STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NO. C 520-8-71

SH 155
ANDERSON COUNTY

PROJECT NO.			
C 520-8-71			
CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		1

FUNCTIONAL CLASSIFICATION = RURAL ARTERIAL

DESIGN SPEED: 70 MPH RURAL
45 MPH URBAN

2020 ADT = 9,220
2040 ADT = 12,908

NET LENGTH OF PROJECT= 101,240 FT.= 19.174 MI.

LIMITS: FROM .14 MI S OF FM 19 (END OF CURB AND GUTTER), S TO FM 315

FOR THE CONSTRUCTION OF OVERLAY CONSISTING OF OCST, PFC SURFACE, SHOULDER TEXTURING, EDGE TREATMENT AND PAVEMENT MARKINGS.

INDEX OF SHEETS

FINAL PLANS

DATE CONTRACT LETTING: _____

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK COMPLETED & ACCEPTED: _____

CONTRACTOR: _____

USED ____ OF ____ ALLOTTED DAYS _____

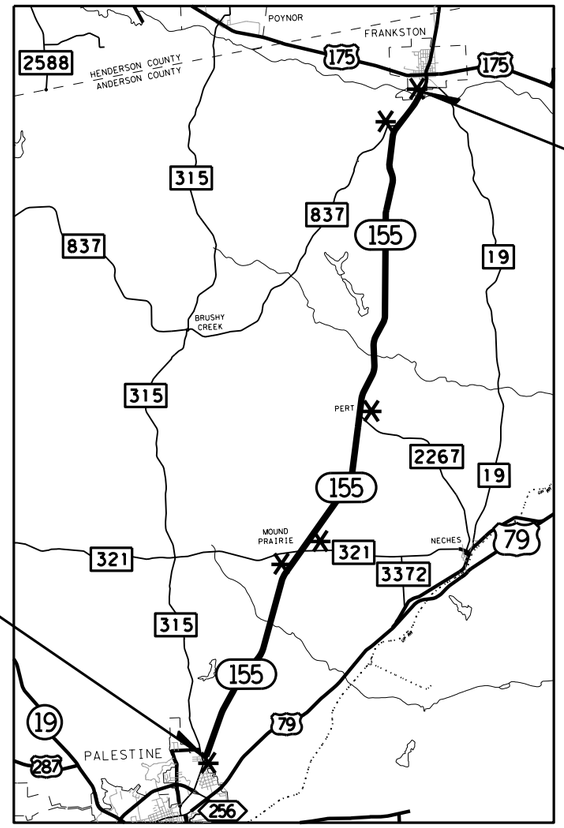
FINAL CONTRACT COST : $ _____

FINAL AS BUILT PLANS

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

_____ DATE

_____ AREA ENGINEER



BEGIN PROJECT:
CSJ: 0520-08-071
STA 159+60
REF MRK: 348+2.017

END PROJECT
CSJ: 0520-08-071
STA: 1172+00
REF MRK: 368+1.105

✳ SIGN IN ACCORDANCE WITH THE STANDARD BC SHEETS AND PART 6 OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

NOT TO SCALE

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

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

Texas Department of Transportation

SUBMITTED FOR LETTING: 1/24/2022

DocuSigned by: Gilbert Arteaga BF88CB5DCDAE4E8...

DISTRICT DESIGN ENGINEER

APPROVED FOR LETTING: 1/24/2022

DocuSigned by: Vernon M. Webb 6149184A8C65461...

DISTRICT ENGINEER

GENERAL

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2	SUPPLEMENTAL INDEX OF SHEETS
3 - 16	TYPICAL SECTIONS
17,17A-17J	GENERAL NOTES
18, 18A-18B	ESTIMATE AND QUANTITY SHEET
19 - 31	QUANTITY SUMMARY SHEETS
32	SUMMARY OF SMALL SIGNS

TRAFFIC CONTROL PLAN

SHEET NO.	DESCRIPTION
33	CONSTRUCTION SEQUENCE
SHEET NO.	**STANDARDS**
34 - 45	BC(1)-21 THRU BC(12)-21
46 - 47	TCP (1-2)-18, TCP (1-5)-18
48 - 49	TCP (2-1)-18, TCP (2-2)-18
50 - 52	TCP (3-1)-13, TCP (3-2)-13, TCP (3-3)-14
53	TCP (7-1)-13
54	TREATMENT FOR VARIOUS EDGE CONDITIONS
55	WZ(TD)-17
56	WZ (STPM)-13
57	WZ (UL)-13
58	WZ(RS)-16

ROADWAY DETAILS

SHEET NO.	DESCRIPTION
59 - 63	MBGF LAYOUTS
64 - 68	MISCELLANEOUS DETAILS
SHEET NO.	**STANDARDS**
69	TE(HMAC)-11
70	GF(31)-19
71	GF(31)MS-19
72 - 73	GF(31)TRTL3-20
74 - 76	SGT(10S)31-16, SGT(11S)31-18, SGT(12S)31-18
77	BED-14

DRAINAGE ITEMS

SHEET NO.	DESCRIPTION
78 - 79	CULVERT LAYOUT
80	BCS
SHEET NO.	**STANDARDS**
81	PSET-SC
82	PSET-SP
83 - 84	SCC-10 (MOD)
85	PW

BRIDGE ITEMS

SHEET NO.	DESCRIPTION
86	CLEANING & SEALING EXISTING BRIDGE JOINTS
SHEET NO.	**STANDARDS**
87 - 88	TRAFFIC RAIL TYPE T631

TRAFFIC ITEMS

SHEET NO.	STANDARDS
89 - 94	D&OM(1)-20, D&OM(2)-20, D&OM(3)-20, D&OM(4)-20, D&OM(6)-20, D&OM(VIA)-20
95 - 97	PM(1)-20 THRU PM(3)-20
98	RS(1)-13
99	SMD(GEN)-08
100	SMD(TWT)-08

ENVIRONMENTAL ISSUES

SHEET NO.	DESCRIPTION
101	ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS (EPIC)
102	STORMWATER POLLUTION PREVENTION PLAN (SW3P)
SHEET NO.	**STANDARDS**
103	EC(1)-16
104	EC(2)-16
105 - 107	EC(9)-16

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

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER

J. Ryan Griffin

01/14/2022

SH 155
SUPPLEMENTAL
INDEX OF SHEETS

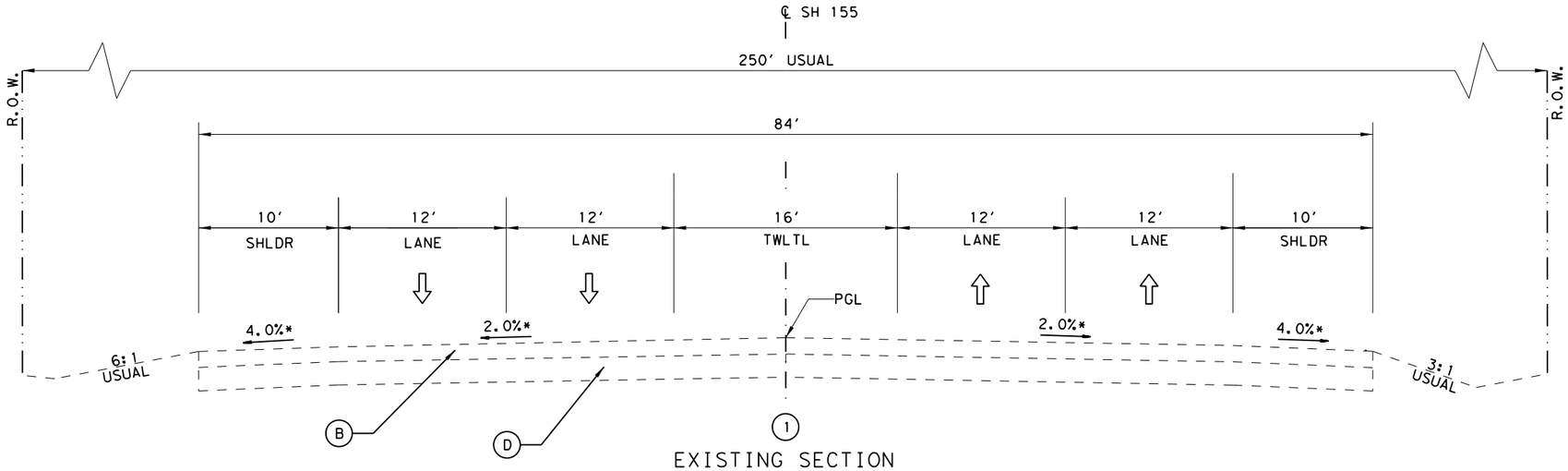
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		2

DATE: 1/14/2022 4:29:41 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH155_GEN_INDEX.dgn

LEGEND

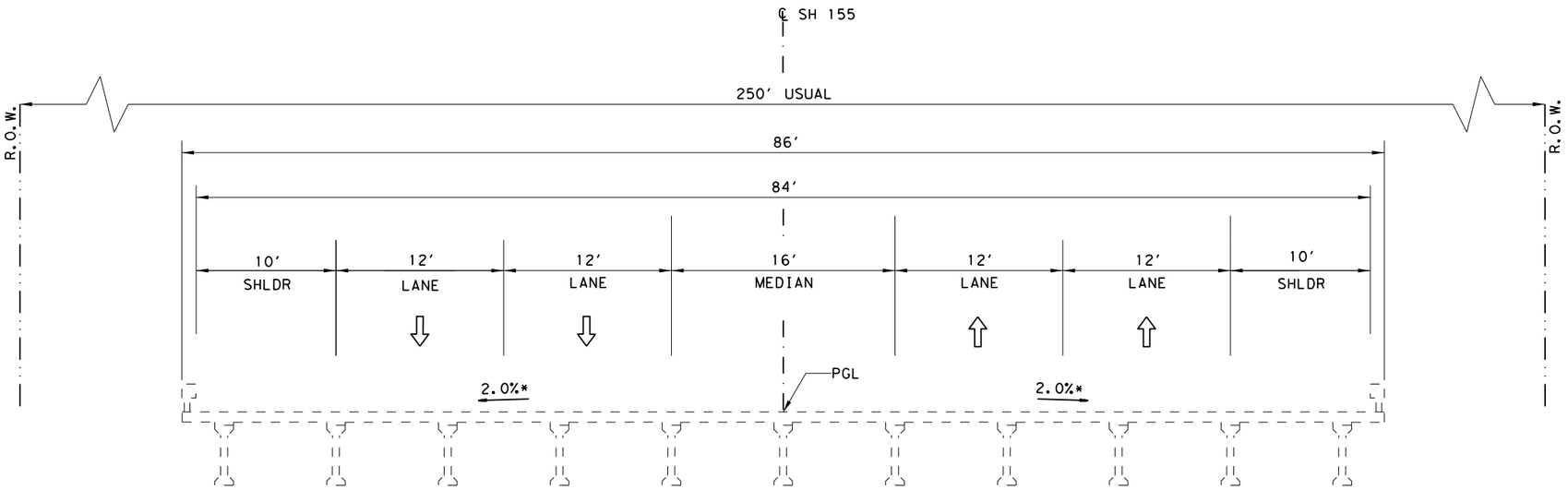
- (A) 2"-4" HMAC SURFACE
- (B) 4"-8" HMAC SURFACE
- (C) 8"-12" HMAC SURFACE
- (D) 10"-12" FLEX BASE
- (E) 8" CEMENT STAB SUBGRADE



EXISTING SECTION

STA 159+60 TO STA 173+20
STA 173+20 TO STA 173+40 TRANSITION FROM (1) TO (2)

STA 176+80 TO STA 186+50
STA 186+50 TO STA 189+85 TRANSITION FROM (1) TO (3)



(2)

EXISTING BRIDGE SECTION (CADDO CREEK)

STA 173+40 TO STA 176+60
STA 176+60 TO STA 176+80 TRANSITION FROM (2) TO (1)

0 5' 10'
SCALE: 1" = 10'

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

SH 155
TYPICAL SECTIONS

Texas Department of Transportation

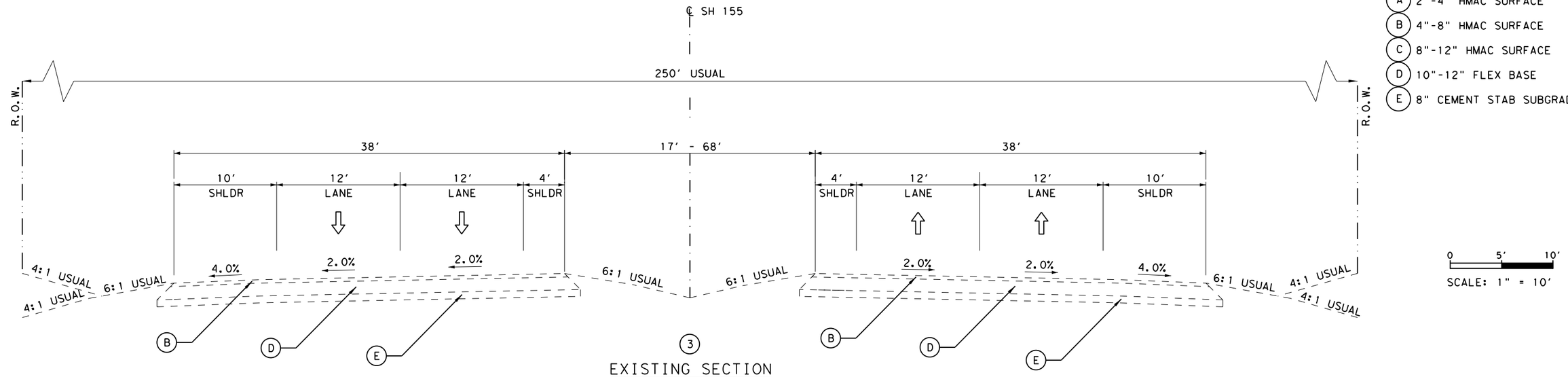
SHEET 1 OF 14

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		3

DATE: 1/12/2022 2:05:21 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH0155_GEN_TYP.dgn

LEGEND

- (A) 2"-4" HMAC SURFACE
- (B) 4"-8" HMAC SURFACE
- (C) 8"-12" HMAC SURFACE
- (D) 10"-12" FLEX BASE
- (E) 8" CEMENT STAB SUBGRADE



0 5' 10'

SCALE: 1" = 10'

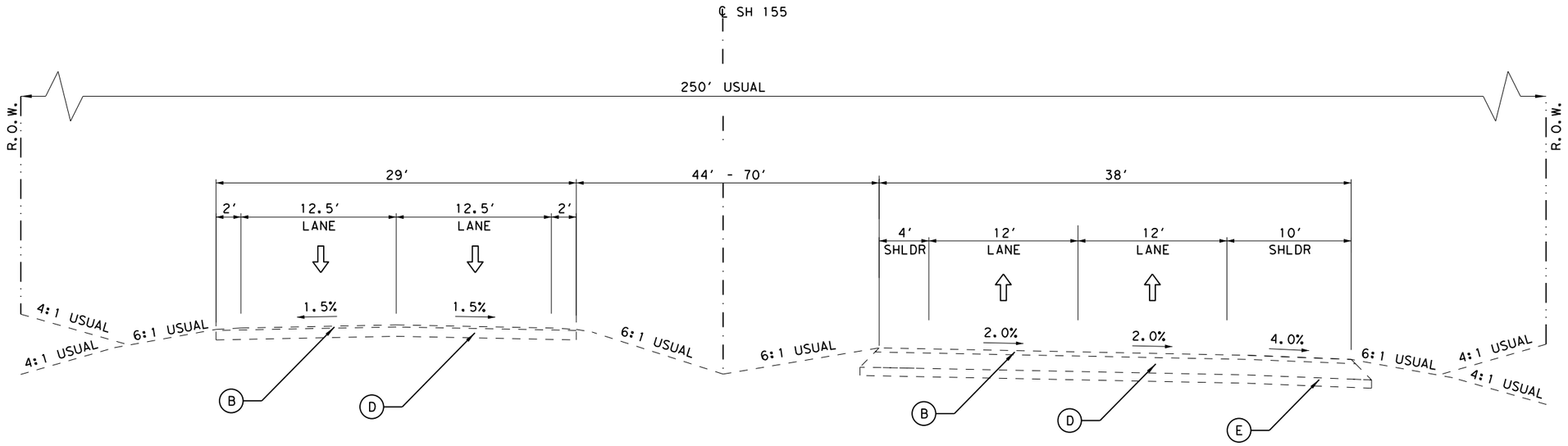
(3)

EXISTING SECTION

STA 189+85 TO STA 253+85
STA 253+85 TO STA 258+48 TRANSITION FROM (3) TO (4)

NORTHBOUND LANES

SOUTHBOUND LANES



(4)

EXISTING SECTION

NORTHBOUND LANES

SOUTHBOUND LANES

STA 258+48 TO STA 544+85
STA 544+85 TO STA 548+78 TRANSITION FROM (4) TO (5)

STA 560+20 TO STA 649+15
STA 649+15 TO STA 679+25 TRANSITION FROM (4) TO (6)

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

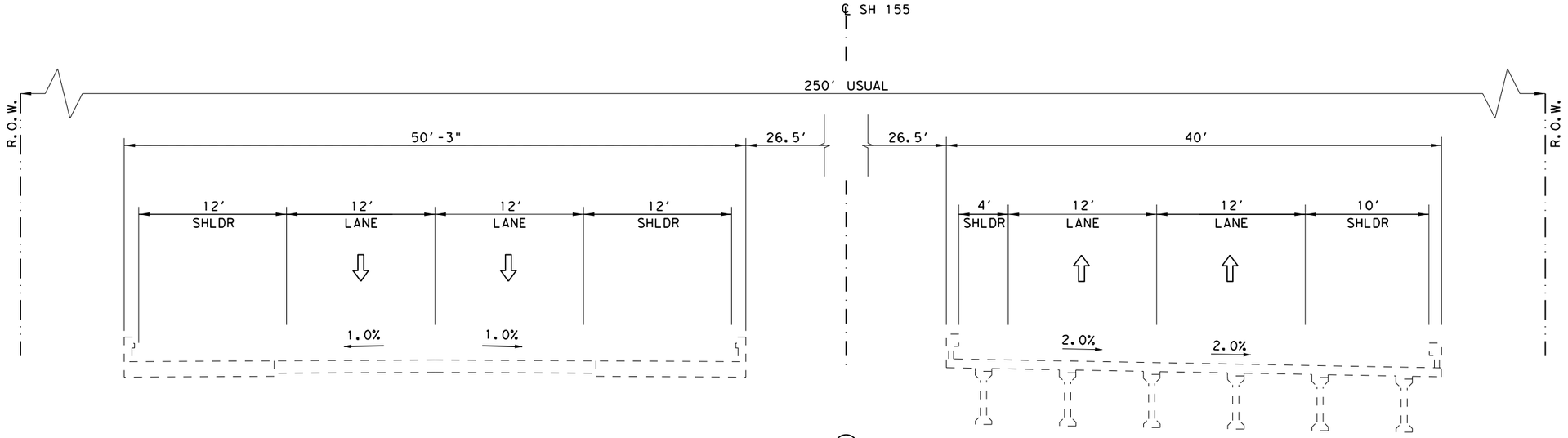
SH 155
TYPICAL SECTIONS

Texas Department of Transportation

SHEET 2 OF 14

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		4

DATE: 1/12/2022 2:05:22 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH0155_GEN_TYP.dgn



(5)

EXISTING BRIDGE SECTION (BRUSHY CREEK)

STA 548+78 TO STA 552+82
STA 552+82 TO STA 560+20 TRANSITION FROM (5) TO (4)

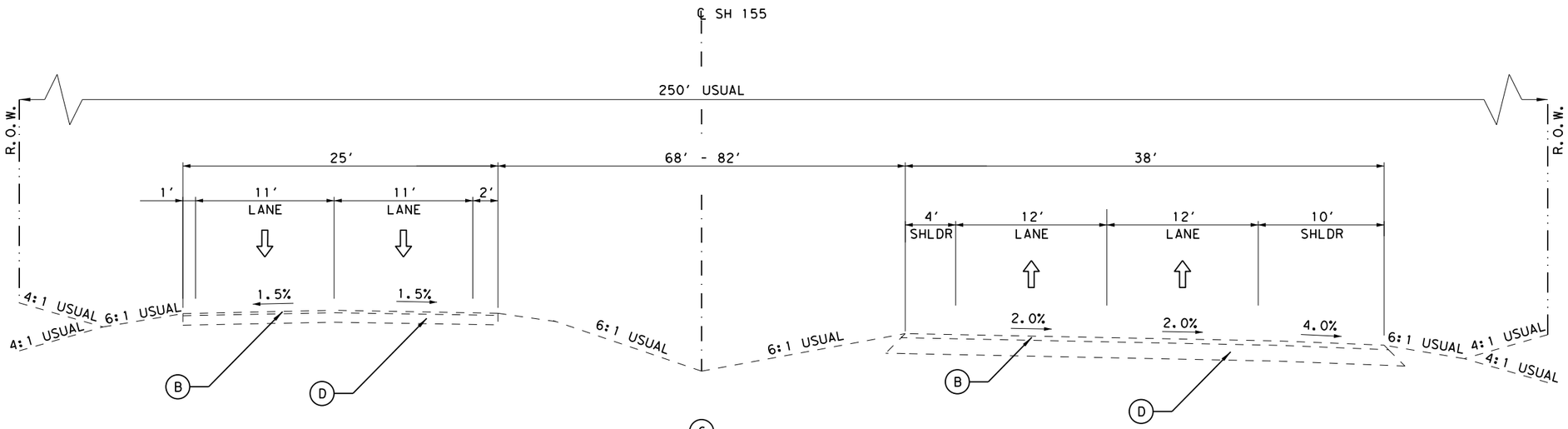
NORTHBOUND LANES
STA 549+52 TO STA 552+82

SOUTHBOUND LANES
STA 548+78 TO STA 552+78

LEGEND

- (A) 2"-4" HMAC SURFACE
- (B) 4"-8" HMAC SURFACE
- (C) 8"-12" HMAC SURFACE
- (D) 10"-12" FLEX BASE
- (E) 8" CEMENT STAB SUBGRADE

0 5' 10'
SCALE: 1" = 10'



