
LICENSED PROFESSIONAL ENGINEER

PE. 4-27-2021

SHEET 1 OF 1

NO.	REVISIONS	BY	DATE

ARREDONDO, ZEPEDA & BRUNZ, LLC
11355 McCree Road - Dallas, Texas 75238
(214) 341-9900
FIRM REGISTRATION No. F-10098

Texas Department of Transportation

US 87/LP-306

SW3P INDEX

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			58
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, Etc.	US 87, ETC.

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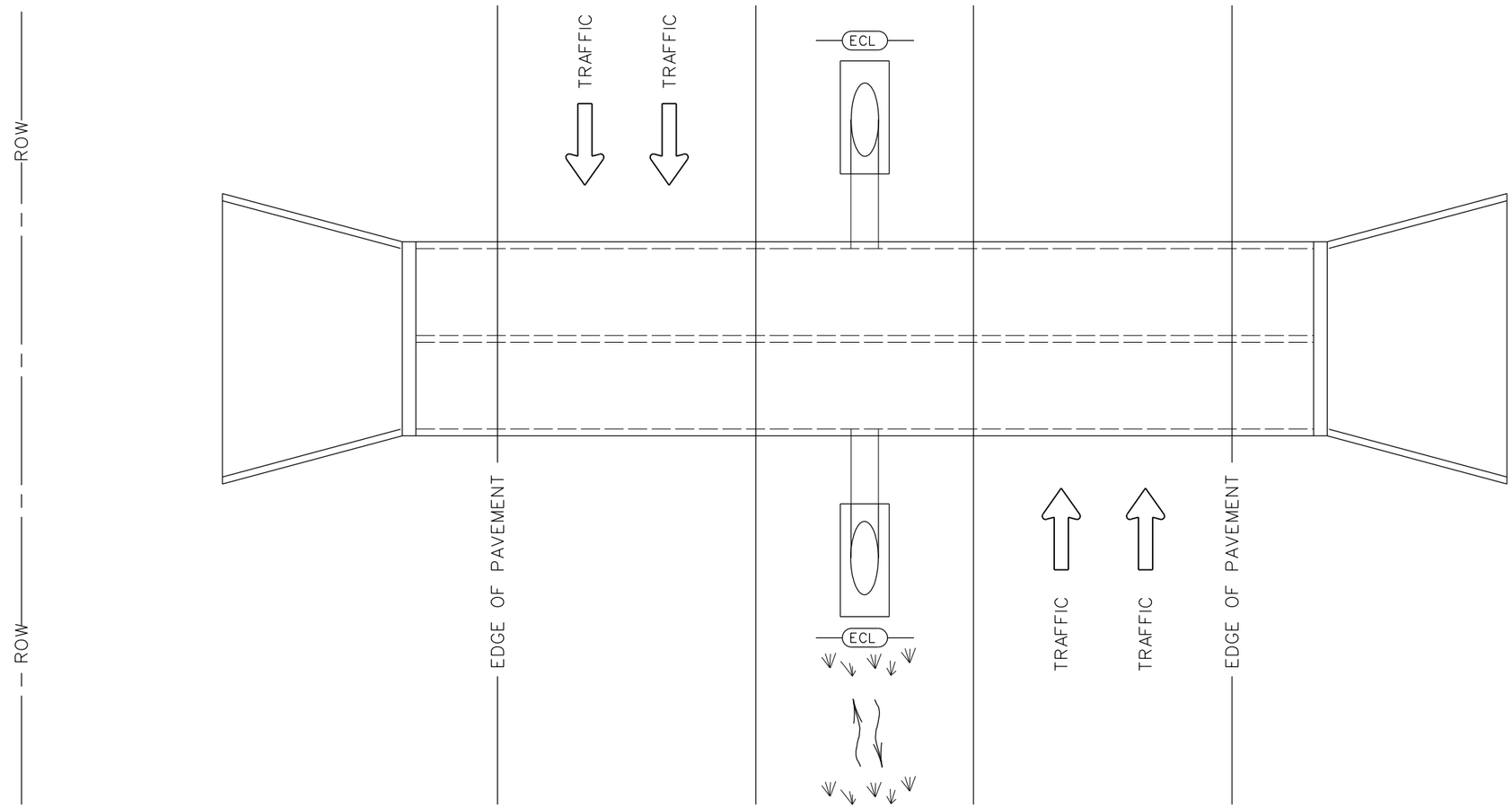
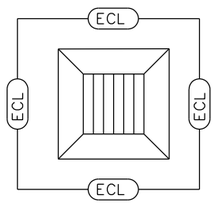