(6)

NORTHBOUND LANES

EXISTING SECTION

STA 679+25 TO STA 712+00
STA 712+00 TO STA 715+73 TRANSITION FROM (6) TO (7)
STA 720+65 TO STA 925+00
STA 925+00 TO STA 931+80 TRANSITION FROM (6) TO (8)

SOUTHBOUND LANES

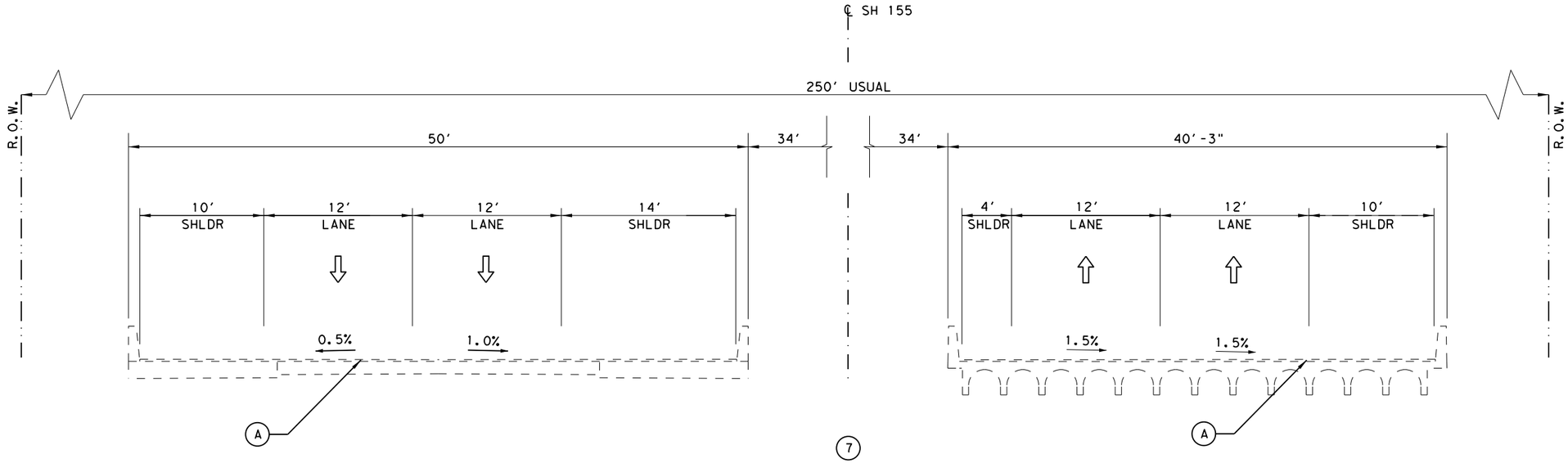
STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER
J. Ryan Griffin
01/13/2022

SH 155
TYPICAL SECTIONS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		5

DATE: 1/12/2022 2:05:22 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH0155_GEN_TYP.dgn



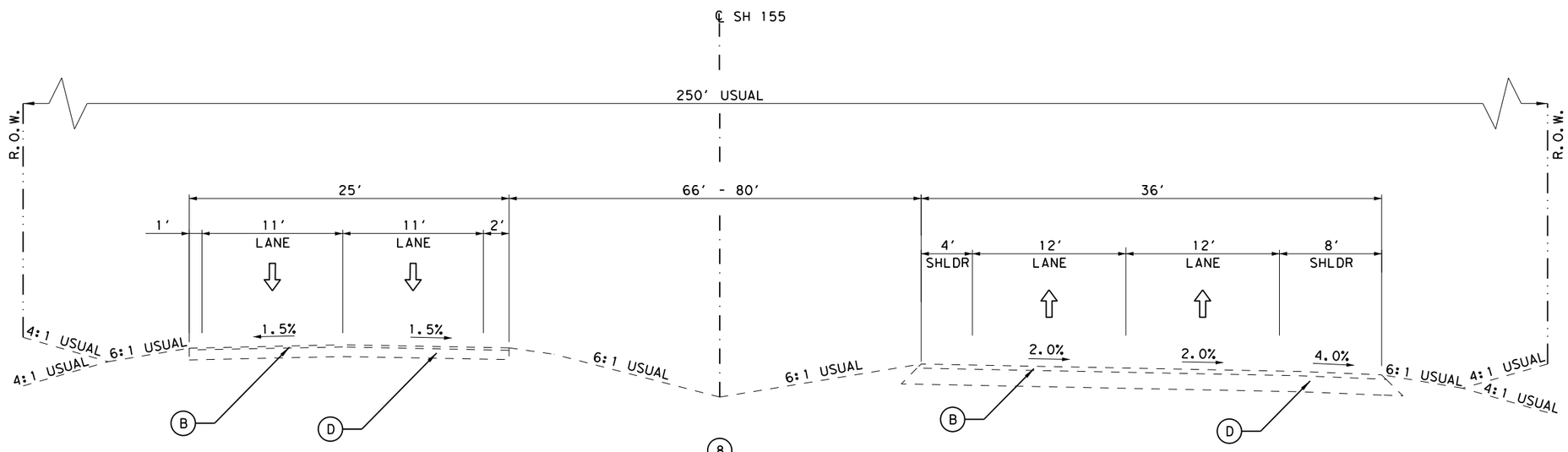
7

EXISTING BRIDGE SECTION (WALNUT CREEK)

NORTHBOUND LANES
STA 715+74 TO STA 717+24

STA 715+73 TO STA 717+25
STA 717+25 TO STA 720+65 TRANSITION FROM (7) TO (6)

SOUTHBOUND LANES
STA 715+73 TO STA 717+25



8

NORTHBOUND LANES

EXISTING SECTION

SOUTHBOUND LANES

STA 931+80 TO STA 957+35
STA 957+35 TO STA 959+82 TRANSITION FROM (8) TO (9)

LEGEND

- (A) 2"-4" HMAC SURFACE
- (B) 4"-8" HMAC SURFACE
- (C) 8"-12" HMAC SURFACE
- (D) 10"-12" FLEX BASE
- (E) 8" CEMENT STAB SUBGRADE

0 5' 10'
SCALE: 1" = 10'

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

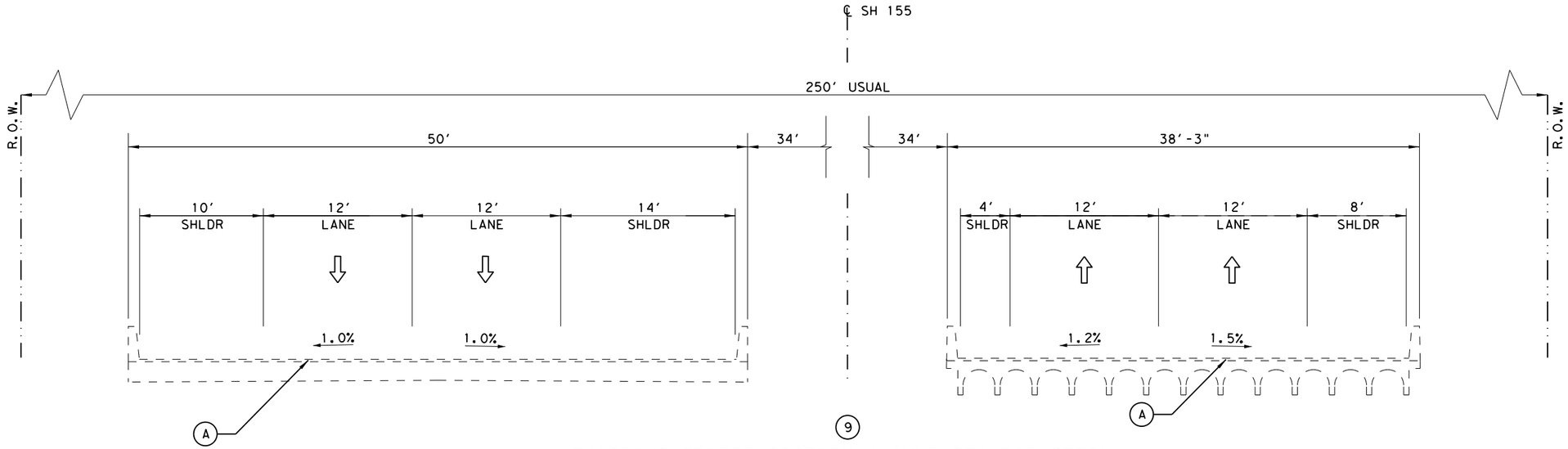
SH 155
TYPICAL SECTIONS

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		6

DATE: 1/12/2022 2:05:23 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH0155_GEN_TYP.dgn

LEGEND

(A) 2"-4" HMAC SURFACE
(B) 4"-8" HMAC SURFACE
(C) 8"-12" HMAC SURFACE
(D) 10"-12" FLEX BASE
(E) 8" CEMENT STAB SUBGRADE



(9)

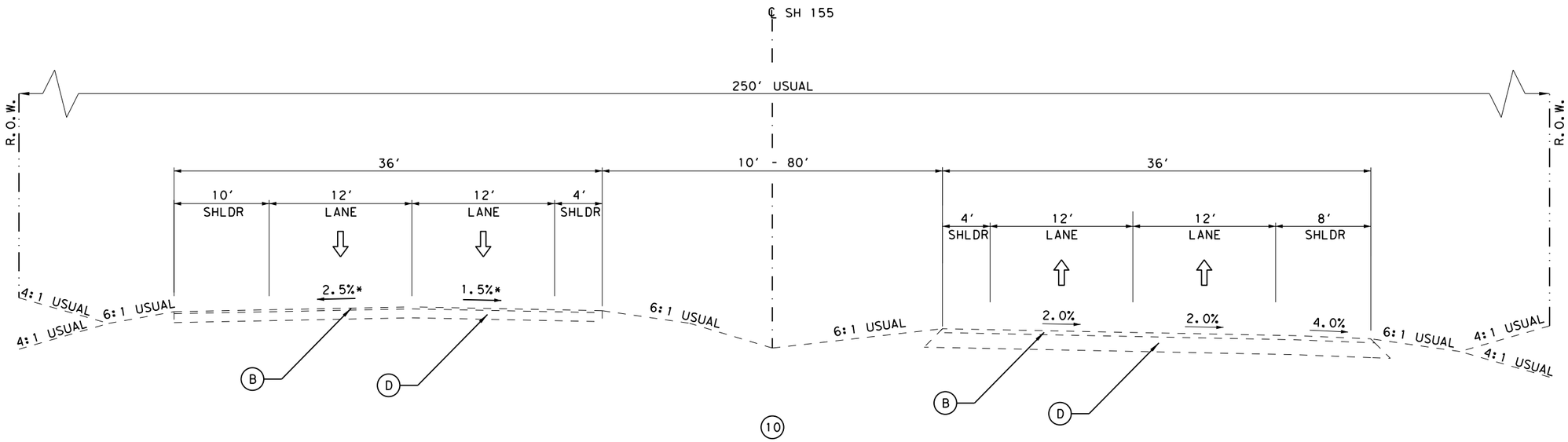
EXISTING BRIDGE SECTION (MOUND PRAIRIE CREEK)

STA 959+82 TO STA 962+62
STA 962+62 TO STA 965+60 TRANSITION FROM (9) TO (10)

NORTHBOUND LANES
STA 959+82 TO STA 962+52

SOUTHBOUND LANES
STA 959+89 TO STA 962+62

0 5' 10'
SCALE: 1" = 10'



(10)

EXISTING SECTION

STA 965+60 TO STA 1172+00

NORTHBOUND LANES

SOUTHBOUND LANES

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

SH 155
TYPICAL SECTIONS

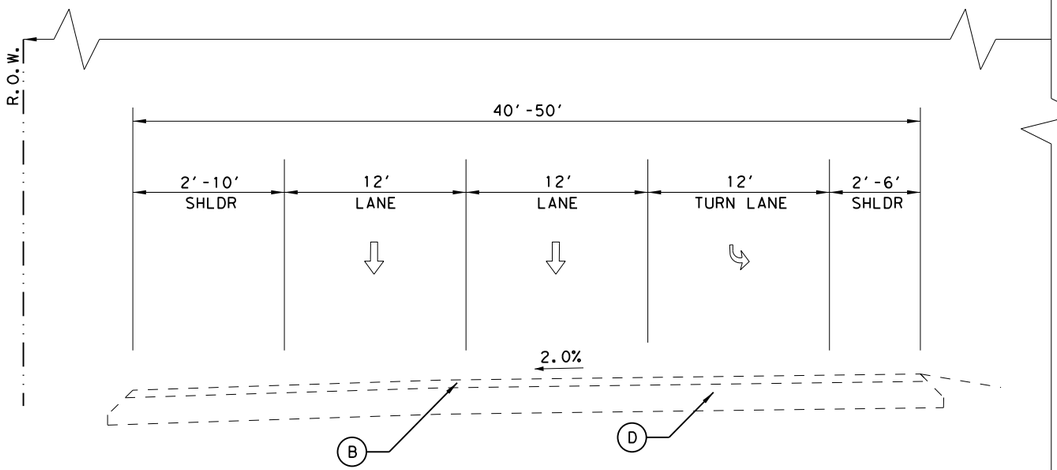
CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		7

DATE: 1/12/2022 2:05:23 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH0155_GEN_TYP.dgn

LEGEND

(A) 2"-4" HMAC SURFACE
(B) 4"-8" HMAC SURFACE
(C) 8"-12" HMAC SURFACE
(D) 10"-12" FLEX BASE
(E) 8" CEMENT STAB SUBGRADE

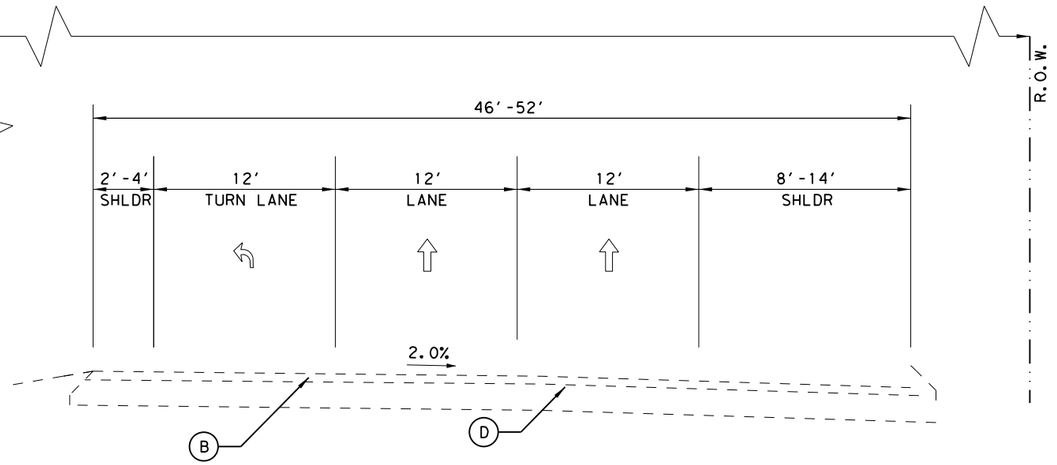
0 5' 10'
SCALE: 1" = 10'



EXISTING LEFT TURN LANE SECTION

SH 155 NORTHBOUND

STA 204+84 TO STA 213+29
STA 268+60 TO STA 277+17
STA 296+34 TO STA 305+30
STA 315+59 TO STA 324+55
STA 348+78 TO STA 372+12
STA 395+42 TO STA 404+59
STA 419+01 TO STA 427+99
STA 448+75 TO STA 495+47
STA 504+36 TO STA 512+86
STA 534+28 TO STA 542+98
STA 586+79 TO STA 596+25
STA 670+28 TO STA 679+25
STA 699+16 TO STA 703+61
STA 729+74 TO STA 734+01
STA 748+08 TO STA 752+19
STA 770+23 TO STA 774+07
STA 797+35 TO STA 801+06
STA 820+62 TO STA 824+51
STA 839+68 TO STA 843+43
STA 888+59 TO STA 892+99
STA 920+85 TO STA 925+00
STA 931+25 TO STA 936+57
STA 954+38 TO STA 957+35
STA 986+83 TO STA 990+04
STA 1009+84 TO STA 1013+43
STA 1032+84 TO STA 1037+04
STA 1058+86 TO STA 1062+02
STA 1076+23 TO STA 1079+67
STA 1102+32 TO STA 1105+73
STA 1119+45 TO STA 1123+10
STA 1143+54 TO STA 1146+80
STA 1164+22 TO STA 1167+93



EXISTING LEFT TURN LANE SECTION

SH 155 SOUTHBOUND

STA 194+82 TO STA 202+88
STA 258+48 TO STA 267+65
STA 286+69 TO STA 294+92
STA 305+30 TO STA 313+41
STA 338+53 TO STA 361+57
STA 385+40 TO STA 394+49
STA 409+13 TO STA 418+14
STA 438+83 TO STA 447+85
STA 478+81 TO STA 485+74
STA 495+47 TO STA 503+40
STA 524+40 TO STA 533+42
STA 577+09 TO STA 585+74
STA 628+52 TO STA 637+75
STA 663+40 TO STA 669+35
STA 694+95 TO STA 698+66
STA 725+92 TO STA 729+01
STA 743+92 TO STA 747+44
STA 766+49 TO STA 769+44
STA 792+83 TO STA 796+60
STA 816+98 TO STA 820+01
STA 835+65 TO STA 839+02
STA 884+96 TO STA 887+97
STA 916+28 TO STA 920+19
STA 927+00 TO STA 930+53
STA 950+06 TO STA 953+72
STA 982+81 TO STA 986+14
STA 1005+30 TO STA 1008+89
STA 1028+43 TO STA 1031+96
STA 1054+63 TO STA 1058+11
STA 1072+78 TO STA 1075+56
STA 1090+51 TO STA 1101+73
STA 1114+38 TO STA 1117+86
STA 1139+96 TO STA 1142+85
STA 1160+49 TO STA 1163+57

J. Ryan Griffin

01/13/2022

SH 155
TYPICAL SECTIONS

Texas Department of Transportation
SHEET 6 OF 14

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		8

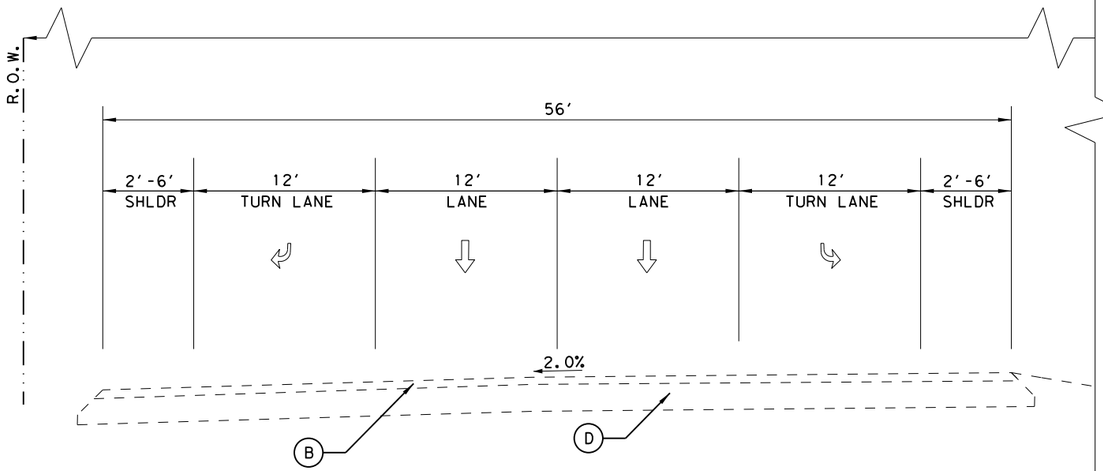
DATE: 1/12/2022 3:06:05 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH0155_GEN_TYP.dgn

LEGEND

- (A) 2"-4" HMAC SURFACE
- (B) 4"-8" HMAC SURFACE
- (C) 8"-12" HMAC SURFACE
- (D) 10"-12" FLEX BASE
- (E) 8" CEMENT STAB SUBGRADE

0 5' 10'

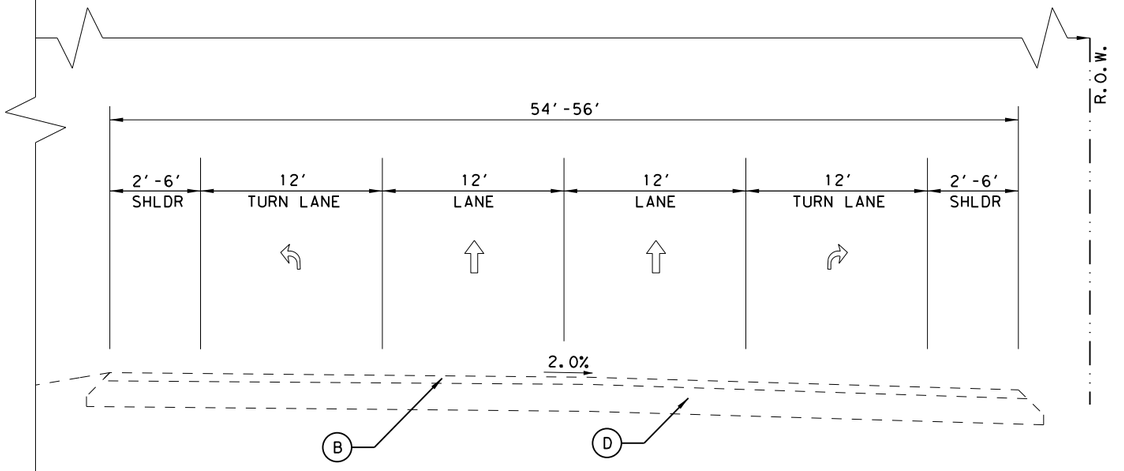
SCALE: 1" = 10'



EXISTING RIGHT TURN LANE & LEFT TURN LANE SECTION

SH 155 NORTHBOUND

STA 222+93 TO STA 232+10
STA 639+58 TO STA 649+15
STA 851+24 TO STA 856+43



EXISTING RIGHT TURN LANE & LEFT TURN LANE SECTION

SH 155 SOUTHBOUND

STA 212+73 TO STA 221+17
STA 468+55 TO STA 477+38
STA 846+16 TO STA 851+24

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

SH 155
TYPICAL SECTIONS

Texas Department of Transportation

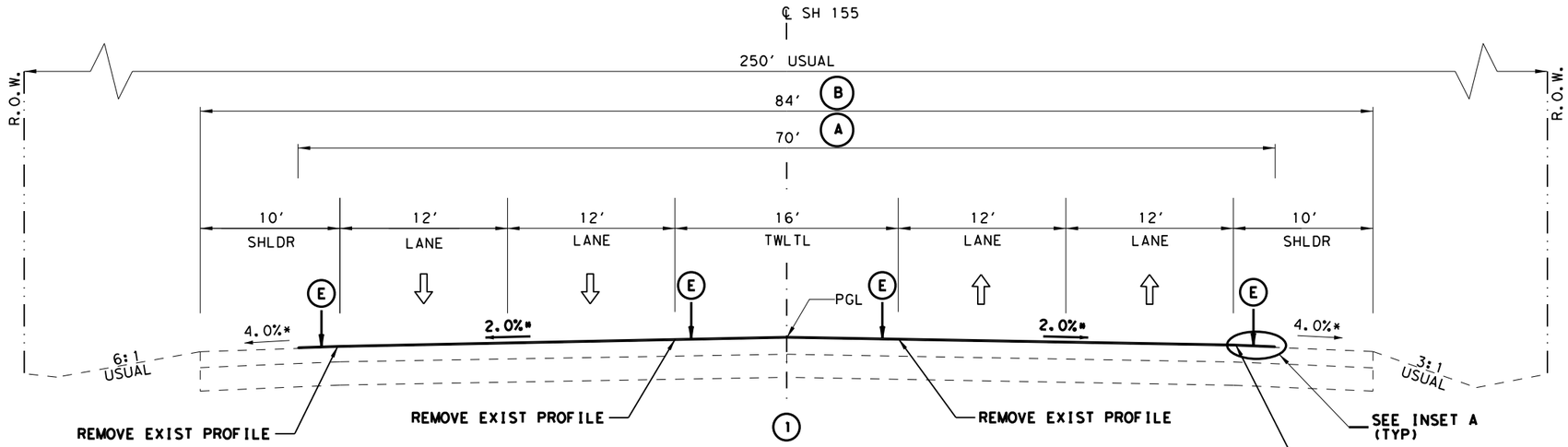
SHEET 7 OF 14

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		9

DATE: 1/12/2022 3:17:10 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH0155_GEN_TYP.dgn

LEGEND

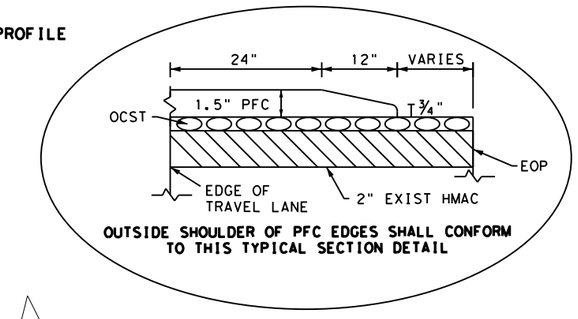
- (A) 1.5" PFC
- (B) OCST
- (C) PLANE 1.5"
- (D) BACKFILL (TY A) & EMULSION
- (E) MILLED RUMBLE STRIPS OPTION 4
- * MATCH EXISTING ROADWAY CROSS-SLOPE



(1)

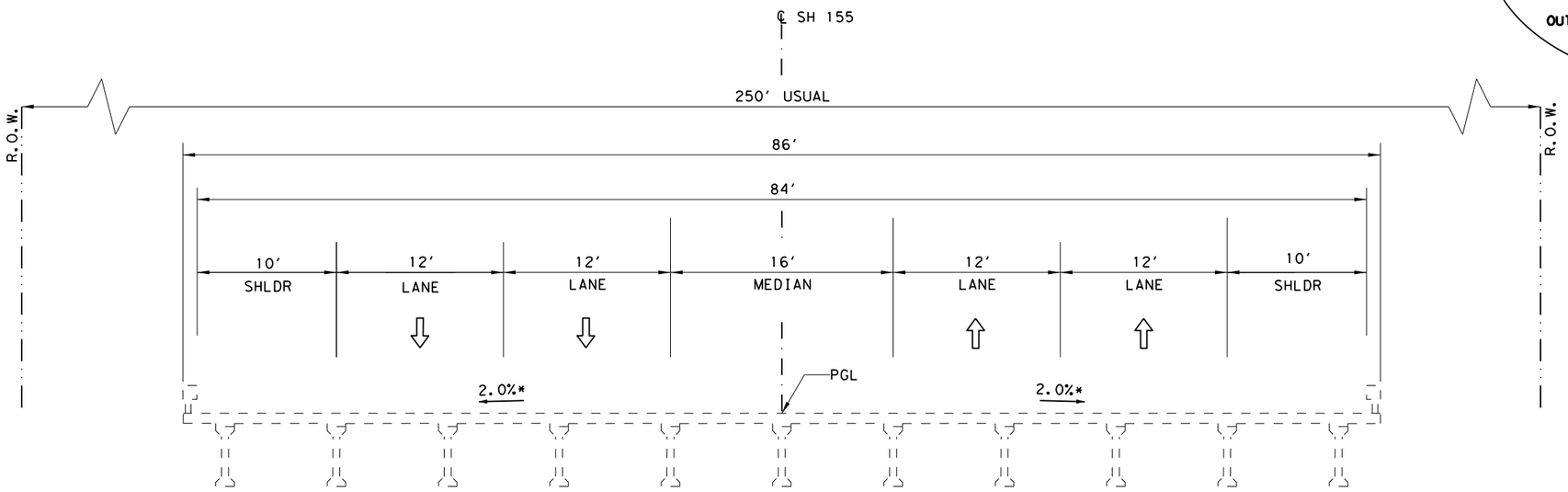
PROPOSED SECTION

STA 159+60 TO STA 173+20
STA 173+20 TO STA 173+40 TRANSITION FROM (1) TO (2)
STA 176+80 TO STA 186+50
STA 186+50 TO STA 189+85 TRANSITION FROM (1) TO (3)



OUTSIDE SHOULDER OF PFC EDGES SHALL CONFORM TO THIS TYPICAL SECTION DETAIL

INSET "A"



(2)

PROPOSED BRIDGE SECTION (CADDO CREEK)

STA 173+40 TO STA 176+60
STA 176+60 TO STA 176+80 TRANSITION FROM (2) TO (1)

0 5' 10'
SCALE: 1" = 10'

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED PROFESSIONAL ENGINEER

J. Ryan Griffin

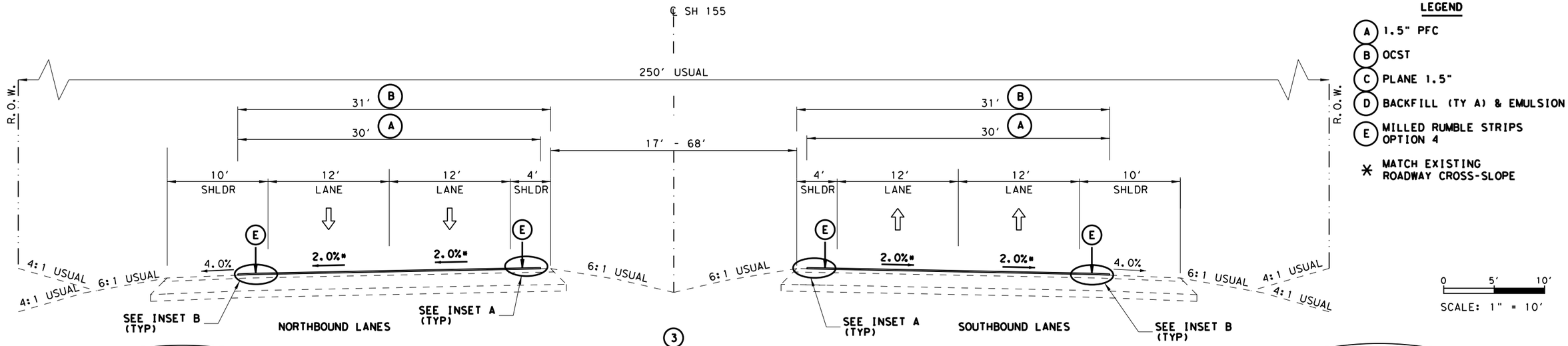
01/13/2022

SH 155
TYPICAL SECTIONS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		10

DATE: 1/12/2022 2:05:25 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH0155_GEN_TYP.dgn



③

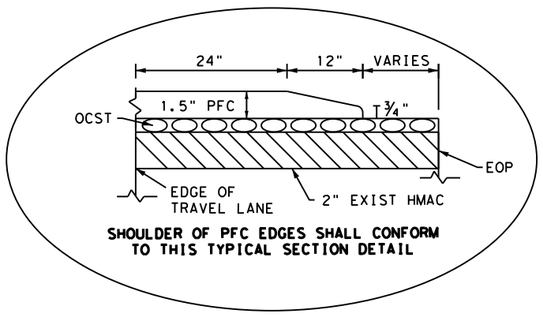
PROPOSED SECTION

STA 189+85 TO STA 253+85
STA 253+85 TO STA 258+48 TRANSITION FROM ③ TO ④

LEGEND

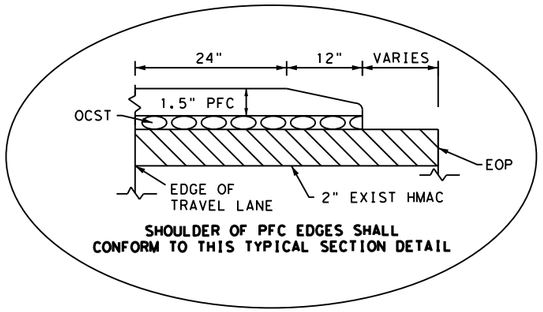
- (A) 1.5" PFC
- (B) OCST
- (C) PLANE 1.5"
- (D) BACKFILL (TY A) & EMULSION
- (E) MILLED RUMBLE STRIPS OPTION 4
- * MATCH EXISTING ROADWAY CROSS-SLOPE

0 5' 10'
SCALE: 1" = 10'



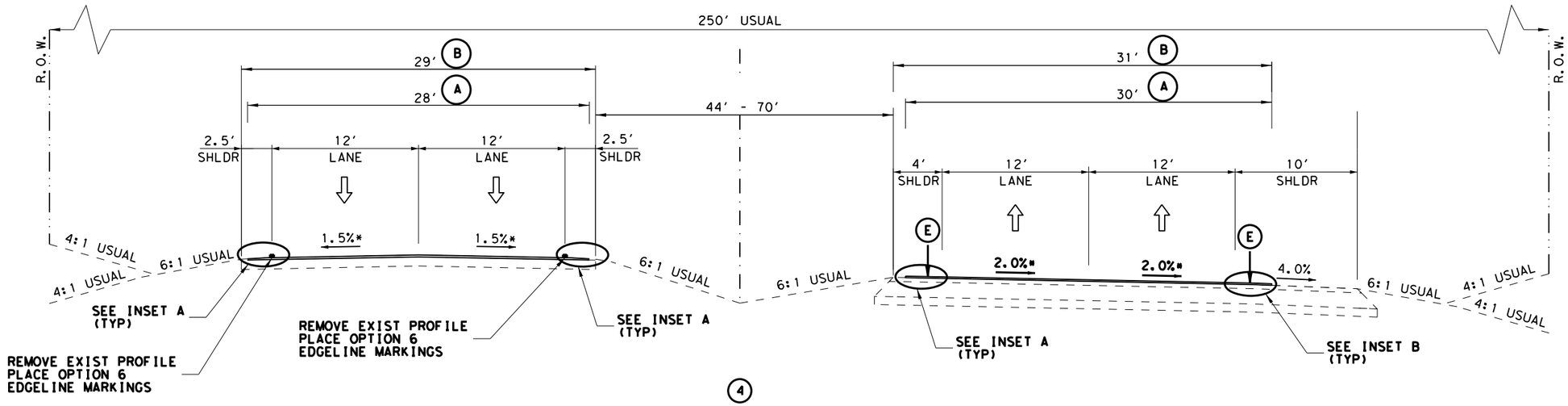
SHOULDER OF PFC EDGES SHALL CONFORM TO THIS TYPICAL SECTION DETAIL

INSET "A"



SHOULDER OF PFC EDGES SHALL CONFORM TO THIS TYPICAL SECTION DETAIL

INSET "B"



④

PROPOSED SECTION

NORTHBOUND LANES

SOUTHBOUND LANES

STA 258+48 TO STA 544+85
STA 544+85 TO STA 548+78 TRANSITION FROM ④ TO ⑤

STA 560+20 TO STA 649+15
STA 649+15 TO STA 679+25 TRANSITION FROM ④ TO ⑥

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED PROFESSIONAL ENGINEER

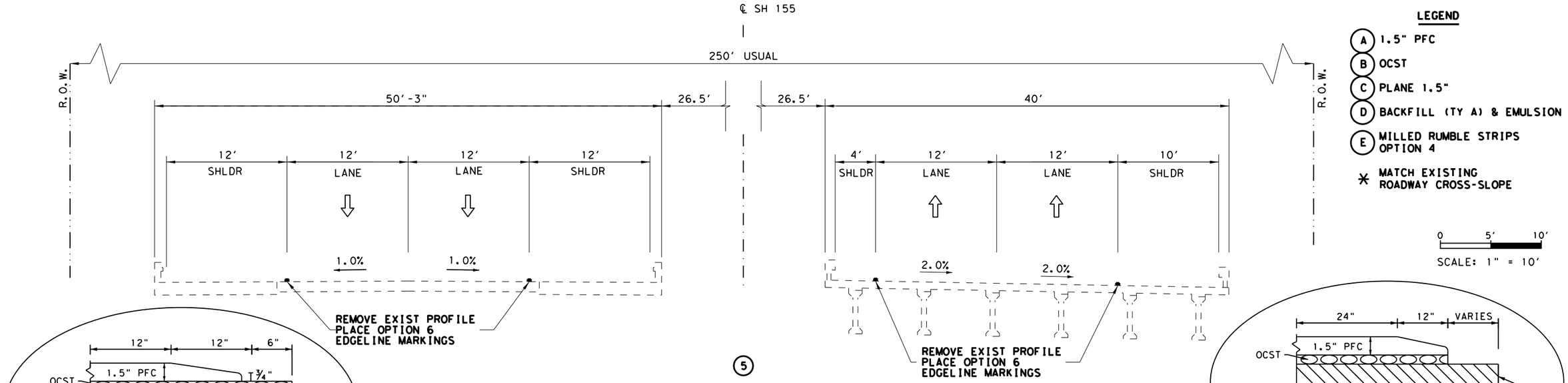
J. Ryan Griffin

01/13/2022

SH 155
TYPICAL SECTIONS

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		11

DATE: 1/12/2022 2:05:26 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH0155_GEN_TYP.dgn



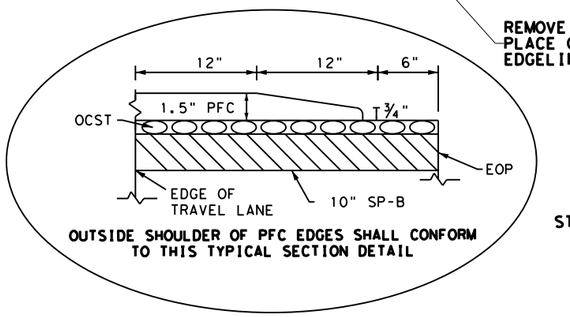
⑤

PROPOSED BRIDGE SECTION (BRUSHY CREEK)

STA 548+78 TO STA 552+82
STA 552+82 TO STA 560+20 TRANSITION FROM ⑤ TO ④

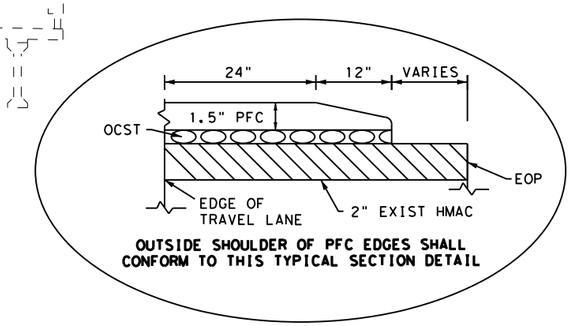
NORTHBOUND LANES
STA 549+52 TO STA 552+82

SOUTHBOUND LANES
STA 548+78 TO STA 552+78



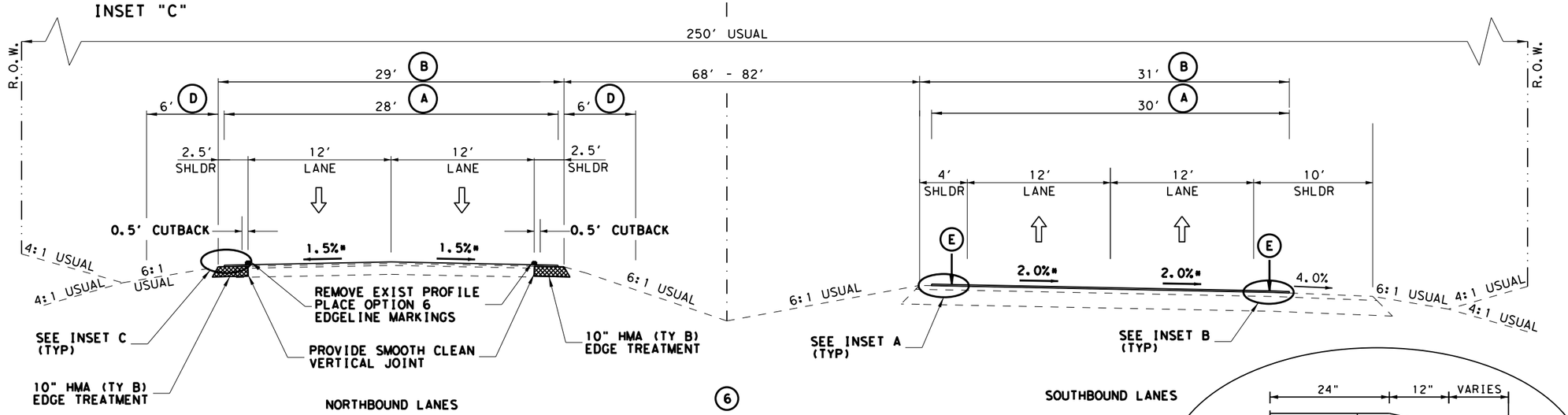
OUTSIDE SHOULDER OF PFC EDGES SHALL CONFORM TO THIS TYPICAL SECTION DETAIL

INSET "C"



OUTSIDE SHOULDER OF PFC EDGES SHALL CONFORM TO THIS TYPICAL SECTION DETAIL

INSET "B"



NORTHBOUND LANES

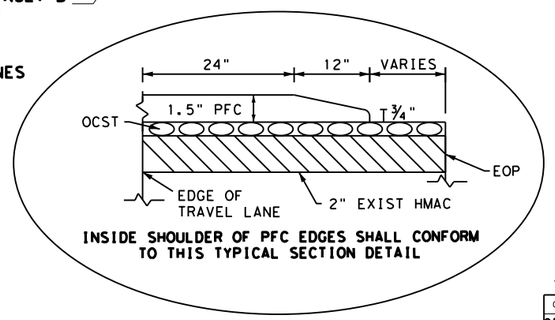
SOUTHBOUND LANES

⑥

PROPOSED SECTION

STA 679+25 TO STA 712+00
STA 712+00 TO STA 715+73 TRANSITION FROM ⑥ TO ⑦
STA 720+65 TO STA 925+00
STA 925+00 TO STA 931+80 TRANSITION FROM ⑥ TO ⑧

NOTE: EDGE TREATMENT TO MATCH EXISTING GRADE.
EDGE TREATMENT TO BE PLACED IN 3 APPROXIMATELY EQUAL LIFTS.



INSIDE SHOULDER OF PFC EDGES SHALL CONFORM TO THIS TYPICAL SECTION DETAIL

INSET "A"

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED PROFESSIONAL ENGINEER

01/13/2022

SH 155 TYPICAL SECTIONS

Texas Department of Transportation
SHEET 10 OF 14

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		12

DATE: 1/12/2022 2:05:26 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH0155_GEN_TYP.dgn

℄ SH 155

250' USUAL

R.O.W.

R.O.W.

48' (A)(B)(C) 34'

10' SHLDR | 12' LANE | 12' LANE | 14' SHLDR

0.5%* 1.0%*

REMOVE EXIST PROFILE
PLACE OPTION 6
EDGELINE MARKINGS

34' 38' (A)(B)(C)

4' SHLDR | 12' LANE | 12' LANE | 10' SHLDR

1.5%* 1.5%*

REMOVE EXIST PROFILE
PLACE OPTION 6
EDGELINE MARKINGS

LEGEND

- (A) 1.5" PFC
- (B) OCST
- (C) PLANE 1.5"
- (D) BACKFILL (TY A) & EMULSION
- (E) MILLED RUMBLE STRIPS OPTION 4
- * MATCH EXISTING ROADWAY CROSS-SLOPE

0 5' 10'

SCALE: 1" = 10'

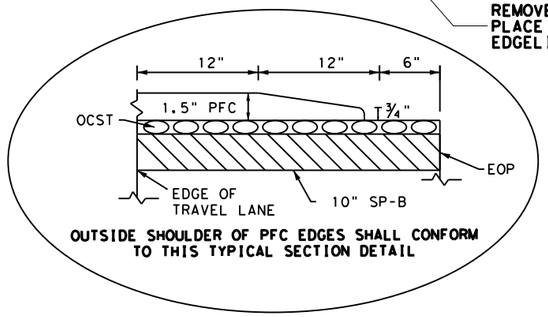
(7)

PROPOSED BRIDGE SECTION (WALNUT CREEK)

STA 715+73 TO STA 717+25
STA 717+25 TO STA 720+65 TRANSITION FROM (7) TO (6)

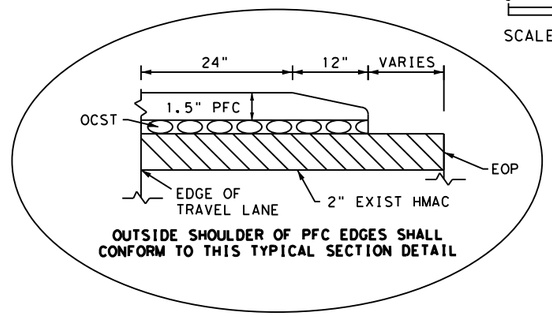
NORTHBOUND LANES
STA 715+74 TO STA 717+24

SOUTHBOUND LANES
STA 715+73 TO STA 717+25



OUTSIDE SHOULDER OF PFC EDGES SHALL CONFORM TO THIS TYPICAL SECTION DETAIL

INSET "C"



OUTSIDE SHOULDER OF PFC EDGES SHALL CONFORM TO THIS TYPICAL SECTION DETAIL

INSET "B"

℄ SH 155

250' USUAL

R.O.W.