BEST MANAGEMENT PRACTICE (BMP)(NTS)

SEDIMENT CONTROL AT CULVERT SIDE DRAIN IN MEDIAN
SIMILAR AT CROSSOVERS WITH PIPE DRAINS



BEST MANAGEMENT PRACTICE (BMP)(NTS)

SEDIMENT CONTROL AT CULVERT DROP INLETS

P.E. 4-27-2021

SHEET 1 OF 1

NO.	REVISIONS	BY	DATE

POZNECKI CAMARILLO INC
(210) 349-3273
(210) 349-4395 (FAX)
5835 CALLAGHAN RD. SUITE 200
SAN ANTONIO, TEXAS, 78228
TBPE REG. NO. F-483
http://www.pozcam.com/

AZ&B
ARREDONDO, ZEPEDA & BRUNZ, LLC
11355 McCree Road - Dallas, Texas 75238
(214) 341-9900
FIRM REGISTRATION No. F-10098

Texas Department of Transportation

US87/LP306

SW3P BMP DETAILS

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			59
STATE	DISTRICT	COUNTY	
TEXAS	SJT	STERLING, ETC.	
CONTROL	SECTION	JOB	HIGHWAY NO.
0069	03	060, ETC.	US 87, ETC.

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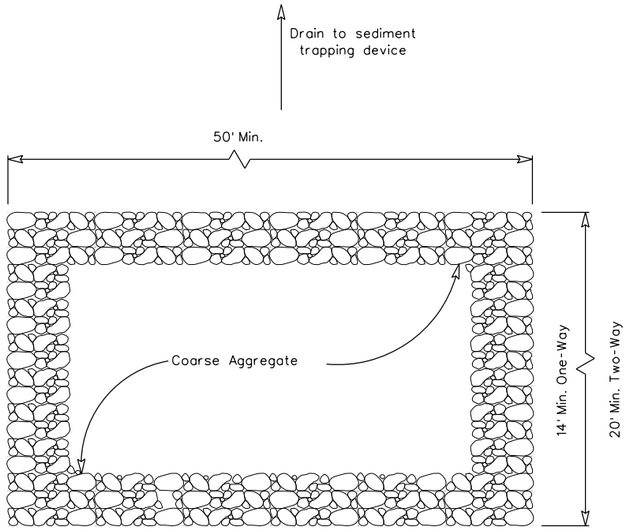
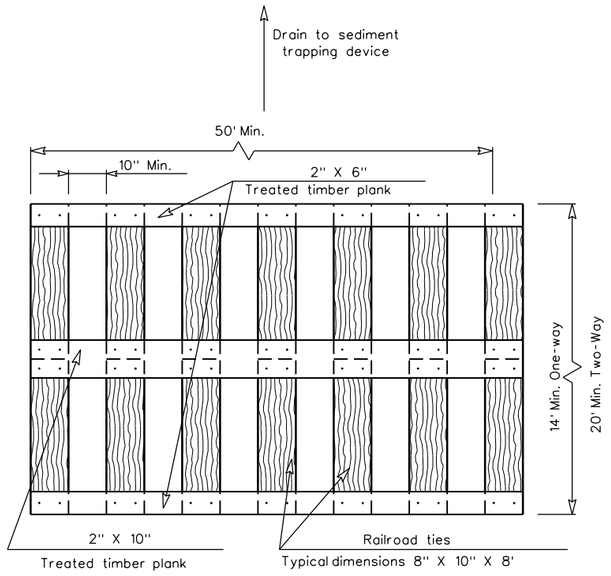