R.O.W.

29' (B) / 28' (A)

6' (D) | 2.5' SHLDR | 12' LANE | 12' LANE | 2.5' SHLDR | 6' (D)

66' - 80'

31' (B) / 30' (A)

4' SHLDR | 12' LANE | 12' LANE | 8' SHLDR

0.5' CUTBACK 1.5%* 1.5%* 0.5' CUTBACK

4:1 USUAL 6:1 USUAL 6:1 USUAL 4:1 USUAL

REMOVE EXIST PROFILE
PLACE OPTION 6
EDGELINE MARKINGS

SEE INSET C (TYP)

PROVIDE SMOOTH CLEAN VERTICAL JOINT

10" HMA (TY B) EDGE TREATMENT

10" HMA (TY B) EDGE TREATMENT

NORTHBOUND LANES

(E) 2.0%* 2.0%* (E) 4.0%

6:1 USUAL 6:1 USUAL 4:1 USUAL 4:1 USUAL

SEE INSET A (TYP)

SEE INSET B (TYP)

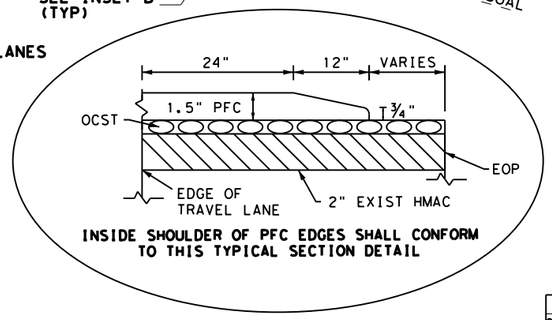
SOUTHBOUND LANES

(8)

PROPOSED SECTION

STA 931+80 TO STA 957+35
STA 957+35 TO STA 959+82 TRANSITION FROM (8) TO (9)

NOTE: EDGE TREATMENT TO MATCH EXISTING GRADE.
EDGE TREATMENT TO BE PLACED IN 3 APPROXIMATELY EQUAL LIFTS.



INSIDE SHOULDER OF PFC EDGES SHALL CONFORM TO THIS TYPICAL SECTION DETAIL

INSET "A"

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

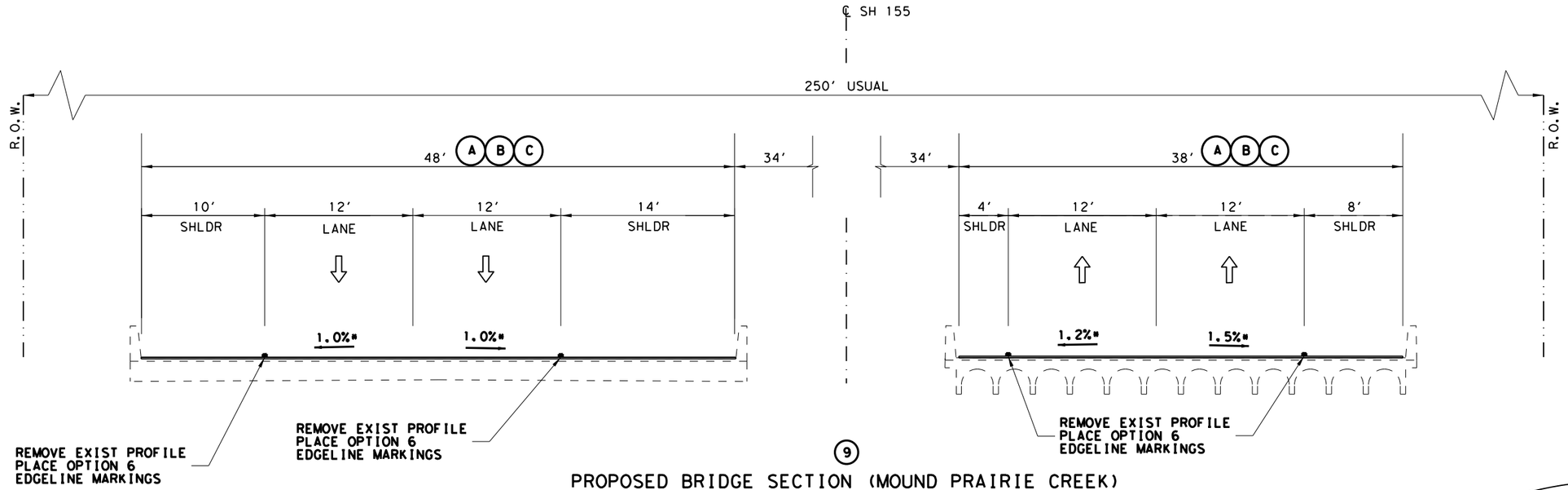
SH 155
TYPICAL SECTIONS

Texas Department of Transportation

SHEET 11 OF 14

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		13

DATE: 1/12/2022 2:05:27 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH0155_GEN_TYP.dgn



LEGEND

- (A) 1.5" PFC
- (B) OCST
- (C) PLANE 1.5"
- (D) BACKFILL (TY A) & EMULSION
- (E) MILLED RUMBLE STRIPS OPTION 4
- * MATCH EXISTING ROADWAY CROSS-SLOPE

0 5' 10'

SCALE: 1" = 10'

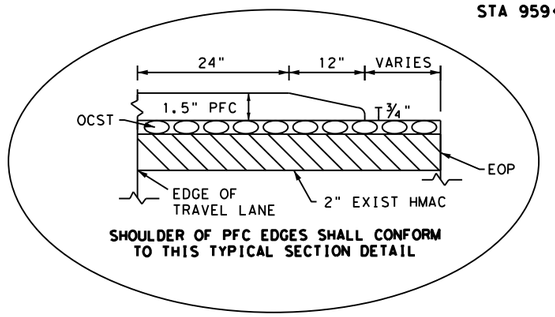
(9)

PROPOSED BRIDGE SECTION (MOUND PRAIRIE CREEK)

NORTHBOUND LANES
STA 959+82 TO STA 962+52

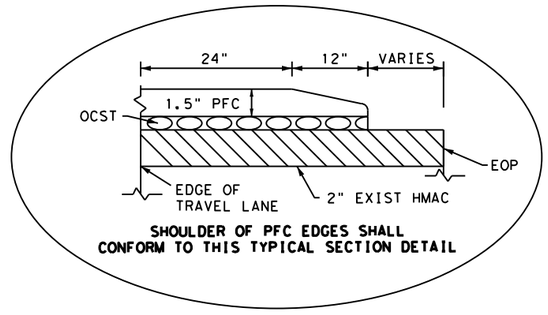
STA 959+82 TO STA 962+62
STA 962+62 TO STA 965+60 TRANSITION FROM (9) TO (10)

SOUTHBOUND LANES
STA 959+89 TO STA 962+62



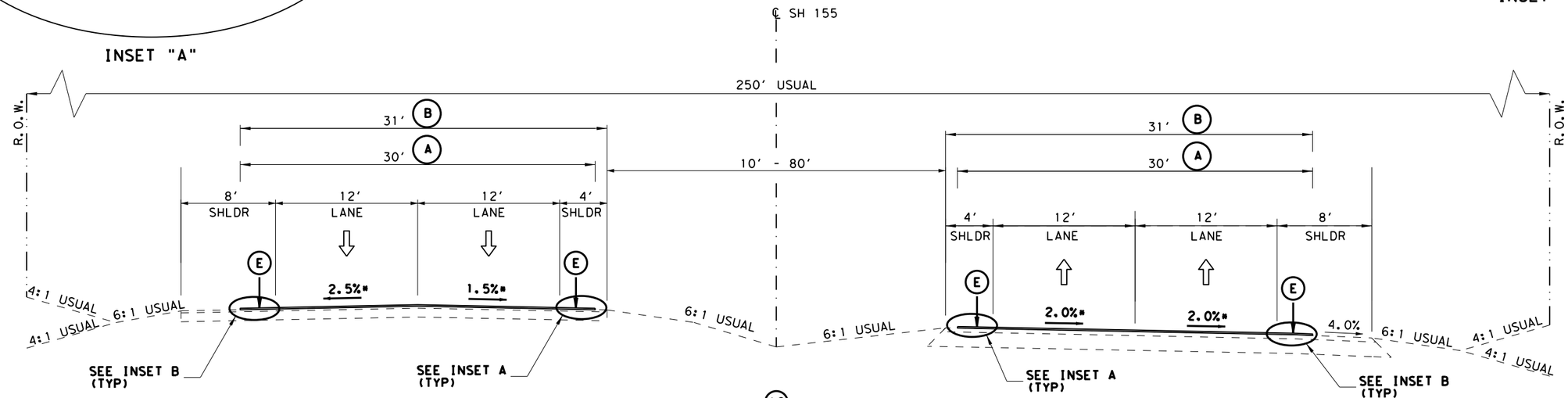
SHOULDER OF PFC EDGES SHALL CONFORM TO THIS TYPICAL SECTION DETAIL

INSET "A"



SHOULDER OF PFC EDGES SHALL CONFORM TO THIS TYPICAL SECTION DETAIL

INSET "B"



(10)

PROPOSED SECTION

STA 965+60 TO STA 1172+00

NORTHBOUND LANES **SOUTHBOUND LANES**

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

SH 155
TYPICAL SECTIONS

Texas Department of Transportation

SHEET 12 OF 14

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		14

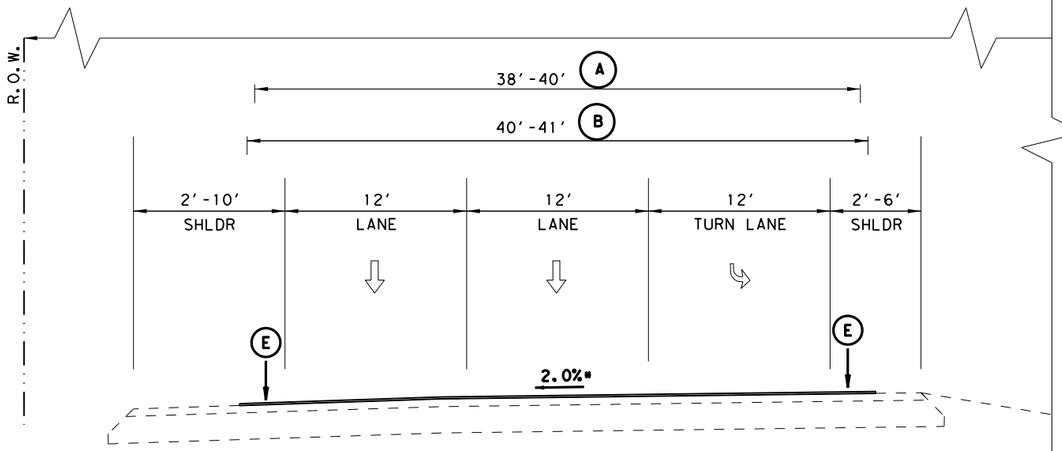
DATE: 1/12/2022 2:05:28 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d039035f\SH0155_GEN_TYP.dgn

LEGEND

- (A) 1.5" PFC
- (B) OCST
- (C) PLANE 1.5"
- (D) BACKFILL (TY A) & EMULSION
- (E) MILLED RUMBLE STRIPS OPTION 4
- * MATCH EXISTING ROADWAY CROSS-SLOPE

0 5' 10'

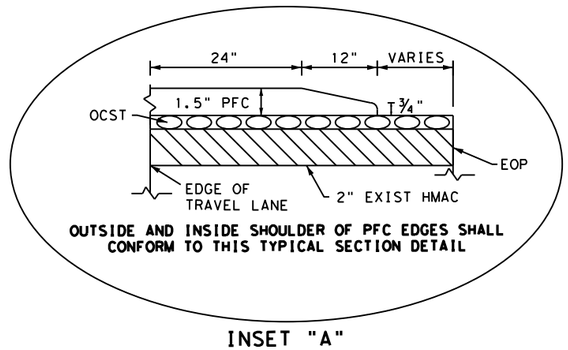
SCALE: 1" = 10'



PROPOSED LEFT TURN LANE SECTION

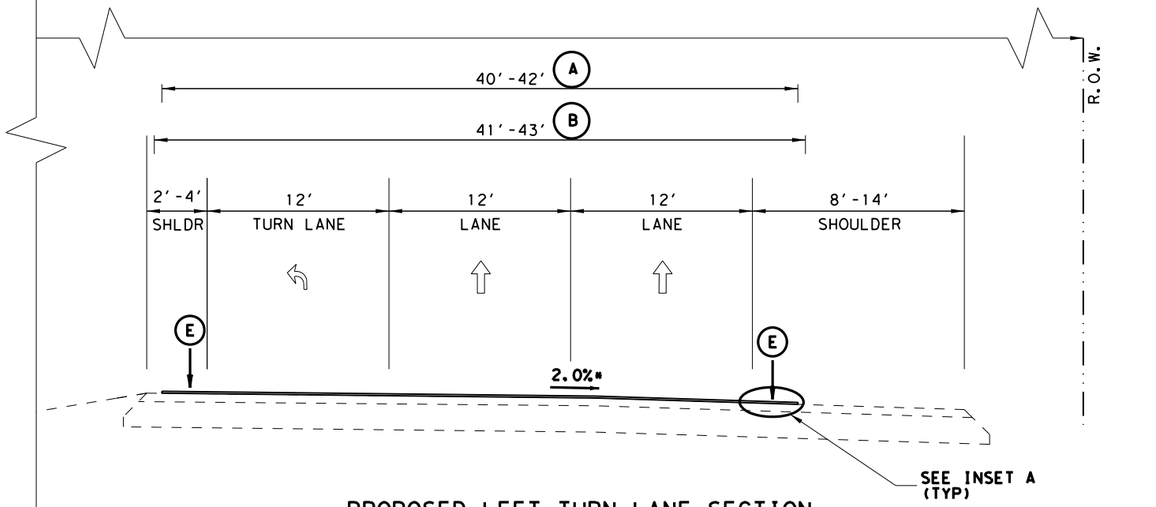
SH 155 NORTHBOUND

STA 204+84 TO STA 213+29	STA 797+35 TO STA 801+06
STA 268+60 TO STA 277+17	STA 820+62 TO STA 824+51
STA 296+34 TO STA 305+30	STA 839+68 TO STA 843+43
STA 315+59 TO STA 324+55	STA 888+59 TO STA 892+99
STA 348+78 TO STA 372+12	STA 920+85 TO STA 925+00
STA 395+42 TO STA 404+59	STA 931+25 TO STA 936+57
STA 419+01 TO STA 427+99	STA 954+38 TO STA 957+35
STA 448+75 TO STA 495+47	STA 986+83 TO STA 990+04
STA 504+36 TO STA 512+86	STA 1009+84 TO STA 1013+43
STA 534+28 TO STA 542+98	STA 1032+84 TO STA 1037+04
STA 586+79 TO STA 596+25	STA 1058+86 TO STA 1062+02
STA 670+28 TO STA 679+25	STA 1076+23 TO STA 1079+67
STA 699+16 TO STA 703+61	STA 1102+32 TO STA 1105+73
STA 729+74 TO STA 734+01	STA 1119+45 TO STA 1123+10
STA 748+08 TO STA 752+19	STA 1143+54 TO STA 1146+80
STA 770+23 TO STA 774+07	STA 1164+22 TO STA 1167+93



OUTSIDE AND INSIDE SHOULDER OF PFC EDGES SHALL CONFORM TO THIS TYPICAL SECTION DETAIL

INSET "A"



PROPOSED LEFT TURN LANE SECTION

SH 155 SOUTHBOUND

STA 194+82 TO STA 202+88	STA 766+49 TO STA 769+44
STA 258+48 TO STA 267+65	STA 792+83 TO STA 796+60
STA 286+69 TO STA 294+92	STA 816+98 TO STA 820+01
STA 305+30 TO STA 313+41	STA 835+65 TO STA 839+02
STA 338+53 TO STA 361+57	STA 884+96 TO STA 887+97
STA 385+40 TO STA 394+49	STA 916+28 TO STA 920+19
STA 409+13 TO STA 418+14	STA 927+00 TO STA 930+53
STA 438+83 TO STA 447+85	STA 950+06 TO STA 953+72
STA 478+81 TO STA 485+74	STA 982+81 TO STA 986+14
STA 495+47 TO STA 503+40	STA 1005+30 TO STA 1008+89
STA 524+40 TO STA 533+42	STA 1028+43 TO STA 1031+96
STA 577+09 TO STA 585+74	STA 1054+63 TO STA 1058+11
STA 628+52 TO STA 637+75	STA 1072+78 TO STA 1075+56
STA 663+40 TO STA 669+35	STA 1090+51 TO STA 1101+73
STA 694+95 TO STA 698+66	STA 1114+38 TO STA 1117+86
STA 725+92 TO STA 729+01	STA 1139+96 TO STA 1142+85
STA 743+92 TO STA 747+44	STA 1160+49 TO STA 1163+57

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

SH 155
TYPICAL SECTIONS

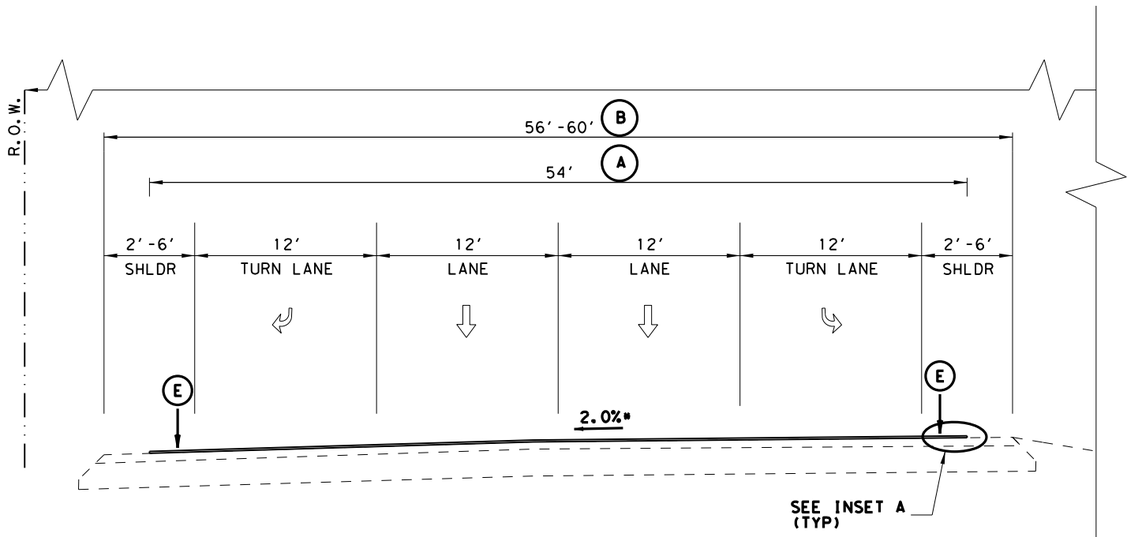
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		15

DATE: 1/12/2022 2:05:28 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH0155_GEN_TYP.dgn

LEGEND

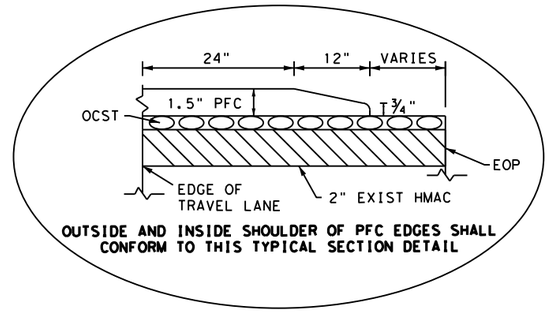
- (A) 1.5" PFC
- (B) OCST
- (C) PLANE 1.5"
- (D) BACKFILL (TY A) & EMULSION
- (E) MILLED RUMBLE STRIPS OPTION 4
- * MATCH EXISTING ROADWAY CROSS-SLOPE



PROPOSED RIGHT TURN LANE & LEFT TURN LANE SECTION

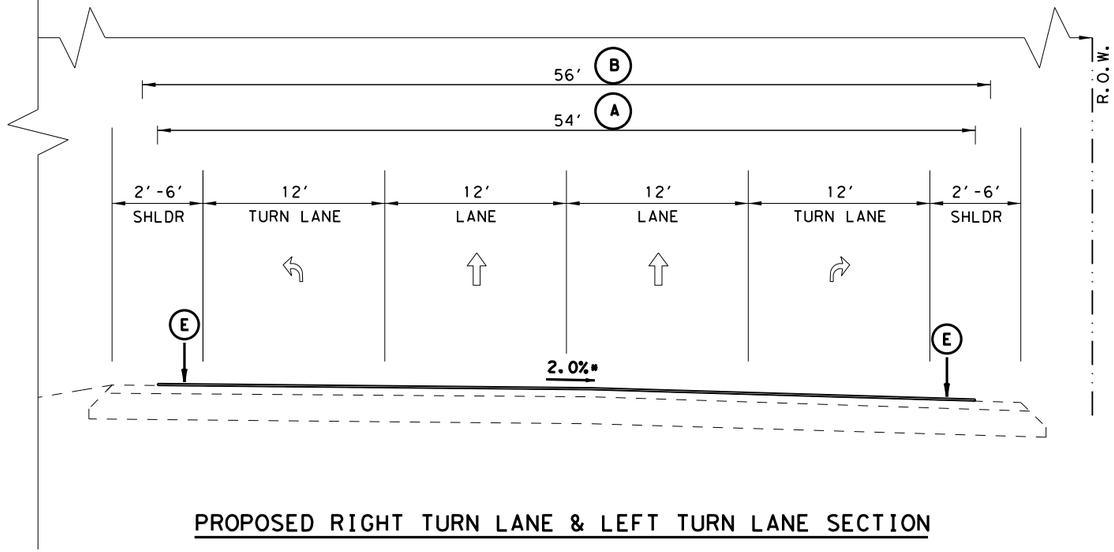
SH 155 NORTHBOUND

STA 222+93 TO STA 232+10
STA 639+58 TO STA 649+15
STA 851+24 TO STA 856+43



OUTSIDE AND INSIDE SHOULDER OF PFC EDGES SHALL CONFORM TO THIS TYPICAL SECTION DETAIL

INSET "A"



PROPOSED RIGHT TURN LANE & LEFT TURN LANE SECTION

SH 155 SOUTHBOUND

STA 212+73 TO STA 221+17
STA 468+55 TO STA 477+38
STA 846+16 TO STA 851+24

0 5' 10'

SCALE: 1" = 10'

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

SH 155
TYPICAL SECTIONS

Texas Department of Transportation

SHEET 14 OF 14

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		16

DATE: 1/12/2022 2:05:29 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH0155_GEN_TYP.dgn

GENERAL NOTES:

GENERAL.