PLAN VIEW



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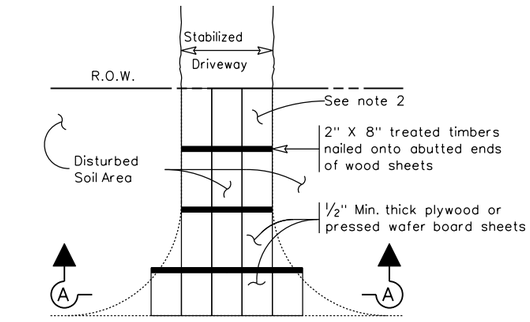

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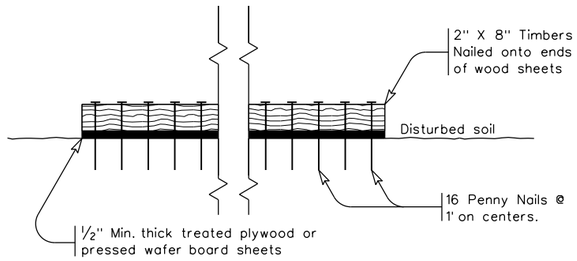
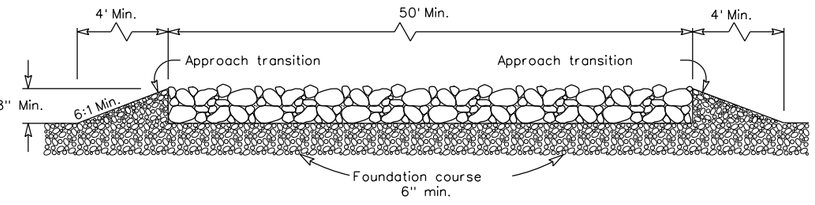


SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

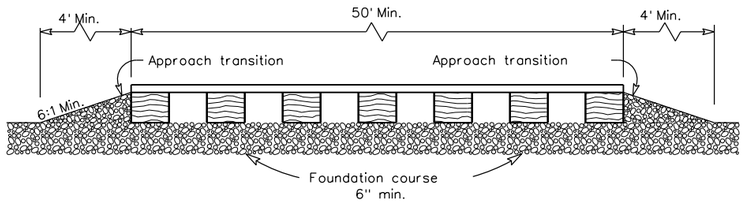
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

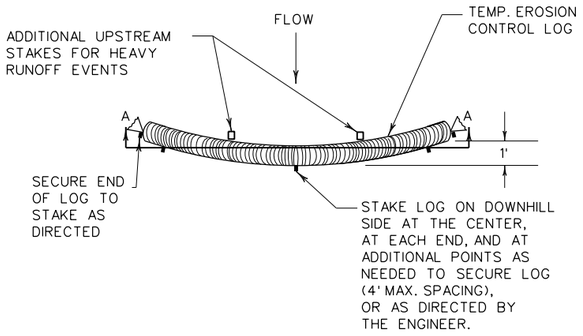
CONSTRUCTION EXITS

EC(3)-16

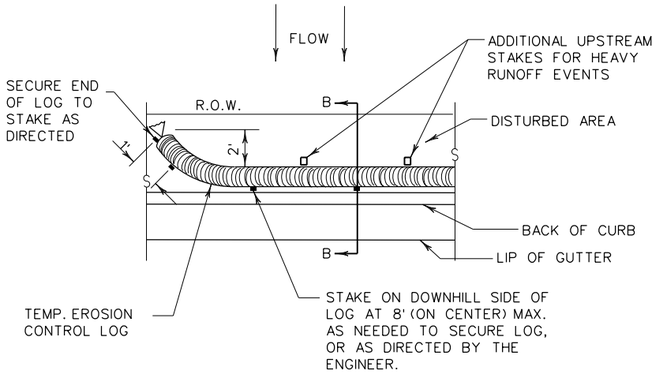
FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0069	03	060, ETC.	US 87, ETC.
	DIST	COUNTY		SHEET NO.
	SJT	STERLING, ECT.		60

DATE: 4/27/2021
FILE: pw:\\azbpwl.azb-engrs.com:PWAZBPROD01\Documents\Collaboration Projects\TxDOT\220013.001\0069-03-060\4 - Design\Plan Set\9, SW3P\STANDARDS_SW3P\060-EC(3)-16.dgn

DATE: 4/27/2021
FILE: pw:\\azbpw1.azb-engrs.com:PWAZBPROD01\Documents\Collaboration Projects\TxDOT\220013.001\0069-03-060\4 - Design\Plan Set\9. SW3P\STANDARDS_SW3P\061-EC(9)-16.dgn



PLAN VIEW



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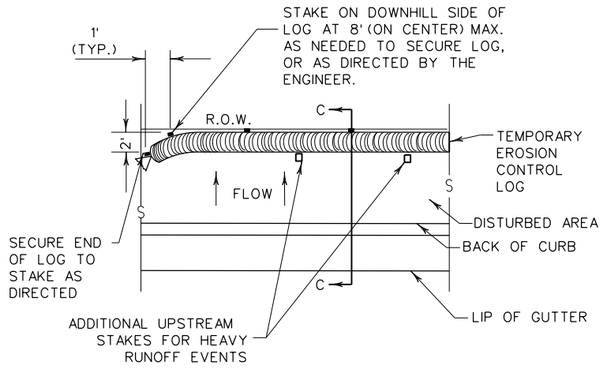

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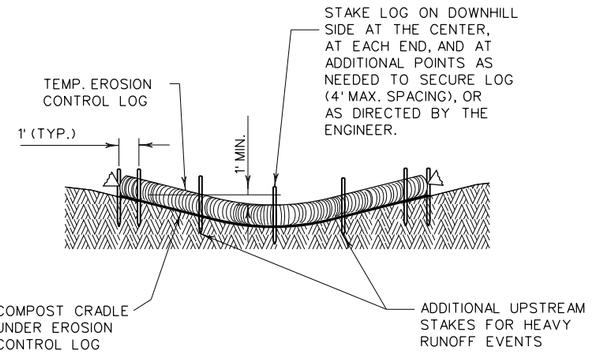
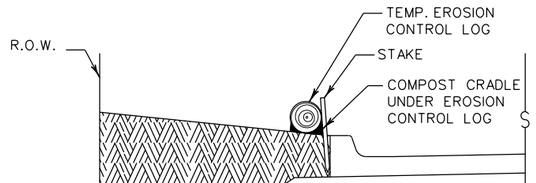


SECTION A-A

EROSION CONTROL LOG DAM

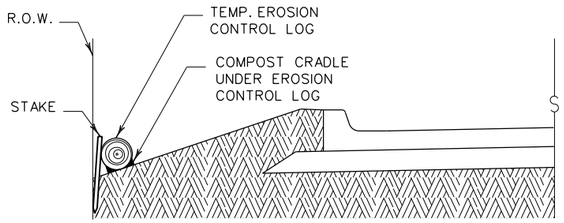
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

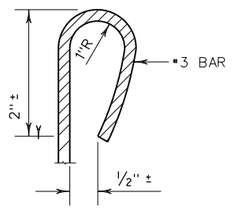
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

LEGEND

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

GENERAL NOTES:

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

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

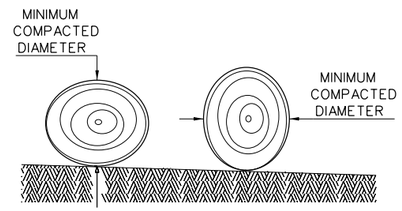
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