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

Eric Fisher, P.E. Eric.Fisher@txdot.gov

Louis McDow III, P.E. Louis.McDow@txdot.gov

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

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.

For this Contract, the following standard sheets have been modified:

SCC(10)-MOD

All stockpiles within TxDOT right of way, must not exceed 12 ft. in height and must have 3:1 slopes unless otherwise directed. Place stockpiles in a manner that will be outside the horizontal clear zone, will not obstruct traffic or sight distance, and will not interfere with roadway drainage.

Do not haul with loaded scrapers on the surfaced areas of any highway except as approved.

Remove all vegetation from pavement edges, intersections, and driveways prior to planing operations, seal coat, or ACP operations. This work will not be paid for directly, but will be subsidiary to the bid items of the Contract.

ATTN: Provide a 20-ft. length per 1-in. depth temporary taper at all transverse joints in the travel lane before opening to traffic. This work will not be paid for directly, but will be subsidiary to the bid items of the Contract.

Project Number: **Sheet 17**

County: ANDERSON **Control:** 0520-08-071

Highway: SH 155

Provide all-weather surface for temporary ingress and egress to adjacent property, as directed. Materials, labor, equipment and incidentals necessary to provide temporary ingress and egress will not be paid for directly, but will be subsidiary to various bid items.

PROJECT MOWING

Mow the highway right of way in the project limits a maximum of 2 cycles per year, as directed. Mowing will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Provide approved mowing equipment capable of mowing on slopes without unduly marring finished slope surfaces or damaging existing growth. The minimum cutting width should not be less than 5 ft. unless otherwise approved.

Mow all areas of existing vegetation and vegetation placed during the project, as directed. The mowing height should be 5 in. unless otherwise directed. Repair portions of sod or grass which are damaged during mowing operations in an acceptable manner.

Mow as close as possible to all fixed objects, exercising extreme care not to damage trees, plants, shrubs, signs, delineators or other appurtenances which are part of the facility. Hand trim around such objects, unless otherwise specified.

Use safety chains or other manufacturer's safety devices to prevent injury to people or damage to property caused by flying debris propelled out from under rotary mowers. Chains should be a minimum size of 5/16 in. and links spaced side by side around the front, sides and rear of mower. When mowing at the specified cutting height, the chains should be long enough to drag the ground. If at any time it is determined that mowing or trimming equipment is defective to the point that it may affect the quality of work or create unsafe conditions, then immediately repair or replace the equipment.

LITTER PICKUP

Remove litter from the right of way in the project limits a maximum of 3 cycles per year as directed. Litter pickup will not be measured or paid for directly, but will be subsidiary to pertinent Items.

Equipment used for litter pickup must be approved.

Collect and properly dispose of all litter deposited by construction operations or the traveling public from within the right of way as directed. This includes cans, bottles, paper, plastic items, metal scraps, lumber, etc. Do not dump or stockpile collected litter on Department property.

ITEM 4. SCOPE OF WORK

During final clean up, remove all foreign material that has accumulated at bridge abutments and bent caps as approved. All work and equipment involved in the removal of this material is subsidiary to the bid items of the Contract.

ITEM 5. CONTROL OF THE WORK

If utility lines need adjustments during construction operations, modify operations and continue the work in a manner that will allow others to make the utility adjustments. Additional working time may be allowed for delays caused by these utility adjustments.

Use “Method C” for construction surveying in accordance with Section 5.9.3.

Refer to the horizontal and vertical alignment data summaries for satellite-control point information.

Utility locations shown on the plans are approximate. Contact utilities in accordance with Article 5.6., “Cooperating With Utilities.”

ITEM 7. LEGAL RELATIONS AND RESPONSIBILITIES

Do not initiate activities in a project specific location (PSL) associated with a U.S. Army Corps of Engineers (COE) permit area that has not been previously evaluated by the COE as part of the permit review of this project. Such activities include haul roads, equipment staging areas, borrow pits, and disposal sites. “Associated,” defined here, means “materials are delivered to or from the PSL.” The permit area includes all waters of the U.S. or associated wetlands affected by activities associated with this project. Special restrictions may be required for this work. The Contractor is responsible for all consultations with the COE regarding activities (including PSL) that have not been previously evaluated by the COE. Provide the Department with a copy of all consultations or approvals from the COE before initiating activities.

Proceed with activities in PSL that do not affect a COE permit area if Contractor determines that the PSL is non-jurisdictional or proper COE clearances have been obtained in jurisdictional areas or have been previously evaluated by the COE as part of the permit review of this project. The Contractor is responsible for documenting his determination that his activities do not affect a COE permit area. Maintain copies of determination for review by the Department or any regulatory agency.

Keep mailboxes in a position accessible to the carrier’s vehicle along the travelway. When grading operations necessitate the moving of mailboxes, place mailboxes nearby at a location accessible to the carrier’s vehicle. Return mailboxes to a position accessible to the carrier’s vehicle along the travelway when grading operations are not in progress. The Contractor may

Project Number: **Sheet 17A**

County: ANDERSON **Control:** 0520-08-071

Highway: SH 155

mount mailboxes on a portable stand that keeps the mailbox in a level position approximately 42 in. above the pavement.

Furnish mounts for mailboxes in accordance with the Compliant Work Zone Traffic Control Device List for temporary mailboxes. When existing mailboxes are non-standard size, supply the new standard sized mailbox when temporarily relocated on drum and label the address as directed. This process will not be paid for directly, but will be subsidiary to the various bid items.

Coordinate with the local mail carrier where to place temporary mailboxes.

Concrete truck drivers and concrete pump operators are required to wash out only in designated areas specifically constructed for eliminating run-off. Dispose of materials in accordance with federal, state, and local requirements.

Maintain positive drainage for permanent and temporary work for the duration of the project. The Contractor will be responsible for any items associated with the temporary or interim drainage and all related maintenance. This work will be subsidiary to various bid items.

The total disturbed area for this project is 4.9 acres. The disturbed area in this project and the Contractor Project Specific Locations (PSL’s) within 1 mile of the project limits for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. Obtain any required authorization from the TCEQ for any Contractor PSL for construction support activities on or off the ROW. When the total area disturbed for all projects in the Contract and PSLs within 1 mile of the project limits exceed 5 acres, before disturbance, provide a copy of the Contractor NOI for PSLs on the ROW and within 1 mile of the project limits to the Engineer and to any local government that operates a Municipal Separate Storm Sewer System (MSSS).

No significant traffic generator events identified.

ITEM 8. PROSECUTION AND PROGRESS

Prepare the progress schedule as a bar chart.

ITEM 9. MEASUREMENT & PAYMENT

In accordance with Article 9.1., “Measurement of Quantities,” furnish the tare and maximum gross weights as well as the volume capacity of all vehicles, trucks, truck-tractors, trailers, semi-trailers, or combination of such vehicles used to deliver materials for this Contract. Also, furnish calculations supporting these weights and capacities. Provide all measurements required for pay a minimum of 2 days before the trucks are used.

ITEM 104. REMOVING CONCRETE

Blasting will not be permitted on this project.

ITEMS 110 & 132. EXCAVATION & EMBANKMENT

When excavation is required to adjust stream flow lines at culvert ends, flatten the side slopes of channels and the backslopes of parallel ditches to the maximum extent possible within the existing right of way and channel easements.

ITEM 112. SUBGRADE WIDENING

In a cut section, if the soil encountered in the subgrade is unsuitable or unstable, undercut a minimum depth of 1 ft. and a maximum depth as directed. Replace with a material having a plasticity index of 6 to 18.

ITEM 132. EMBANKMENT

Furnish Type C embankment consisting of suitable earth material (rock, loam, clay, or other approved materials) that will form a stable embankment. The top 2 ft. of embankment material should have a plasticity index between 6 and 18.

ITEM 134. BACKFILLING PAVEMENT EDGES

Compact the backfill adjacent to the pavement edge with a pneumatic roller or other approved equipment. This rolling will not be paid for directly, but will be subsidiary to Item 134.

ITEM 150. BLADING

Any required mowing and pulverizing before blading will not be paid for directly, but will be subsidiary to Item 150.

Use blading to finish slopes after placement of the ACP surface and use blading to reshape unimproved driveways as directed.

Compact blading material as directed.

ITEM 164. SEEDING FOR EROSION CONTROL

The rates, types of seed, asphalt, and locations for the straw mulch and broadcast seed items will be determined if temporary erosion control is needed.

Project Number: **Sheet 17B**

County: ANDERSON **Control:** 0520-08-071

Highway: SH 155

Mow tall vegetation prior to placement of erosion control measures in order to provide optimal growing conditions. This work will not be paid for directly, but will be subsidiary to the bid items of the Contract.

The season and seed mixture for “Broadcast Seeding (Temporary Erosion Control) (Cool Season)” and “Broadcast Seeding (Temporary Erosion Control) (Warm Season)” is specified below:

Cool Season - September 1 thru November 30
Warm Season - May 15 thru August 31

Permanent Planting Mixture	
Species and Rates	
(lb. PLS/ac.)	
(Season: February 1 to May 15)	
Green Sprangletop	0.5
Bermudagrass	5.0
Weeping Lovegrass (Ermelo)	0.5
Sand Lovegrass	0.5
Lance-Leaf Coreopsis	1.0
(Season: September 1 to February 1)	
Bermuda (unhulled)	12
Crimson Clover	10

Temporary Seeding for Erosion Control	
Warm Season	
(Season: May 15 to August 31)	
Bermudagrass	10
Foxtail Millet	30
Cool Season	
(Season: September 1 to November 30)	
Tall Fescue	4.5
Oats	24
Wheat	34

Place topsoil before temporary seeding unless otherwise directed.

Do not use Bahiagrass.

Use additional temporary seeding if permanent seeding is placed outside the optimum growing season shown for this Item as directed.

Provide a Bonded Fiber Matrix that meets the current requirements of the Approved Products List for Item 169, “Soil Retention Blanket, Class 1, Type D, Spray Type Blanket,” for both permanent and temporary seeding. Install according to manufacturer’s recommendations based on a slope steeper than 3:1 with sandy soils. This Item will be paid for under Item 164.

ITEM 166. FERTILIZER

Place fertilizer at the rate of 1 lb. per 9 sq. yd. on areas prepared for seeding.

Project Number: **Sheet 17C**

County: ANDERSON **Control:** 0520-08-071

Highway: SH 155

ITEM 168. VEGETATIVE WATERING

Apply water to all newly placed sod or seeded areas the same day of installation. Maintain the sod or seeded areas in a sufficiently watered condition. Do not allow sod or seeded areas to dry out so that water stress is evident.

ITEM 314. EMULSIFIED ASPHALT TREATMENT

Before application, dilute the emulsion with water up to a maximum dilution of 50% at a distribution rate of 0.30 gal. per sq. yd.

ITEM 316. SEAL COAT

Protect all existing bridges, curbs, and other exposed concrete surfaces from asphaltic materials by any acceptable method. Removal of excessive asphaltic materials deposited on these surfaces will be at the Contractor’s expense.

During surface treatment application, if existing conditions warrant, vary the lane widths, transitions, and intersection areas as directed.

Perform rolling as directed with equipment complying with Section 210.2.4.2, “Medium Pneumatic Tire.” This work will not be paid for directly, but will be subsidiary to pertinent Items.

Do not apply asphalt later than 1 hour before sunset unless otherwise approved.

Provide aggregate for shoulders and mainlanes from the same source unless otherwise directed.

Place surface treatments between May 1 and August 31 unless otherwise directed.

The rates shown on the plans for asphalt and aggregate are for estimating purposes only. The rates may be varied as directed.

ITEM 320. EQUIPMENT FOR ASPHALT CONCRETE PAVEMENT

Provide either a material transfer vehicle or material transfer paver for the surface course of this project as approved.

Provide either a material transfer vehicle or material transfer paver for the surface course of this project. The material transfer vehicle must be self-propelled, wheel mounted and capable of receiving material from haul trucks separate from the paver. The 20-ton minimum capacity hopper must be equipped with a pivoting discharge conveyor and must have a means of remixing the asphaltic material before placement. The material transfer paver, if supplied, must consist of

a mobile, self-propelled asphalt paver incorporating an integral mix loadout elevator (conveyor) having a minimum rated capacity of 750 ton per hour. The conveyor system must have a means of remixing the asphaltic concrete material before discharging into the paver hopper and must be equipped with either a truck dump hopper attachment or a minimum 20-ton capacity surge hopper. If a material transfer paver utilizing the truck dumper hopper attachment is used, the haul trucks must stop a minimum of 1 foot into the truck. In addition, paving will not be allowed to begin until the paver has reached its full storage capacity.

ITEM 3079. PERMEABLE FRICTION COURSE (PFC)

Cease production of mixture if the asphalt content from any sublot drops below 6%. Resume production following tests showing appropriate adjustments have been made to the satisfaction of the Engineer.

Provide Class A coarse aggregate for the PFC as listed in the Department's Bituminous Rated Source Quality Catalog (BRSQC).

Warm Mix Asphalt (WMA) is not allowed.

The use of Reclaimed Asphalt Pavement (RAP) and Recycled Asphalt Shingles (RAS) is not allowed.

ITEM 351. FLEXIBLE PAVEMENT STRUCTURE REPAIR

Replace the unstable pavement structure with 3 in. of asphaltic concrete pavement base (Super Pave SP-C), unless otherwise directed. The Engineer will determine the exact locations and limits of pavement repair in the field prior to beginning this Item of work.

Apply a tack coat with a rate of 0.10 gal/sy of residual asphalt between each layer of ACP pavement unless otherwise directed.

Furnish planing equipment to remove existing material in accordance with Item 354, as directed. The planing equipment will be subsidiary to Item 351.

Furnish an asphalt paver on full lane width pavement repair sections in accordance with Item 320 unless otherwise directed.

ITEM 354. PLANING AND TEXTURING PAVEMENT

Use a front-end loader or other suitable equipment at the stockpile site to properly stockpile the planed material as required.

Project Number: **Sheet 17D**

County: ANDERSON **Control:** 0520-08-071

Highway: SH 155

ATTN: Vary planing locations to meet field conditions as directed. Begin and end planing at a sawed or planed vertical joint to provide a smooth transition to existing pavement. Provide a 20-ft. length per 1-in. depth temporary taper at all transverse joints in the travel lane before opening to traffic.

Before opening planed areas to traffic, bevel vertical or near vertical longitudinal faces in the pavement surface.

The Department retains ownership of planed material generated on this project. The stockpile site for RAP is located at the intersection of SH 155 and CR 327. The Engineer will determine the exact stockpile location within the designated area.

Furnish a small planing machine as approved for planing small areas and street intersections.

ITEM 401. FLOWABLE BACKFILL

Use an accelerator that produces a set time in 4 hours. Provide a rheofill or equivalent air entrainment to ensure flowability. Anchor pipes to ensure no movement or displacement by the flowable fill. Furnish paper type cylinder test molds.

ITEM 403. TEMPORARY SPECIAL SHORING

Use mats during placement and removal of temporary special shoring to avoid damage to the pavement structure.

Do not allow shoring to project more than 4-in above natural ground elevation unless otherwise approved.

ITEM 432. RIPRAP

Locations and quantities may be varied as directed by the Engineer to accommodate field conditions.

ITEM 462. CONCRETE BOX CULVERTS AND DRAINS

Provide Portland cement mortar joints between precast concrete box culverts and existing reinforced box culverts in accordance with Section 464.3., "Jointing."

Provide cast-in-place concrete box culverts.

Removal of existing wingwalls is subsidiary to Item 462.

If existing curb and wingwalls are left in place during cast-in-place culvert extensions, drill and epoxy 2 ft. long #6 bars halfway into the existing curb and wingwalls at 18-in. center to center spacing. This work is considered subsidiary to Item 462.

ITEM 464. REINFORCED CONCRETE PIPE

Removal of portions of the existing structure, including headwalls, safety end treatments, and pipe, is subsidiary to Item 464.

ITEM 465. JUNCTION BOXES, MANHOLES, AND INLETS

Paint all iron manhole rings and covers with galvanized paint.

Payment for precast elements and inlet extensions are included in the payment for Inlet (Compl).

ITEM 467. SAFETY END TREATMENT

Reshape embankment side slopes and provide embankment as required. Add mulch sod to achieve a smooth uniform finish around the installation of the safety end treatments and culvert extensions as directed.

Removal of portions of the existing structure, including headwalls, safety end treatments, and pipe, is subsidiary to Item 467.

ITEM 496. REMOVING STRUCTURES

All materials removed under this Item are the property of the Contractor.

ITEM 502. BARRICADES, SIGNS, AND TRAFFIC HANDLING

The traffic control plan for this Contract consists of: the installation and maintenance of warning signs and other traffic control devices shown on the plans; specification data, which may be included in the general notes; applicable provisions of the Texas Manual on Uniform Traffic Control Devices (TMUTCD); traffic control plan sheets included on the plans; standard BC sheets; Compliant Work Zone Traffic Control Device List, and Item 502 of the standard specifications.

Use ground-mounted sign mounts with two posts for all temporary work zone signs unless otherwise directed.

Inspect and correct deficiencies each day throughout the duration of the Contract. In accordance with Article 502.4., “Payment,” no payment will be made for the month if the Contractor fails to provide or properly maintain signs and devices in compliance with Contract requirements.

Project Number: **Sheet 17E**

County: ANDERSON **Control:** 0520-08-071

Highway: SH 155

Temporary warning signs that are visible when conditions do not apply will be considered improper maintenance of signs.

Provide at least one employee on call nights and weekends (or any other time that work is not in progress) for maintenance of signs and traffic control devices. This employee must have an address and telephone number near the project, as approved. Notify the Engineer in writing of the name, address, and telephone number of this employee. The Engineer will furnish this information to local law enforcement officials.

In addition to providing a Contractor’s Responsible Person and a phone number for emergency contact, have an employee available to respond on the project for emergencies and for taking corrective measures within 30 minutes.

Sign all roads intersecting the project in accordance with current BC standards.

Refer to the traffic control plan sheets for traffic handling through the work area. Contractor may vary the signing arrangement and spacing as necessary to fit field conditions; however, any proposed changes in the traffic control plan must be approved before implementation.

When the sequence of work is shown on the plans, the Contractor may submit an alternate proposal for approval. Submit in writing all proposed variations and revisions.

High-visibility safety apparel is required for workers in accordance with the General Notes on current BC standards.

Place and maintain signs, channelizing devices, and flaggers to direct and route traffic at any location and for any period of time as may be required or directed.

When operations require a lane closure, provide cones, vertical panels, drums, signs, flaggers, and flashing arrow panels as necessary to route traffic around the closed lane as shown on the plans and as directed. Lane closures will be limited to one specific lane as directed.

Lane closures will not be allowed before 8 A.M. unless otherwise directed.

Unless otherwise approved, lane closures for minor or major construction operations will not be allowed on Good Friday, Easter weekend, Memorial Day, Memorial Day weekend, July 4th, Labor Day, Labor Day weekend, Thanksgiving Day thru Sunday, Christmas Eve, Christmas Day, New Year’s Eve, New Year’s Day, or on any other high traffic days or holidays as determined.

Maintain existing roadside signs within this project’s limits during this Contract. In order to accommodate the grading or other operations, temporarily relocate these signs in accordance with the TMUTCD as directed. Use ground-mounted sign mounts with two posts for all

relocated signs unless otherwise directed. This work will not be paid for directly, but will be subsidiary to Item 502.

Provide truck-mounted attenuators (TMA) as shown on the appropriate traffic control plan sheets. Provide a letter certifying that all TMA used on this project meet NCHRP 350 or AASHTO Manual for Assessing Safety Hardware (MASH) requirements.

Regulate all construction activities and equipment to minimize inconvenience to the traveling public. At points where it is necessary for trucks to stop, load, or unload, provide warning signs and flaggers to protect the traveling public.

The pavement must be entirely open to traffic each night. Remove or clearly barricade all material stockpiles, equipment left overnight, or any obstruction within 30 ft. of a travelway as approved.

The Contractor Force Account "Safety Contingency" is intended to be used for work zone enhancements that could not be foreseen in the project planning and design stage for the purpose of improving 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 it does not slow the implementation of enhancement.

Provide flaggers at county roads, commercial driveways, and other intersecting roadways deemed necessary by the Engineer to maintain control of the work zone during one-lane two-way operations. Provide communication radios to each flagger in the work zone and the pilot vehicle operator.

When a culvert extension, inlet construction, or safety end treatment, etc. is within 30 ft. of a travel lane, delineate these areas as shown on current BC standards. In addition, provide a 4-ft. high plastic construction fence at or around any structure or obstruction that would be a hazard to pedestrians unless otherwise approved. Erect fence using a minimum of 4-T-posts, one at each corner of the structure or obstruction.

Where there is excavation adjacent to the pavement edge, provide adequate warning signs, vertical panels, drums, and lights at the pavement edge as directed. Treat pavement drop-offs created by ACP operations in a similar manner in accordance with the details shown on the plans.