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

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

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



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SHEET 1 OF 3

Texas Department of Transportation — Design Division Standard

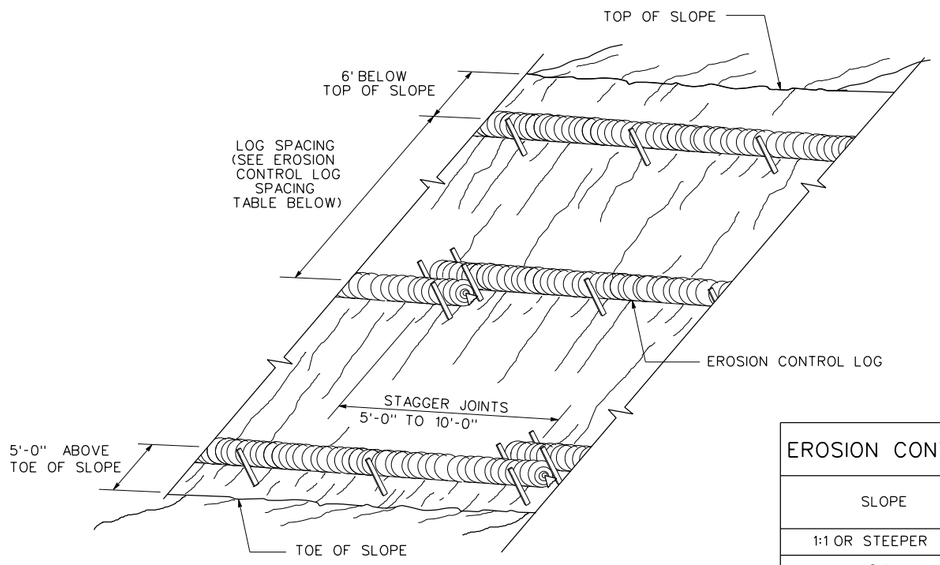
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

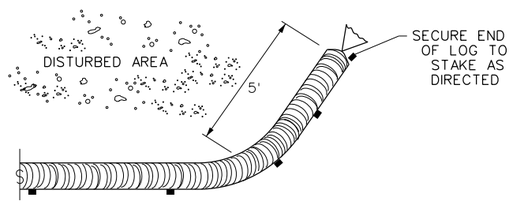
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0069	03	060, ETC.	US 87, ETC.
	DIST	COUNTY		SHEET NO.
	SJT	STERLING, ECT.		61

DATE: 4/27/2021
FILE: pw:\\ezbpw.ezb-engrs.com:PWAZBPROD01\Documents\Collaboration Projects\TxDOT\220013.001\0069-03-060\4 - Design\Plan Set\9. SW3P\STANDARDS_SW3P\062-EC(9)-16.dgn



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

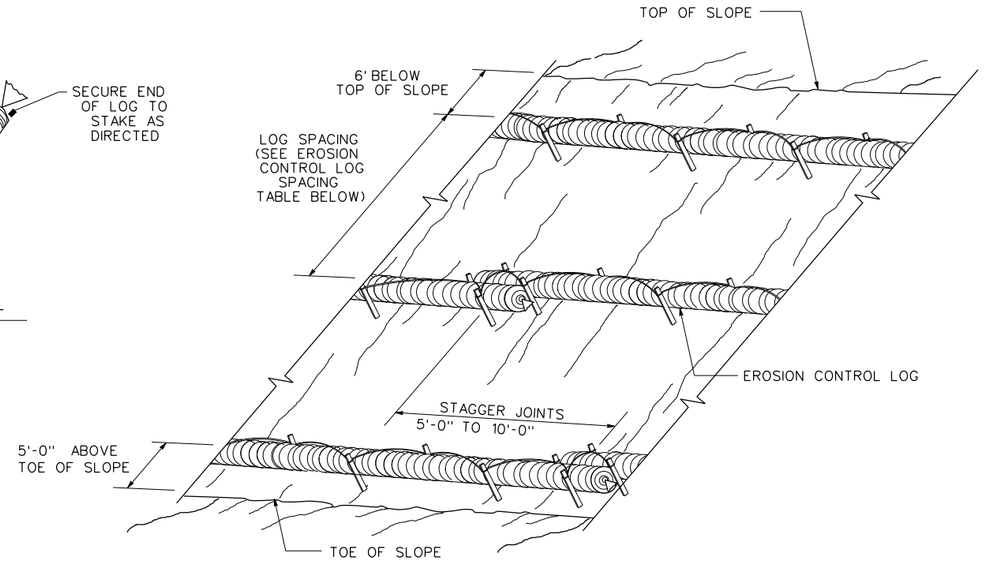
CL-SST



END SECTION RAP DETAIL

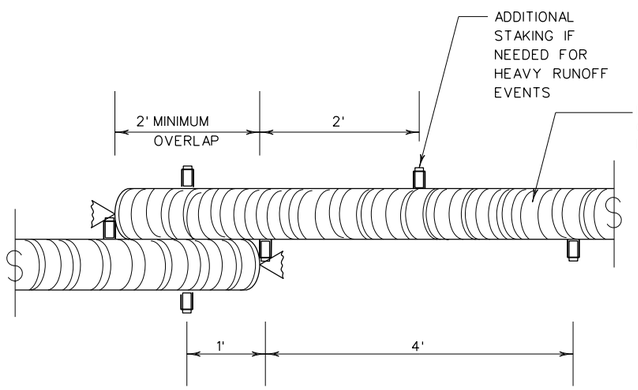
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

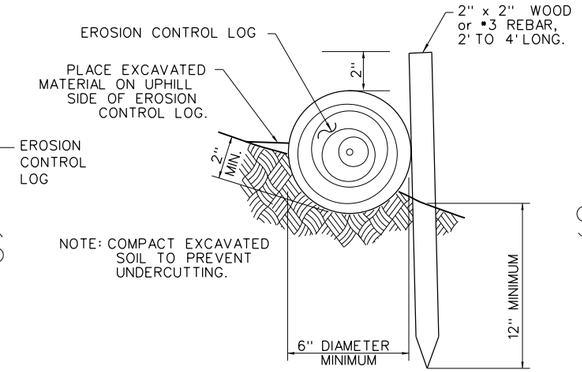
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

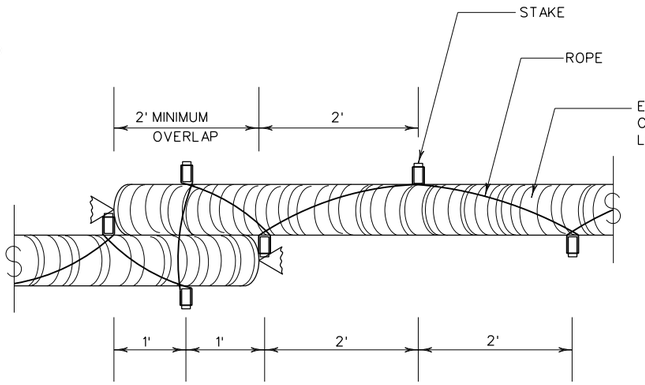


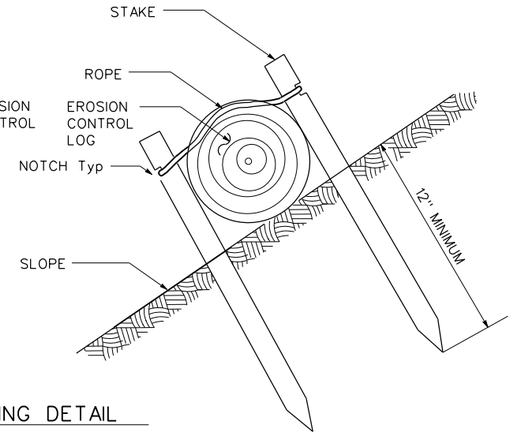


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

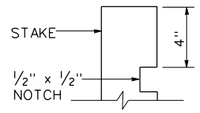
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