Furnish and install work zone/reduce speed ahead and work zone/speed limit signs in accordance with current BC standards at locations as established by the Engineer. Signs must be ground-mounted.

Project Number: **Sheet 17F**

County: ANDERSON **Control:** 0520-08-071

Highway: SH 155

Provide work zone speed limit signs that meet sizing requirements in accordance with Table 2B-1 of the TMUTCD.

When excavation is required next to a travel lane carrying traffic and widening is not completed by the end of the day's operation, place sufficient backfill against the edge of the travel lane in order to provide a 3:1 slope, unless otherwise permitted on the plans. Provide backfill containing a durable crushed stone type of flexible base or other materials as approved. When work resumes on this excavated area, carefully remove and dispose of the backfill material. Materials and labor for this work will not be paid for directly, but will be subsidiary to the various bid items of the Contract.

Refer to the traffic control details for surfacing operations shown on the plans. Install signs as required by this standard or plan sheet. Keep signs in place until after completion of the surface course operation and until placement of the standard pavement markings. Place standard pavement markings within 7 days of surface treatment application. The placement of acceptable permanent pavement markings and the completion of the final cleanup will be considered a part of the surface course operation. These signs are in addition to the signs and barricades that may be required on standard BC sheets. Short-term stationary/short duration portable signs will be required during the removal of the temporary pavement markings.

Provide a pilot vehicle.

Do not perform base widening on both sides of the roadway simultaneously.

The Contractor and the Engineer should agree on the allowable length of roadway sections for scarifying and reshaping the existing base and hauling base material. Provide qualified flaggers at each end of the section being processed to instruct and direct the traveling public.

Prior to beginning work, the Contractor and Engineer must agree on the allowable length of lane closure.

Restrict movement of construction equipment and haul trucks to all paved surfaces. Do not allow construction equipment and haul trucks to cross the median unless specifically authorized. Use entrance and exit ramps for ingress and egress to the mainlanes.

During ACP operations, provide and place additional cones at the required spacing in order to close the continuous left turn lane when an inside lane closure is in place.

The use of Law Enforcement Officers (LEOs) will be required for this project. Before the preconstruction meeting, coordinate with local agencies to be prepared for staffing needs.

Provide uniformed LEOs with marked vehicles during work zone activities. The officer in marked vehicle will be located as approved to monitor or direct traffic during the closure. The

Engineer will approve the method used to direct traffic at signalized intersections. Additional officers and vehicles may be provided when directed.

Complete the daily tracking form provided by the Department and submit invoices that agree with the tracking form for payment at the end of each month approved services were provided. Minimums, scheduling fees, etc. will not be paid; TxDOT will consider paying cancellation fees on a case by case basis.

All law enforcement personnel used in work zone traffic control must be trained for performing duties in work zones and are required to take "Safe and Effective Use of Law Enforcement Personnel in Work Zones" (Course #133119) which can be found online at the following site: www.nhi.fhwa.dot.gov.

Certificates of completion should be available to all who finish the course. These should be kept by the officers to verify completion when reporting to the work site.

Provide the Engineer 72-hour notice of lane or ramp closures to provide advance notice to the traveling public by way of media and for any dynamic message sign programing. Place Portable Changeable Message Signs (PCMS) at locations as directed a minimum of 3 days in advance of entrance ramp closures on the affected crossroad. These signs are to remain in place during the ramp closures.

All work required by these general notes, except as provided for by Item 502, will not be paid for directly, but will be subsidiary to Item 502 unless otherwise shown on the plans.

ITEM 504. FIELD OFFICE AND LABORATORY

Provide a facility at the asphalt concrete pavement plant for use by the Engineer as a laboratory. This is an existing requirement of Item 6, Article 5, "Plant Inspection and Testing," of the Standard Specifications. Provide a facility meeting the requirements of Item 504. At a minimum meet the requirements of 504.2.2.4, "Ty D Structure (Asphalt Mix Control Laboratory)" and 504.2.2.4.1, "Asphalt Content by Ignition Method." In addition, provide the following: At least one exterior door opening with a 48-in. minimum width. If steps are required to gain access to the facility's 48-in. door, provide a landing dock with minimum dimensions of 60 in. wide by 60 in. deep. The strong floor and landing of the facility should support the weight of all equipment and personnel providing a stable, essentially zero deflection during testing operations, acceptable to the Engineer. This facility will be required of all projects with plant produced asphalt concrete pavement.

No direct payment will be made for Engineer field labs. All construction, maintenance, utilities, custodial services, security, and permits necessary to establish and maintain readiness of this facility is the responsibility of the Contractor. This building/facility is required by the standard

Project Number: **Sheet 17G**

County: ANDERSON **Control:** 0520-08-071

Highway: SH 155

specifications and is considered a standard part of any asphalt concrete pavement plant producing materials for Department projects.

Furnish a Superpave Gyratory Compactor calibrated in accordance with Tex-241-F for molding production samples. The Superpave Gyratory Compactor will not be paid for directly, but will be subsidiary to the asphalt concrete pavement Items of work.

ITEM 506. TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS

Remove dirt, silt, rocks, debris, and other foreign matter that accumulates in all structures due to project erosion and Contractor's operations. Keep stream channels open at all times. This work will not be paid for directly, but will be subsidiary to this Item.

The total disturbed area for this project is 4.9 acres. The disturbed area in this project, all project locations in the Contract, and Contractor project specific locations (PSLs) within 1 mile of the project limits for the Contract, will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. Obtain any required authorization from the TCEQ for any Contractor PSLs for the construction support activities on or off right of way. When the total area disturbed for all projects in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, before disturbance, provide a copy of the Contractor NOI for PSLs on the right of way to the Engineer (to the appropriate MS4 operator when on an off-State system route).

The Engineer will provide copies of documents to meet TxDOT's posting requirements. Laminate, post, and maintain these documents at the project limits and at major roadways intersecting the project as directed. Post required Contractor documents in the same manner and location. This work will be subsidiary to Item 506.

ITEM 540. METAL BEAM GUARD FENCE

Do not paint treated timber posts.

Use round wood posts on all metal beam guard fence except where steel posts are required in accordance with "Low Fill Culvert Post Mounting" details shown on standard sheet MBGF.

ITEMS 540 & 542. METAL BEAM GUARD FENCE & REMOVING METAL BEAM GUARD FENCE

Prior to removal of existing MBGF and associated appurtenances, submit to the Engineer for approval a work plan, including a detailed timeline, outlining removal and reinstallation of safety

features. It is the intent that the Contractor has the necessary materials and labor force available to reinstall the safety features prior to beginning the removal process.

Regardless of when the Contractor installs proposed MBGF, set the rail height to account for any subsequent surfacing work in order to be in accordance with standard MBGF upon completion of the Contract.

When replacing guard rail, ensure that all segments of guard rail removed are replaced the same work day before opening to traffic.

ITEM 542. REMOVING METAL BEAM GUARD FENCE

The Engineer will determine the metal beam guard fence to be salvaged and location of stockpile sites.

Removal of existing ACP mow strips is incidental to removal of the existing guard rail.

ITEM 545. CRASH CUSHION ATTENUATORS

Provide crash cushion attenuators meeting TL-3 requirements.

ITEM 585. RIDE QUALITY FOR PAVEMENT SURFACES

Use Surface Test Type B pay adjustment schedule 3 to evaluate ride quality of the travel lanes in accordance with Item 585, “Ride Quality for Pavement Surfaces.”

ITEM 636. SIGNS

Install signs in accordance with the Department of Transportation’s “Sign Crew Field Book,” latest edition, or as directed.

All signs removed from the project are deemed salvageable and become the property of the Department. Stockpile salvageable material at the Palestine Maintenance Section located at 4089 S SH 19, Palestine, TX, 75801.

ITEM 644. SMALL ROADSIDE SIGN ASSEMBLIES

Sign types for which details are not shown on the plans must conform to “Standard Highway Sign Designs for Texas,” latest edition.

Before construction begins, locate all Texas Reference Marker (TRM) signs and Adopt-a-Highway signs using survey control methods for accuracy. Provide the survey data to the

Project Number: **Sheet 17H**

County: ANDERSON **Control:** 0520-08-071

Highway: SH 155

Engineer. If either type of sign is relocated during construction activities, survey the sign location and notify the Engineer before placement of the permanent sign.

Stake all sign locations for approval prior to placement.

ITEM 658. DELINEATOR AND OBJECT MARKER ASSEMBLIES

Accept ownership of unsalvageable delineator and object marker assemblies and remove from the right of way.

ITEM 662. WORK ZONE PAVEMENT MARKINGS

For this project, Contractor may use paint and beads for work zone pavement markings (non-removable).

Dispose of all empty paint containers and unused paint in accordance with federal, state, and local requirements.

Do not use foil backed pavement markings as removable work zone pavement markings. Removable work zone pavement markings must be pliant polymer detour grade (removable) material or other markings that can be obliterated or removed to the satisfaction of the Engineer.

Use tape for short-term removable pavement markings on hot mix & PFC surfacing applications.

Tabs may be used before surface treatment application.

ITEM 666. RETROREFLECTORIZED PAVEMENT MARKINGS

Use the spray method for application of the thermoplastic compound for lane lines, barrier lines, edge lines and channelizing lines.

In high traffic volume areas, do not begin work before 9 A.M. and do not continue work after 4 P.M. unless otherwise approved. In other areas, the Engineer will approve and direct the time of work.

Extrude hot to the pavement surface thermoplastic compound for arrows, stop lines, yield triangles, transverse lines, crosswalk lines, words and symbols.

For lengths greater than 300-ft, provide guide markings that will not leave a permanent mark on the roadway. Have the guide marking material and equipment used for placement approved prior to use. Provide adequate notification for approval of the guide markings prior to placement of the permanent pavement markings.

Provide a crew experienced in the work of installing pilot guideline markings and in the necessary traffic control. Supply all the equipment, personnel, traffic control, and materials necessary for the placement of pilot guideline markings as directed. All work will be in conformance with Part 6 of the TMUTCD.

The Engineer will establish beginning and ending points of no passing zones.

Correct deficiencies in the alignment of pavement markings at Contractor's expense, as directed. Use a strip seal with aggregate and asphalt types and rates as directed to eliminate the deficient pavement markings.

Static lane closures are required for all profile stripe operations. These operations will require a pilot car for all two-lane roadways, unless otherwise directed.

ITEM 672. RAISED PAVEMENT MARKERS

Provide dispensing equipment such that the bituminous material can be directly applied from the melting pot to the pavement surface without secondary handling. Dispensing material from the melting pot into a separate container and then to the pavement surface will not be permitted. Intermittent agitation of the bituminous material will be by a method approved by the Engineer to ensure even heat distribution and must be such that the adhesive is agitated at approved and consistent intervals.

ITEM 677. ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS

Unless otherwise directed, utilize Surface Treatment Method for removal on asphaltic surfaces. The Engineer will approve materials and rates prior to use.

Furnish a high-pressure water blasting system for removing paint, thermoplastic, epoxy and preformed tape material from the following surfaces without causing any grooves or trenching of the surface: asphalt, concrete, permeable friction course, grooved asphalt and grooved concrete.

Use a high-pressure water blasting system that consists of a vacuum recovery system that must provide for a nearly dry surface eliminating the possibility of uncontained run-off blasting water or debris, or the need for any secondary clean-up vehicles or operations.

All components required for the complete operation of the water blasting system (ultra-high-pressure pump, vacuum system, clean water supply, vacuum recovery storage, primary truck-mounted and optional secondary tractor-mounted blasting components) must be mounted and transported on a single, fully self-contained and supporting single truck chassis, thereby eliminating the need for any additional water, vacuum or other transport vehicles.

Project Number: **Sheet 17I**

County: ANDERSON **Control:** 0520-08-071

Highway: SH 155

ITEM 3076. DENSE-GRADED HOT-MIX ASPHALT

When using crushed gravel as a coarse aggregate for ACP, use 1% lime as an antistripping agent.

Target laboratory molded density is 97%.

Provide coarse aggregate for the final surface course from the same source or blended sources unless otherwise directed.

Give the TxDOT inspector at the spreading and finishing machine one weight ticket for each load of material. When directed, weigh asphaltic concrete loads on public scales to ensure the proper weight of material.

Complete asphaltic concrete pavement base for both directions of travel before placing surface course unless otherwise directed.

For materials paid for by the ton, provide a summary spreadsheet in accordance with Article 520.2., "Equipment."

All RAP used on this project must be fractionated. If an existing mix design is submitted for use as Warm Mix Asphalt (WMA), then a new trial batch with passing Hamburg Wheel test results is required.

Use an electrical impedance (non-nuclear) measurement gauge to determine mat segregation and joint density for Part V and Part VIII of test procedure TEX-207-F. Do not use nuclear density gauges or thin lift gauges for segregation or joint density determinations. Data reporting for mat segregation and joint density must be performed on Department templates.

Apply a tack coat with a rate of 0.10 gal/sy of residual asphalt between each layer of ACP pavement unless otherwise directed.

ITEM 3077. SUPERPAVE MIXTURES

When using crushed gravel as a coarse aggregate for ACP, use 1% lime as an antistripping agent.

Provide coarse aggregate for the final surface course from the same source or blended sources unless otherwise directed.

Give the State inspector at the spreading and finishing machine one weight ticket for each load of material. When directed, weigh asphaltic concrete loads on public scales to ensure the proper weight of material.

For materials paid for by the ton, provide a summary spreadsheet in accordance with Article 520.2, “Equipment.”

Provide Class A coarse aggregate for the surface as listed in the Department’s *Bituminous Rated Source Quality Catalog* (BRSQC).

Use an electrical impedance (non-nuclear) measurement gauge to determine mat segregation and joint density for Part V and Part VIII of test procedure Tex-207-F. Do not use nuclear density gauges or thin lift gauges for segregation or joint density determinations. Data reporting for mat segregation and joint density must be performed on Department templates.

All RAP used on this project must be fractionated. If an existing mix design is submitted for use as Warm Mix Asphalt (WMA), then a new trial batch with passing Hamburg Wheel test results is required.

Apply a tack coat with a rate of 0.10 gal/sy of residual asphalt between each layer of ACP pavement unless otherwise directed.

On Table 1, under 3077.2.1.3, the Sand equivalent, % Min is voided and not replaced. The minimum percent for the sand equivalent must be 45 for the combined aggregate.

ITEM 6001. PORTABLE CHANGEABLE MESSAGE SIGN

Provide a non-erodible, stable surface to place the Portable Changeable Message Sign (PCMS) units adjacent to the roadway as directed. Payment for this surface is incidental to Item 6001.

ITEM 6185. TRUCK MOUNTED ATTENUATOR (TMA)

Shadow vehicles with truck mounted attenuator (TMA) are required on the traffic control plan and TCP standards for this project. The Contractor will be responsible for determining if one or more of these traffic control operations will be ongoing at the same time to determine the total number of TMAs needed for the project. Additional truck mounted attenuators (TMAs) may be required as deemed necessary by the Engineer.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0520-08-071 **DISTRICT** Tyler **COUNTY** Anderson
HIGHWAY SH 155

			CONTROL SECTION JOB		**0520-08-071**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00178594**		
			COUNTY		**Anderson**		
			HIGHWAY		**SH 155**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	4.000		4.000	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY	61.000		61.000	
	112-6001	SUBGRADE WIDENING (ORD COMP)	STA	101.400		101.400	
	132-6021	EMBANKMENT (VEHICLE)(ORD COMP)(TY C)	CY	1,459.000		1,459.000	
	134-6001	BACKFILL (TY A)	STA	201.400		201.400	
	150-6001	BLADING	STA	57.000		57.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	133,690.000		133,690.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)	SY	66,850.000		66,850.000	
	164-6054	BOND FBR MTRX SEED (PERM)(RURAL)(SAND)	SY	133,690.000		133,690.000	
	164-6055	BONDED FBR MTRX SEED (TEMP)(WARM)	SY	66,850.000		66,850.000	
	164-6056	BONDED FBR MTRX SEED (TEMP)(COOL)	SY	66,850.000		66,850.000	
	168-6001	VEGETATIVE WATERING	MG	2,941.000		2,941.000	
	316-6406	ASPH (AC-20XP, AC-10-2TR, OR AC-20-5TR)	GAL	332,490.000		332,490.000	
	316-6407	AGGR (TY-PD GR-3 OR TY-PL GR-3)	CY	7,916.000		7,916.000	
	351-6019	FLEXIBLE PAVEMENT STRUCTURE REPAIR(3")	SY	12,000.000		12,000.000	
	354-6041	PLANE ASPH CONC PAV (1.5")	SY	3,976.000		3,976.000	
	354-6051	PLANE ASPH CONC PAV (0" TO 1 1/2")	SY	13,932.000		13,932.000	
	401-6001	FLOWABLE BACKFILL	CY	30.000		30.000	
	403-6001	TEMPORARY SPL SHORING	SF	1,620.000		1,620.000	
	420-6071	CL C CONC (COLLAR)	EA	2.000		2.000	
	420-6077	CL E CONC (SEAL SLAB)(NON-REINF)	CY	2.000		2.000	
	432-6033	RIPRAP (STONE PROTECTION)(18 IN)	CY	900.000		900.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	537.000		537.000	
	438-6002	CLEANING AND SEALING EXIST JOINTS(CL3)	LF	1,520.000		1,520.000	
	451-6019	RETROFIT RAIL (TY T631)	LF	668.000		668.000	
	462-6031	CONC BOX CULV (10 FT X 7 FT)	LF	8.000		8.000	
	464-6003	RC PIPE (CL III)(18 IN)	LF	1,520.000		1,520.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	464.000		464.000	
	464-6007	RC PIPE (CL III)(30 IN)	LF	8.000		8.000	
	464-6008	RC PIPE (CL III)(36 IN)	LF	6.000		6.000	
	466-6185	WINGWALL (PW - 2) (HW=10 FT)	EA	1.000		1.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	92.000		92.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	22.000		22.000	
	467-6417	SET (TY II) (30 IN) (RCP) (3: 1) (C)	EA	1.000		1.000	
	467-6448	SET (TY II) (36 IN) (RCP) (3: 1) (C)	EA	1.000		1.000	
	496-6016	REMOV STR (PIPE)	EA	54.000		54.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0520-08-071 **DISTRICT** Tyler **COUNTY** Anderson
HIGHWAY SH 155

			CONTROL SECTION JOB		**0520-08-071**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00178594**		
			COUNTY		**Anderson**		
			HIGHWAY		**SH 155**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	12.000		12.000	
	506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	240.000		240.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	240.000		240.000	
	506-6029	EARTHWORK (EROSN & SEDMT CONT, IN VEH)	CY	100.000		100.000	
	506-6030	BACKHOE WORK (EROSION & SEDMT CONT)	HR	40.000		40.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	14,520.000		14,520.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	14,520.000		14,520.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	400.000		400.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	400.000		400.000	
	506-6046	TRACKHOE WORK (EROSION & SEDMT CONT)	HR	40.000		40.000	
	530-6002	INTERSECTIONS (ACP)	SY	374.000		374.000	
	530-6005	DRIVEWAYS (ACP)	SY	2,700.000		2,700.000	
	530-6017	DRIVEWAYS (CONC) (HES)	SY	61.000		61.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	263,340.000		263,340.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	7,950.000		7,950.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	14.000		14.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	7,500.000		7,500.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA	5.000		5.000	
	542-6004	RM MTL BM GD FENCE TRANS (THRIE-BEAM)	EA	18.000		18.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	32.000		32.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	23.000		23.000	
	644-6060	IN SM RD SN SUP&AM TYTWT(1)WS(P)	EA	18.000		18.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	16.000		16.000	
	658-6061	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2	EA	78.000		78.000	
	658-6064	INSTL DEL ASSM (D-SY)SZ 1(BRF)GF2	EA	43.000		43.000	
	658-6099	INSTL OM ASSM (OM-2Z)(WFLX)GND	EA	4.000		4.000	
	662-6001	WK ZN PAV MRK NON-REMOV (W)4"(BRK)	LF	50,590.000		50,590.000	
	662-6004	WK ZN PAV MRK NON-REMOV (W)4"(SLD)	LF	139,610.000		139,610.000	
	662-6010	WK ZN PAV MRK NON-REMOV (W)8"(DOT)	LF	525.000		525.000	
	662-6012	WK ZN PAV MRK NON-REMOV (W)8"(SLD)	LF	41,940.000		41,940.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	710.000		710.000	
	662-6034	WK ZN PAV MRK NON-REMOV (Y)4"(SLD)	LF	138,320.000		138,320.000	
	662-6060	WK ZN PAV MRK REMOV (W)4"(BRK)	LF	22,400.000		22,400.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	710.000		710.000	
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	10,471.000		10,471.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	3,490.000		3,490.000	
	666-6030	REFL PAV MRK TY I (W)8"(DOT)(100MIL)	LF	525.000		525.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0520-08-071 **DISTRICT** Tyler **COUNTY** Anderson
HIGHWAY SH 155

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0520-08-071**			
		PROJECT ID		**A00178594**			
		COUNTY		**Anderson**			
		HIGHWAY		**SH 155**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	41,940.000		41,940.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	710.000		710.000	
	666-6300	RE PM W/RET REQ TY I (W)4"(BRK)(100MIL)	LF	50,590.000		50,590.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	139,610.000		139,610.000	
	666-6312	RE PM W/RET REQ TY I (Y)4"(BRK)(100MIL)	LF	660.000		660.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	138,320.000		138,320.000	
	666-6342	REF PROF PAV MRK TY I(W)4"(SLD)(100MIL)	LF	65,360.000		65,360.000	
	666-6345	REF PROF PAV MRK TY I(Y)4"(SLD)(100MIL)	LF	59,750.000		59,750.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	210.000		210.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA	208.000		208.000	
	668-6092	PREFAB PAV MRK TY C (W) (36")(YLD TRI)	EA	950.000		950.000	
	668-6101	PREFAB PAV MRK TY C (Y) (4") (SLD)	LF	2,856.000		2,856.000	
	672-6006	REFL PAV MRKR TY I-A	EA	264.000		264.000	
	672-6007	REFL PAV MRKR TY I-C	EA	2,113.000		2,113.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	102.000		102.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	2,464.000		2,464.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	3,540.000		3,540.000	
	3076-6071	D-GR HMA TY-D PG 64-22 (EXEMPT)	TON	1,014.000		1,014.000	
	3077-6001	SP MIXESSP-BPG64-22	TON	2,806.000		2,806.000	
	3077-6075	TACK COAT	GAL	1,366.000		1,366.000	
	3079-6007	PFC-C (PG76 MIX) SAC-A	TON	56,769.000		56,769.000	
	3079-6023	TACK COAT	GAL	75,692.000		75,692.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	3.000		3.000	
	6185-6002	TMA (STATIONARY)	DAY	147.000		147.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	31.000		31.000	
	08	CONTRACTOR FORCE ACCOUNT SAFETY CONTINGENCY (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT EROSION CONTROL MAINTENANCE (NON-PARTICIPATING)	LS	1.000		1.000	
		CONTRACTOR FORCE ACCOUNT LAW ENFORCEMENT (NON-PARTICIPATING)	LS	1.000		1.000	

BASIS OF ESTIMATE

	ITEM	DESCRIPTION	RATE	DESIGN QUANTITY	DESIGN UNIT	PAY QUANTITY	PAY UNIT
[1]	166	FERTILIZER	1 LB/9 SY	66850	SY	3.71	TON
	168	VEGETATIVE WATERING	11 GAL/SY	267380	SY	2941	MG
[2]	314	EMULS ASPH (EROSN CONT)(CSS-1)	0.15 GAL/SY	13520	SY	2028	GAL
	316	ASPH (AC-20XP, AC-10-2TR, OR AC-20-5TR)	0.42 GAL/SY	791644	SY	332490	GAL
	316	AGGR (TY-PD GR-3 OR TY-PL GR-3)	1 CY/100 SY	791644	SY	7916	CY
	3079	PFC-C (PG76 MIX) SAC-A	150 LB/SY	756923	SY	56769	TON
	3079	TACK COAT	0.10 GAL/SY	756923	SY	75692	GAL
	3076	D-GR HMA TY-D PG 64-22 (EXEMPT)	220 LB/SY	9220	SY	1014	TON
[3]	3077	SP MIXES SP-B PG 64-22	1265 LB/SY	4436	SY	2806	TON
	3077	TACK COAT	0.10 GAL/SY	13656	SY	1366	GAL
	500	MOBILIZATION			LS	1	LS
	502	BARRICADES, SIGNS AND TRAFFIC HANDLING			MO	12	MO

[1] CONTRACTOR INFORMATION ONLY, SUBSIDIARY TO ITEM 164.
[2] CONTRACTOR INFORMATION ONLY, SUBSIDIARY TO ITEM 134.
[3] RATE AUGMENTED TO ACCOUNT FOR TAPERED EDGE.

PREP ROW

LOCATION FROM	LOCATION TO	DESCRIPTION	ITEM 100 PREPARING ROW STA
1027+50 LT	1031+50 LT	AT DITCH WITH RIPRAP STONE PROTECTION	4
PROJECT TOTAL			4

TRUCK MOUNTED ATTENUATORS

NUMBER OF TRUCKS	LOCATION	ITEM 6185 TMA (STATIONARY) DAYS	ITEM 6185 TMA (MOBILE OPERATION) DAYS
1	TCP OPERATIONS	147	
1	MOBILE OPERATIONS		31
PROJECT TOTAL		147	31

PORTABLE CHANGEABLE MESSAGE SIGN

SIGN	LOCATION	ITEM 6001 PORTABLE CHANGEABLE MESSAGE SIGN EACH
SH 155	TO BE LOCATED AS DIRECTED BY THE ENGINEER	3
PROJECT TOTAL		3

RIPRAP SUMMARY

LOCATION	ITEM 432 RIPRAP (MOW STRIP) (4 IN) CY	ITEM 432 RIPRAP (STONE PROTECTION) (18 IN) CY
FROM MBGF	537	
FROM CULVERT SUMMARY		900
PROJECT TOTALS	537	900

BACKFILL SUMMARY

FROM STA	TO STA	LOCATION	ITEM 134 BACKFILL (TY A) STA	ITEM 314 [1] EMULS ASPH (EROSN CONT) (CSS-1) SY
649+15	715+73	EDGE TREATMENT	66.58	8877
925+00	959+82	EDGE TREATMENT	34.82	4643
		AS DIRECTED	100.00	
PROJECT TOTAL			201.40	13520

[1] FOR INFORMATION ONLY, SUBSIDIARY TO ITEM 134.

GRADING SUMMARY

LOCATION	ITEM 112 SUBGRADE WIDENING (ORD COMP) STA	ITEM 132 EMBANKMENT (VEHICLE) (ORD COMP) (TY C) CY	ITEM 150 BLADING STA
EDGE TREATMENT	101.40		
FROM MBGF		1349	
FROM CULVERTS		110	
AT DRIVEWAYS			57
PROJECT TOTAL	101.40	1459	57

SH 155
QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		19

DATE: 3/8/2022 1:39:24 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH155_GEN_SUM.dgn

CK:
DW:
CK:
DN:

ROADWAY SUMMARY

FROM STA	TO STA	REMARKS	LENGTH FT	WIDTH FT	ITEM 354 PLANE ASPH CONC PAV 0"-1.5" SY	ITEM 354 PLANE ASPH CONC PAV 1.5" SY	ITEM 351 FLEXIBLE PAVEMENT STRUCTURE REPAIR (3") SY
159+60	161+10	VERTICAL TRANSITION	150	84	1400		
161+10	171+70		1060	84			
171+70	173+20	CADDO CREEK TRANSITION	150	84	1400		
173+20	176+80	CADDO CREEK BRIDGE	360	84			
176+80	178+30	CADDO CREEK TRANSITION	150	84	1400		
178+30	186+50		820	84			
186+50	189+85		335	80 AVG			
189+85	253+85		6400	76			
253+85	258+48		463	72 AVG			
258+48	544+85		28637	67			
544+85	547+28		243	77 AVG			
548+02	549+52	BRUSHY CREEK BRIDGE TRANSITION (NB)	150	38	633		
547+28	548+78	BRUSHY CREEK BRIDGE TRANSITION (SB)	150	48	800		
549+52	552+82	BRUSHY CREEK BRIDGE (NB)	330	38			
548+78	552+78	BRUSHY CREEK BRIDGE (SB)	400	48			
552+82	554+32	BRUSHY CREEK BRIDGE TRANSITION (NB)	150	38	633		
552+78	554+28	BRUSHY CREEK BRIDGE TRANSITION (SB)	150	48	800		
554+32	560+20		588	77 AVG			
560+20	649+15		8895	67			
649+15	679+25		3010	65 AVG			
679+25	712+00		3275	63			
712+00	714+24		224	75 AVG			
714+24	715+74	WALNUT CREEK BRIDGE TRANSITION (NB)	150	38	633		
714+23	715+73	WALNUT CREEK BRIDGE TRANSITION (SB)	150	48	800		
715+74	717+24	WALNUT CREEK BRIDGE (NB)	150	38		633	
715+73	717+25	WALNUT CREEK BRIDGE (SB)	152	48		811	
717+24	718+74	WALNUT CREEK BRIDGE TRANSITION (NB)	150	38	633		
717+25	718+75	WALNUT CREEK BRIDGE TRANSITION (SB)	150	48	800		
718+75	720+65		190	75 AVG			
720+65	925+00		20435	63			
925+00	931+80		680	62 AVG			
931+80	957+35		2555	61			
957+35	959+89		254	73 AVG			
958+32	959+82	MOUND PRAIRIE CREEK BRIDGE TRANSITION (NB)	150	48	800		
958+39	959+89	MOUND PRAIRIE CREEK BRIDGE TRANSITION (SB)	150	36	600		
959+82	962+52	MOUND PRAIRIE CREEK BRIDGE (NB)	270	48		1440	
959+89	962+62	MOUND PRAIRIE CREEK BRIDGE (SB)	273	36		1092	
962+52	964+02	MOUND PRAIRIE CREEK BRIDGE TRANSITION (NB)	150	48	800		
962+62	964+12	MOUND PRAIRIE CREEK BRIDGE TRANSITION (SB)	150	36	600		
964+12	965+60		148	78 AVG			
965+60	1170+50		20490	72			
1170+50	1172+00	VERTICAL TRANSITION	150	72	1200		
159+60	1172+00	AS DIRECTED					12000
PROJECT TOTAL					**13932**	**3976**	**12000**

DATE: 1/12/2022 2:05:35 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH155_GEN_SUM.dgn

SH 155
QUANTITY SUMMARY

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		20

CK:
DW:
CK:
DN:

TABULATION OF SURFACE AREAS

FROM	TO	LENGTH	PROPOSED OCST WIDTH	PROPOSED PFC WIDTH	EDGE TREATMENT WIDTH	ITEM 112	ITEM 316	ITEM 3076	ITEM 3077		ITEM 3079		REMARKS
						[2] SUBGRADE WIDENING (ORD COMP)	[1] OCST	[1] D-GR HMA TY-D PG 64-22 (EXEMPT)	[1] SP MIXES SP-B PG 64-22	[1] TACK COAT	[1] PFC 1.5"	[1] PFC TACK COAT	
STA	STA	FT	FT	FT	FT	STA	SY	SY	SY	SY	SY	SY	
159+60	173+20	1360	84	70			12693				10578	10578	BEGINNING OF PROJECT
173+20	173+40	20											CADDO CREEK BRIDGE
173+40	176+60	320											CADDO CREEK BRIDGE
176+60	176+80	20											CADDO CREEK BRIDGE
176+80	186+50	970	84	70			9053				7544	7544	
186+50	189+85	335	73 AVG	70			2717				2606	2606	
189+85	253+85	6400	62	60			44089				42667	42667	
253+85	258+48	463	61 AVG	59 AVG			3138				3035	3035	
258+48	544+85	28637	60	58			190913				184550	184550	
544+85	548+78	393	73 AVG	72 AVG			3188				3144	3144	
549+52	552+82	330											BRUSHY CREEK BRIDGE NB
548+78	552+78	400											BRUSHY CREEK BRIDGE SB
552+82	560+20	738	73 AVG	72 AVG			5986				5904	5904	
560+20	649+15	8895	60	58			59300				57323	57323	
649+15	679+25	3010	60	58	2.5 AVG	30.10	20067		836	836	19398	19398	EDGE TREATMENT
679+25	712+00	3275	60	58	5.0	32.75	21833		1819	1819	21106	21106	EDGE TREATMENT
712+00	715+73	373	73 AVG	72 AVG	2.5 AVG	3.73	3025		104	104	2984	2984	EDGE TREATMENT
715+74	717+24	150	48	48			800				800	800	WALNUT CREEK BRIDGE NB
715+73	717+25	152	38	38			642				642	642	WALNUT CREEK BRIDGE SB
717+25	720+65	340	35	72 AVG			1322				2720	2720	
720+65	925+00	20435	60	58			136233				131692	131692	
925+00	931+80	680	60	58	2.5 AVG	6.80	4533		189	189	4382	4382	EDGE TREATMENT
931+80	957+35	2555	60	58	5.0	25.55	17033		1419	1419	16466	16466	EDGE TREATMENT
957+35	959+82	247	73 AVG	72 AVG	2.5 AVG	2.47	2003		69	69	1976	1976	EDGE TREATMENT
959+82	962+52	270	48	48			1440				1440	1440	MOUND PRAIRIE CREEK BRIDGE NB
959+89	962+62	273	36	36			1092				1092	1092	MOUND PRAIRIE CREEK BRIDGE SB
962+62	965+60	298	73 AVG	72 AVG			2417				2384	2384	
965+60	1172+00	20640	62	60			142187				137600	137600	END OF PROJECT
FM 837		640	VARIES				2150						
FM 2267		640	VARIES				1960						
FM 321 (WEST)		640	VARIES				2000						
FM 321 (EAST)		640	VARIES				2150						
LEFT TURN LANES		VARIES	VARIES	VARIES			66330				63780	63780	
RIGHT TURN LANES		VARIES	VARIES	VARIES			6040				5800	5800	
CROSSOVERS		VARIES	VARIES	VARIES			25310				25310	25310	
COUNTY ROADS		VARIES	VARIES					9220		9220			
PROJECT TOTAL						**101.40**	**791644**	**9220**	**4436**	**13656**	**756923**	**756923**	

[1] QUANTITIES INCLUDED IN BASIS OF ESTIMATE.
[2] QUANTITIES INCLUDED IN GRADING SUMMARY.

SH 155
QUANTITY SUMMARY

Texas Department of Transportation
SHEET 3 OF 13

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		21

DATE: 3/8/2022 1:39:25 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH155_GEN_SUM.dgn

PERMANENT PAVEMENT MARKINGS SUMMARY

LOCATION	TYPE	RATE	ITEM 666									ITEM 668				ITEM 672				ITEM 677	ITEM 533
			RE PM W/ RET REQ TY I				REFL PAV MRK TY I			REFL PROF PAV MRK TY I		PREFAB PAV MRK TY C				REFL PAV MRKR				ELIM EXT PAV MRK & MRKS 4"	RUMBLE STRIPS (SHOULDER)
			WHITE		YELLOW		WHITE			WHITE	YELLOW	WHITE			YELLOW						
			4" (SLD) (100 MIL)	4" (BRK) (100 MIL)	4" (SLD) (100 MIL)	4" (BRK) (100 MIL)	8" (DOT) (100 MIL)	8" (SLD) (100 MIL)	24" (SLD) (100 MIL)	4" (SLD) (100 MIL)	4" (SLD) (100 MIL)	(ARROW)	(WORD)	36" (YLD TRI)	(4") (SLD)	TY I-A	TY I-C	TY II-A-A	TY II-C-R		
			LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	LF	EA	EA	EA	EA	LF	LF
STA 159+60 TO STA 1172+00																					
MAIN LANES	EDGE LINE	SOLID	134490		130590					65360	59750									3540	263340
MAIN LANES	CENTER LINE	SOLID			2610	660						2						66			
MAIN LANES	LANE LINE	10 FT/40 FT		50590													34		2464		
TURN LANES	EDGE	SOLID						41570				208	208				2080				
AUXILIARY LANES	LANE LINE	3 FT/12 FT					525														
FM 837	VARIES		1280		1280				44							66		9			
FM 2267	VARIES		1280		1280				38							66		9			
FM 321 WEST	VARIES		1280		1280			185	52							66		9			
FM 321 EAST	VARIES		1280		1280			185	36							66		9			
CROSSOVERS	VARIES													950	2856						
COUNTY ROADS	VARIES								540												
PROJECT TOTAL			**139610**	**50590**	**138320**	**660**	**525**	**41940**	**710**	**65360**	**59750**	**210**	**208**	**950**	**2856**	**264**	**2113**	**102**	**2464**	**3540**	**263340**

NOTE: FOR CONC PVT, ADD SURFACE PREP AND TY II MARKINGS FOR THE SEALER

WORK ZONE PAVEMENT MARKINGS SUMMARY

STATION		ITEM 662									
		WK ZN PAV MRK									
		NON-REMOV						SHT TERM (TAB)		REMOV	
		WHITE					YELLOW	WHITE	YELLOW	WHITE	
		4" (SLD)	4" (BRK)	8" (SLD)	8" (DOT)	24" (SLD)	4" (SLD)	TAB TY W	TAB TY Y-2	4" (BRK)	24" (SLD)
FROM	TO	LF	LF	LF	LF	LF	LF	EA	EA	LF	LF
159+60	1172+00	139610	50590	41940	525	710	138320	10471	3490	22400	710
PROJECT TOTAL		**139610**	**50590**	**41940**	**525**	**710**	**138320**	**10471**	**3490**	**22400**	**710**

SH 155
QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		22

DATE: 1/12/2022 2:05:36 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH155_GEN_SUM.dgn

DRIVEWAY & INTERSECTION SUMMARY (SHEET 1 OF 6)

LOCATION			DESCRIPTION OF EXISTING STRUCTURE	EXIST DRVWY TYPE	EXIST WIDTH	EXIST LENGTH	DISTANCE FROM PIPE TO EOP	ITEM 104	ITEM 354		ITEM 401	ITEM 464		ITEM 467		ITEM 496	ITEM 530		
STA					FT	FT	FT	REMOVING CONC (DRIVEWAYS) SY	[1] PLANE ASPH CONC PAV (3") (DRIVEWAY) SY	[1] PLANE ASPH CONC PAV (4") (INTERSECT) SY	FLOWABLE BACKFILL CY	RCP (CL III) (18 IN) LF	RCP (CL III) (24 IN) LF	SET (TY II) (18 IN) (RCP) (6: 1) (P) EA	SET (TY II) (24 IN) (RCP) (6: 1) (P) EA	REMOV STR (PIPE) EA	DRIVEWAYS (CONC) (HES) SY	DRIVEWAYS (ACP) SY	INTER-SECTIONS (ACP) SY
192+50	LT		NO WORK	ACP															
200+35	LT		NO WORK	GRAVEL															
204+50	LT	CR 3115	NO WORK	ACP															
212+10	LT		NO WORK	ACP															
221+30	LT	CR 3115	NO WORK	ACP															
225+60	LT		NO WORK	ACP															
238+25	LT		NO WORK	ACP															
250+15	LT		NO WORK	ACP															
252+00	LT		NO WORK	ACP															
256+20	LT		NO WORK	ACP															
259+75	LT		NO WORK	CONC															
268+35	LT		NO WORK	ACP															
271+25	LT		NO WORK	CONC															
301+85	LT		NO WORK	ACP															
303+50	LT		NO WORK	ACP															
310+10	LT		NO WORK	ACP															
311+20	LT		NO WORK	ACP															
314+00	LT	CR 318	NO WORK	ACP															
323+50	LT		NO WORK	ACP															
333+00	LT		NO WORK	ACP															
361+00	LT		NO WORK	ACP															
362+75	LT	CR 327	NO WORK	ACP															
372+50	LT		NO WORK	ACP															
395+25	LT		NO WORK	ACP															
397+20	LT		NO WORK	ACP															
397+75	LT		NO WORK	ACP															
418+50	LT	CR 327	NO WORK	ACP															
424+65	LT		NO WORK	ACP															
455+35	LT		NO WORK	ACP															
487+40	LT		NO WORK	ACP															
497+40	LT		NO WORK	ACP															
510+50	LT		NO WORK	ACP															
513+60	LT	PR 8155	NO WORK	ACP															
522+70	LT		NO WORK	ACP															
537+80	LT		NO WORK	ACP															
574+25	LT		NO WORK	ACP															
SUBTOTAL (1 OF 6)								0	0	0	0	0	0	0	0	0	0	0	0

[1] SUBSIDIARY TO ITEM 530. FOR CONTRACTOR'S INFORMATION ONLY.

SH 155
QUANTITY SUMMARY

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		23

DRIVEWAY & INTERSECTION SUMMARY (SHEET 2 OF 6)

LOCATION			DESCRIPTION OF EXISTING STRUCTURE	EXIST DRVWY TYPE	EXIST WIDTH	EXIST LENGTH	DISTANCE FROM PIPE TO EOP	ITEM 104	ITEM 354		ITEM 401	ITEM 464		ITEM 467		ITEM 496	ITEM 530		
STA					FT	FT	FT	REMOVING CONC (DRIVEWAYS) SY	[1] PLANE ASPH CONC PAV (3") (DRIVEWAY) SY	[1] PLANE ASPH CONC PAV (4") (INTERSECT) SY	FLOWABLE BACKFILL CY	RCP (CL III) (18 IN) LF	RCP (CL III) (24 IN) LF	SET (TY II) (18 IN) (RCP) (6: 1) (P) EA	SET (TY II) (24 IN) (RCP) (6: 1) (P) EA	REMOV STR (PIPE) EA	DRIVEWAYS (CONC) (HES) SY	DRIVEWAYS (ACP) SY	INTER-SECTIONS (ACP) SY
619+50	LT		NO WORK	GRAVEL															
638+75	LT	FM 2267	NO WORK	ACP															
669+75	LT		NO WORK	ACP															
673+95	LT		NO WORK	ACP															
729+20	LT		18 IN X 38 FT HDPE	DIRT	20	65	21		63			38		2		1		63	
760+35	LT		NO WORK	ACP															
768+35	LT		NO WORK	ACP															
804+25	LT		NO WORK	ACP															
811+85	LT	WALNUT POND RV PARK	NO WORK	ACP															
818+80	LT		NO WORK	ACP															
827+00	LT		18 IN X 32 FT CMP	DIRT	20	42	14		47			32		2		1		47	
839+00	LT		NO WORK	ACP															
843+25	LT		NO WORK	ACP															
850+50	LT	FM 321	NO WORK	ACP															
854+00			NO WORK	ACP															
859+15	LT		18 IN X 32 FT RCP	ACP	12	42	22		44			32		2		1		44	
865+00	LT		18 IN X 20 FT HDPE	DIRT	12	34	15		34			24		2		1		34	
880+00	LT		12 IN X 42 FT CMP	DIRT	22	32	19		63			42		2		1		63	
888+00	LT		NO WORK	ACP															
920+50	LT	CR 3495	NO WORK	ACP															
930+90	LT	CR 349	NO WORK	ACP															
968+00	LT		18 IN X 18 FT CMP	GRAVEL	12	44	27		50			18		2		1		50	
973+50	LT		18 IN X 28 FT RCP	DIRT	16	52	14		40			28		2		1		40	
990+00	LT		18 IN X 32 FT CMP	ACP	14	52	22		49			32		2		1		49	
993+00	LT		15 IN X 32 FT CMP	DIRT	16	35	18		47			32		2		1		47	
1008+75	LT	CR 359	NO WORK	ACP															
1013+20	LT		NO PIPE	ACP	16	38	18		47			24		2				47	
1036+85	LT		18 IN X 24 FT RCP	ACP	12	44	11		29			24		2		1		29	
1044+00	LT		NO WORK	ACP															
1052+75	LT		18 IN X 20 FT CMP	ACP	12	50	14		33			24		2		1		33	
1054+60	LT		BURIED PIPE	ACP	14	50	14		36			24		2		1		36	
1058+50	LT	CR 3591	NO WORK	ACP															
1063+00	LT		NO WORK	ACP															
1084+00	LT		NO WORK	ACP															
1093+75	LT	CR 362	NO WORK	ACP															
1098+60	LT	CR 364	NO WORK	ACP															
SUBTOTAL (2 OF 6)								**0**	**582**	**0**	**0**	**374**	**0**	**26**	**0**	**12**	**0**	**582**	**0**

[1] SUBSIDIARY TO ITEM 530. FOR CONTRACTOR'S INFORMATION ONLY.