SHEET 2 OF 3

Texas Department of Transportation

Design Division Standard

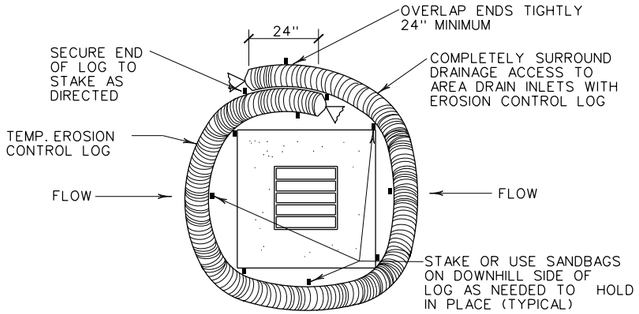
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

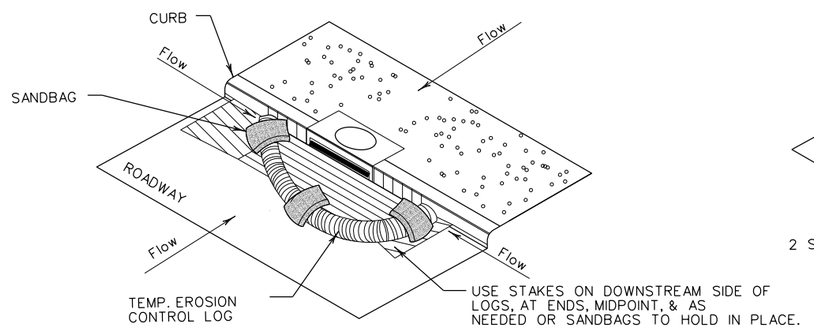
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0069	03	060, ETC.	US 87, ETC.
	DIST	COUNTY		SHEET NO.
	SJT	STERLING, ECT.		62

DATE: 4/27/2021
FILE: p:\\azbpw1.azb-engrs.com:PWAZBPROD01\Documents\Collaboration Projects\TxDOT\220013.0001\0069-03-060\4 - Design\Plan Set\9. SW3P\STANDARDS_SW3P\063-EC(9)-16.dgn



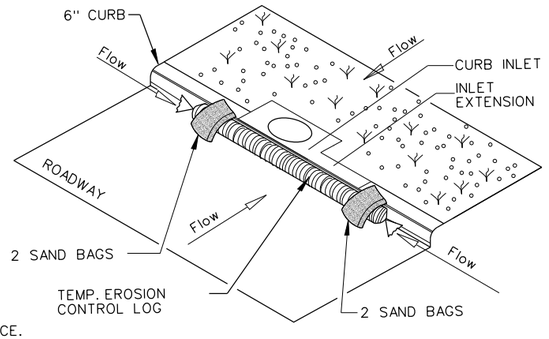
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

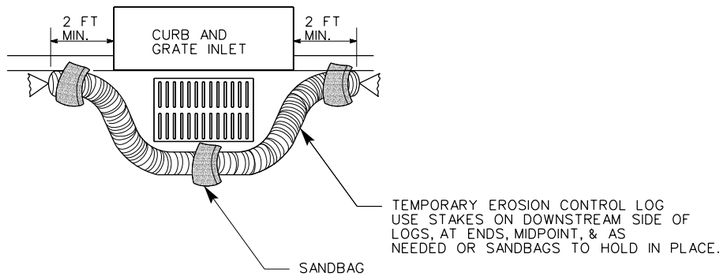
CL-CI



EROSION CONTROL LOG AT CURB INLET

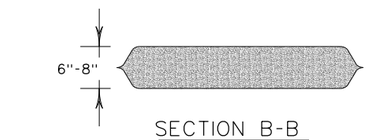
CL-CI

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

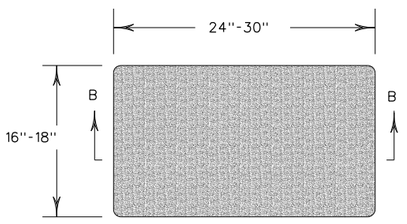


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0069	03	060, ETC.		US 87, ETC.		
	DIST	COUNTY					SHEET NO.
	SJT	STERLING, ECT.					63