SH 155
QUANTITY SUMMARY

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		24

DATE: 1/12/2022 2:05:38 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH155_GEN_SUM.dgn

CK1: DW1: CK2: DN1:

DRIVEWAY & INTERSECTION SUMMARY (SHEET 3 OF 6)

LOCATION	DESCRIPTION OF EXISTING STRUCTURE	EXIST DRVWY TYPE	EXIST WIDTH	EXIST LENGTH	DISTANCE FROM PIPE TO EOP	ITEM 104	ITEM 354		ITEM 401	ITEM 464		ITEM 467		ITEM 496	ITEM 530		
						REMOVING CONC (DRIVEWAYS)	[1] PLANE ASPH CONC PAV (3") (DRIVEWAY)	[1] PLANE ASPH CONC PAV (4") (INTERSECT)	FLOWABLE BACKFILL	RCP (CL III) (18 IN)	RCP (CL III) (24 IN)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	SET (TY II) (24 IN) (RCP) (6: 1) (P)	REMOV STR (PIPE)	DRIVEWAYS (CONC) (HES)	DRIVEWAYS (ACP)	INTER-SECTIONS (ACP)
STA			FT	FT	FT	SY	SY	SY	CY	LF	LF	EA	EA	EA	SY	SY	SY
1102+00 LT CR 366	18 IN X 48 FT CMP	ACP	20	70	48			123	5	48		2		1			123
1109+00 LT	NO WORK	ACP															
1110+20 LT	18 IN X 46 FT CMP	ACP	22	60	14		51			48		2		1		51	
1112+40 LT	18 IN X 48 FT CMP	ACP	18	52	12		40			48		2		1		40	
1116+65 LT	18 IN X 22 FT CMP	ACP	12	56	11		29			24		2		1		29	
1117+60 LT CR 359	NO WORK	ACP															
1118+40 LT CR 359	NO WORK	ACP															
1119+25 LT	NO WORK	ACP															
1121+00 LT	NO PIPE	ACP	30	72	18		78			40		2				78	
1127+00 LT	NO WORK	ACP															
1133+50 LT	NO WORK	ACP															
1135+15 LT	NO WORK	ACP															
1136+25 LT	15 IN X 32 FT RCP	ACP	14	40	14		36			32		2		1		36	
1138+40 LT	15 IN X 24 FT RCP	ACP	14	40	14		36			24		2		1		36	
1143+80 LT	NO WORK	ACP															
1146+00 LT	NO WORK	ACP															
1147+75 LT	18 IN X 28 FT CMP	ACP	24	42	11		46			28		2		1		46	
1148+35 LT	12 IN X 44 FT HDPE	ACP	24	42	11		46			96		2		1		46	
1148+90 LT	12 IN X 44 FT CMP	ACP	32	42	12		61							1		61	
1149+75 LT	12 IN X 68 FT CMP	ACP	46	42	14		93			72		2		1		93	
1152+15 LT	18 IN X 28 FT CMP	ACP	14	32	13	61				28		2		1	61		
1153+65 LT	24 IN X 60 FT CMP	ACP	20	44	14		47				64		2	1		47	
1156+00 LT	24 IN X 58 FT RCP	ACP	30	43	16		72				64		2	1		72	
1158+15 LT	24 IN X 62 FT RCP	ACP	28	48	16		68				64		2	1		68	
1159+60 LT	24 IN X 46 FT CMP	ACP	16	52	9		31				48		2	1		31	
1161+30 LT	24 IN X 32 FT CMP	ACP	14	52	14		36				32		2	1		36	
SUBTOTAL (3 OF 6)						**61**	**770**	**123**	**5**	**488**	**272**	**22**	**10**	**16**	**61**	**770**	**123**

[1] SUBSIDIARY TO ITEM 530. FOR CONTRACTOR'S INFORMATION ONLY.

SH 155
QUANTITY SUMMARY

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		25

DATE: 1/12/2022 2:05:38 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH155_GEN_SUM.dgn

DRIVEWAY & INTERSECTION SUMMARY (SHEET 4 OF 6)

LOCATION			DESCRIPTION OF EXISTING STRUCTURE	EXIST DRVWY TYPE	EXIST WIDTH	EXIST LENGTH	DISTANCE FROM PIPE TO EOP	ITEM 104	ITEM 354		ITEM 401	ITEM 464		ITEM 467		ITEM 496	ITEM 530		
STA					FT	FT	FT	REMOVING CONC (DRIVEWAYS) SY	[1] PLANE ASPH CONC PAV (3") (DRIVEWAY) SY	[1] PLANE ASPH CONC PAV (4") (INTERSECT) SY	FLOWABLE BACKFILL CY	RCP (CL III) (18 IN) LF	RCP (CL III) (24 IN) LF	SET (TY II) (18 IN) (RCP) (6: 1) (P) EA	SET (TY II) (24 IN) (RCP) (6: 1) (P) EA	REMOV STR (PIPE) EA	DRIVEWAYS (CONC) (HES) SY	DRIVEWAYS (ACP) SY	INTER-SECTIONS (ACP) SY
194+15	RT		NO WORK	ACP															
196+30	RT	CR 3112	NO WORK	ACP															
203+60	RT		NO WORK	ACP															
205+50	RT		NO WORK	ACP															
208+00	RT		NO WORK	ACP															
209+10	RT		NO WORK	ACP															
212+60	RT		NO WORK	ACP															
223+50	RT	FM 837	NO WORK	ACP															
249+35	RT		NO WORK	ACP															
276+00	RT		NO WORK	ACP															
277+20	RT		NO WORK	ACP															
302+50	RT		NO WORK	ACP															
315+40	RT	CR 318	NO WORK	ACP															
323+85	RT		NO WORK	ACP															
326+25	RT		NO WORK	ACP															
347+50	RT	CR 327	NO WORK	ACP															
357+00	RT		NO WORK	ACP															
363+00	RT		NO WORK	ACP															
367+35	RT		NO WORK	ACP															
374+00	RT		NO WORK	ACP															
395+10	RT		NO WORK	ACP															
409+35	RT		NO WORK	ACP															
418+30	RT		NO WORK	ACP															
439+20	RT		NO WORK	ACP															
467+25	RT		NO WORK	ACP															
478+00	RT	CR 319	NO WORK	ACP															
479+80	RT		NO WORK	ACP															
486+25	RT	CR 332	NO WORK	ACP															
488+35	RT		NO WORK	ACP															
499+50	RT		NO WORK	ACP															
520+85	RT		NO WORK	ACP															
533+85	RT		NO WORK	ACP															
537+40	RT		NO WORK	ACP															
566+75	RT		NO WORK	ACP															
574+50	RT		NO WORK	ACP															
586+25	RT	CR 436	NO WORK	ACP															
SUBTOTAL (4 OF 6)								0	0	0	0	0	0	0	0	0	0	0	0

[1] SUBSIDIARY TO ITEM 530. FOR CONTRACTOR'S INFORMATION ONLY.

SH 155
QUANTITY SUMMARY

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		26

DRIVEWAY & INTERSECTION SUMMARY (SHEET 5 OF 6)

LOCATION STA			DESCRIPTION OF EXISTING STRUCTURE	EXIST DRVWY TYPE	EXIST WIDTH FT	EXIST LENGTH FT	DISTANCE FROM PIPE TO EOP FT	ITEM 104 REMOVING CONC (DRIVEWAYS) SY	ITEM 354 [1] PLANE ASPH CONC PAV (3") (DRIVEWAY) SY	ITEM 354 [1] PLANE ASPH CONC PAV (4") (INTERSECT) SY	ITEM 401 FLOWABLE BACKFILL CY	ITEM 464 RCP (CL III) (18 IN) LF	ITEM 464 RCP (CL III) (24 IN) LF	ITEM 467 SET (TY II) (18 IN) (RCP) (6: 1) (P) EA	ITEM 467 SET (TY II) (24 IN) (RCP) (6: 1) (P) EA	ITEM 496 REMOV STR (PIPE) EA	ITEM 530 DRIVEWAYS (CONC) (HES) SY	ITEM 530 DRIVEWAYS (ACP) SY	ITEM 530 INTER-SECTIONS (ACP) SY
638+30	RT		NO WORK	ACP															
642+25	RT		NO WORK	ACP															
662+00	RT		NO WORK	ACP															
670+00	RT		NO WORK	ACP															
676+15	RT		NO WORK	ACP															
676+15	RT		18 IN X 26 FT CMP	ACP	16	54	24		58			28		2		1		58	
681+00	RT		NO WORK	ACP															
684+50	RT		NO WORK	ACP															
686+90	RT		NO WORK	ACP															
690+35	RT		NO WORK	ACP															
713+75	RT		NO WORK	ACP															
747+75	RT	CR 434	NO WORK	ACP															
769+85	RT	CR 434	NO WORK	ACP															
787+75	RT		NO WORK	ACP															
789+65	RT		NO WORK	ACP															
800+15	RT		15 IN X 88 FT RCP	ACP	16	88	20		51			28		2		1		51	
803+50	RT		NO WORK	ACP															
817+15	RT		NO WORK	ACP															
840+25	RT	CR 4440	NO WORK	ACP															
852+00	RT	FM 321	NO WORK	ACP															
920+50	RT	CR 349	NO WORK	ACP															
930+40	RT		NO WORK	ACP															
933+90	RT		24 IN X 26 FT CMP	ACP	16	52	26		61				28		2	1		61	
946+00	RT		24 IN X 28 FT RCP	ACP	16	60	46		97				28		2	1		97	
968+00	RT		24 IN X 24 FT RCP	ACP	16	68	20		51				24		2	1		51	
977+50	RT		18 IN X 28 FT RCP	ACP	16	52	18		47				28		2	1		47	
986+70	RT		NO WORK	ACP															
994+60	RT		NO WORK	ACP															
995+55	RT		12 IN X 16 FT CMP	ACP	14	52	24		52			24		2		1		52	
1010+20	RT	CR 358	18 IN X 40 FT RCP	ACP	32	73	18			83	8	40		2		1			83
1013+00	RT		18 IN X 28 FT RCP	ACP	16	38	18		47			28		2		1		47	
1019+50	RT		18 IN X 28 FT RCP	ACP	16	48	20		51			28		2		1		51	
1025+25	RT		18 IN X 32 FT RCP	ACP	16	52	22		54			32		2		1		54	
1033+80	RT		NO WORK	ACP															
1040+60	RT		18 IN X 28 FT RCP	ACP	14	62	24		52			28		2		1		52	
1042+40	RT		NO PIPE	GRAVEL	16	62	24					24		2				58	
SUBTOTAL (5 OF 6)								**0**	**621**	**83**	**8**	**260**	**108**	**18**	**8**	**12**	**0**	**679**	**83**

[1] SUBSIDIARY TO ITEM 530. FOR CONTRACTOR'S INFORMATION ONLY.

SH 155
QUANTITY SUMMARY

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		27

DRIVEWAY & INTERSECTION SUMMARY (SHEET 6 OF 6)

LOCATION STA			DESCRIPTION OF EXISTING STRUCTURE	EXIST DRVWY TYPE	EXIST WIDTH FT	EXIST LENGTH FT	DISTANCE FROM PIPE TO EOP FT	ITEM 104 REMOVING CONC (DRIVEWAYS) SY	ITEM 354 [1] PLANE ASPH CONC PAV (3") (DRIVEWAY) SY	ITEM 354 [1] PLANE ASPH CONC PAV (4") (INTERSECT) SY	ITEM 401 FLOWABLE BACKFILL CY	ITEM 464 RCP (CL III) (18 IN) LF	ITEM 464 RCP (CL III) (24 IN) LF	ITEM 467 SET (TY II) (18 IN) (RCP) (6: 1) (P) EA	ITEM 467 SET (TY II) (24 IN) (RCP) (6: 1) (P) EA	ITEM 496 REMOV STR (PIPE) EA	ITEM 530 DRIVEWAYS (CONC) (HES) SY	ITEM 530 DRIVEWAYS (ACP) SY	ITEM 530 INTER-SECTIONS (ACP) SY
1047+20	RT		18 IN X 28 FT RCP	ACP	14	64	27		57			28		2		1		57	
1058+75	RT		24 IN X 52 FT CMP	ACP	26	68	26		92				52		2	1		92	
1069+50	RT		NO WORK	ACP															
1080+50	RT		NO WORK	ACP															
1087+80	RT	CR 360	18 IN X 38 FT RCP	ACP	20	64	26			74	5	38		2		1			74
1119+40	RT	CR 359	18 IN X 52 FT RCP	ACP	18	102	14			44	7	52		2		1			44
1123+50	RT	CHURCH OF CHRIST	NO PIPE	ACP	14	75	20		46			24		2				46	
1131+00	RT		12 IN X 28 FT RCP	ACP	12	64	26		49			28		2		1		49	
1134+00	RT		NO WORK	ACP															
1136+80	RT		18 IN X 28 FT RCP	ACP	16	62	23		56			28		2		1		56	
1137+80	RT		18 IN X 28 FT RCP	ACP	14	62	23		50			28		2		1		50	
1140+60	RT		18 IN X 28 FT RCP	ACP	16	62	23		56			28		2		1		56	
1141+90	RT		18 IN X 28 FT RCP	ACP	14	62	23		50			28		2		1		50	
1146+20	RT	CR 3596	18 IN X 32 FT RCP	ACP	14	60	23			50	5	32		2		1			50
1151+70	RT		18 IN X 28 FT RCP	ACP	16	65	20		51			28		2		1		51	
1153+50	RT		18 IN X 28 FT RCP	ACP	16	65	20		51			28		2		1		51	
1156+80	RT		18 IN X 28 FT RCP	ACP	16	65	20		51			28		2		1		51	
1169+15	RT		24 IN X 32 FT CMP	ACP	22	65	18		60				32		2	1		60	
SUBTOTAL (6 OF 6)								**0**	**669**	**168**	**17**	**398**	**84**	**26**	**4**	**14**	**0**	**669**	**168**
PROJECT TOTAL								**61**	**2642**	**374**	**30**	**1520**	**464**	**92**	**22**	**54**	**61**	**2700**	**374**

[1] SUBSIDIARY TO ITEM 530. FOR CONTRACTOR'S INFORMATION ONLY.

BRIDGE SUMMARY

LOCATION	ITEM 438 CLEANING AND SEALING EXIST JOINTS (CL 3) LF
NBI#: 10-001-0-0520-08-014 - WALNUT CREEK NB	350
NBI#: 10-001-0-0520-08-060 - WALNUT CREEK SB	240
NBI#: 10-001-0-0520-08-016 - MOUND PRAIRIE CREEK NB	550
NBI#: 10-001-0-0520-08-057 - MOUND PRAIRIE CREEK SB	380
PROJECT TOTAL	**1520**

BRIDGE RAIL SUMMARY

FROM STA	TO STA	LOCATION	ITEM 451 RETROFIT RAIL (TY T631) LF
549+52 LT	552+82 LT	BRUSHY CREEK NB	668
PROJECT TOTAL			**668**

SIGNS SUMMARY

LOCATION	ITEM 644 IN SM RD SN SUP & AM TYTWT(1) WS(P) EA	ITEM 644 REMOVE SM RD SN SUP & AM EA
SEE SUMMARY OF SMALL SIGNS	18	16
PROJECT TOTAL	**18**	**16**

SH 155
QUANTITY SUMMARY

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		28

DATE: 1/12/2022 2:05:41 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH155_GEN_SUM.dgn

SUMMARY OF CROSS CULVERTS

LOCATION		EXISTING CONDITION	PROPOSED WORK	ITEM 132	ITEM 403	ITEM 420		ITEM 432	ITEM 462	ITEM 464		ITEM 466	ITEM 467		ITEM 658
				[1] EMBANK (VEHICLE) (ORD COMP) (TY C)	[2] TEMPORARY SPL SHORING	[2] CL C CONC (COLLAR)	[2][4] CL E CONC (SEAL SLAB) (NON-REINF)	[3] RIPRAP (STONE PROTECTION) (18 IN)	[2] CONC BOX CULV (10 FT X 7 FT)	[2] RC PIPE (CL III) 30 IN	[2] RC PIPE (CL III) 36 IN	[2] WINGWALL (PW - 2) (HW=10 FT)	[2] SET (TY II) (30 IN)(RCP) (3:1)(C)	[2] SET (TY II) (36 IN)(RCP) (3:1)(C)	INSTL OM ASSM (OM-2Z) (WFLX)GND
STA				CY	SF	EA	CY	CY	LF	LF	LF	EA	EA	EA	EA
1029+07	LT	10' X 5' x 184.58' RC BOX	REMOVE HEADWALL, PLACE 8' RC BOX, PLACE PW-2	70	1620		2	900	8			1			2
	RT		NO WORK												
1097+65	LT	36"' X 222' RC PIPE	REMOVE HEADWALL; EXTEND RC PIPE 6 LF, PLACE SETP-CD (3:1)	20		1					6			1	1
	RT		NO WORK												
1109+35	LT	30"' X 187' RC PIPE	REMOVE HEADWALL; EXTEND RC PIPE 8 LF, PLACE SETP-CD (3:1)	20		1				8			1		1
	RT		NO WORK												
PROJECT TOTAL				**110**	**1620**	**2**	**2**	**900**	**8**	**8**	**6**	**1**	**1**	**1**	**4**

[1] QUANTITY INCLUDED IN GRADING SUMMARY
[2] QUANTITY INCLUDED IN STRUCTURE SUMMARY
[3] QUANTITY INCLUDED IN RIPRAP SUMMARY
[4] AS DIRECTED

STRUCTURE SUMMARY

LOCATION	ITEM 403	ITEM 420		ITEM 432	ITEM 462	ITEM 464				ITEM 466	ITEM 467				ITEM 496
	TEMPORARY SPL SHORING	CL C CONC (COLLAR)	CL E CONC (SEAL SLAB) (NON-REINF)	[1] RIPRAP (STONE PROTECTION) (18 IN)	CONC BOX CULV (10 FT X 7 FT)	RC PIPE (CL III) 18 IN	RC PIPE (CL III) 24 IN	RC PIPE (CL III) 30 IN	RC PIPE (CL III) 36 IN	WINGWALL (PW -2) (HW=10 FT)	SET TY II (18 IN)(RCP) (6:1)(P)	SET TY II (24 IN)(RCP) (6:1)(P)	SET TY II (30 IN)(RCP) (3:1)(C)	SET TY II (36 IN)(RCP) (3:1)(C)	REMOV STR (PIPE)
	SF	EA	CY	CY	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA
FROM DRIVEWAYS & INTERSECTIONS						1520	464				92	22			54
FROM CULVERTS	1620	2	2	900	8			8	6	1			1	1	
PROJECT TOTAL	**1620**	**2**	**2**	**900**	**8**	**1520**	**464**	**8**	**6**	**1**	**92**	**22**	**1**	**1**	**54**

[1] QUANTITY INCLUDED IN RIPRAP SUMMARY

SH 155
QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		29

DATE: 1/12/2022 2:05:41 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH155_GEN_SUM.dgn

METAL BEAM GUARD FENCE SUMMARY

FROM	TO	LOCATION	ITEM 132	ITEM 432	ITEM 540		ITEM 542			ITEM 544		ITEM 658	
			[1] EMBANKMENT (VEHICLE) (ORD COMP) (TY C) CY	RIPRAP (MOW STRIP) (4 IN) CY	MTL W-BEAM GD FEN (TIMBER POST) LF	MTL BEAM GD FEN TRANS (THRIE-BEAM) EA	REMOVE METAL BEAM GUARD FENCE LF	RM MTL BM GD FENCE TRANS (THRIE-BEAM) EA	REMOVE TERMINAL ANCHOR SECTION EA	GUARDRAIL END TREATMENT (INSTALL) EA	GUARDRAIL END TREATMENT (REMOVE) EA	INSTL DEL ASSM (D-SW)SZ 1 (BRF)GF2 EA	INSTL DEL ASSM (D-SY)SZ 1 (BRF)GF2 EA
STA 248+65 LT	STA 249+90 LT	CANEY BRANCH	21	10	25					2		2	
STA 249+80 RT	STA 254+30 RT		102	26	350		350			2	2	6	
STA 282+33 RT	STA 289+33 RT		149	37	600		600			2	2	8	
STA 537+00 RT	STA 548+59 RT	BRUSHY CREEK SB IS	97	54	1100	1	1100	1		1	1		13
STA 539+98 RT	STA 548+59 RT	BRUSHY CREEK SB OS	75	41	800	1	800	1		1	1	10	
STA 546+27 LT	STA 549+52 LT	BRUSHY CREEK NB IS	36	18	275		250	1		1	1		4
STA 547+50 LT	STA 549+50 LT	BRUSHY CREEK NB OS	26	13	150		125	1		1	1	3	
STA 552+84 LT	STA 554+84 LT	BRUSHY CREEK NB OS	195	13	150		125	1		1	1	3	
STA 552+84 LT	STA 558+84 LT	BRUSHY CREEK NB IS	56	30	550		525	1		1	1		7
STA 552+86 RT	STA 558+55 RT	BRUSHY CREEK SB IS	52	28	500	1	500	1		1	1		7
STA 552+86 RT	STA 565+55 RT	BRUSHY CREEK SB OS	104	58	1200	1	1200	1		1	1	14	
STA 713+20 RT	STA 715+64 RT	WALNUT CREEK SB IS	14	14	175	1	175	1		1	1		3
STA 713+95 RT	STA 715+64 RT	WALNUT CREEK SB OS	34	9	100	1	100	1		1	1	3	
STA 714+00 LT	STA 715+68 LT	WALNUT CREEK NB	56	11	100	1	100	1	1	1		3	
STA 717+33 RT	STA 719+53 RT	WALNUT CREEK NB OS	65	13	150	1	150	1		1	1	3	
STA 717+33 RT	STA 719+53 RT	WALNUT CREEK NB IS	13	13	150	1	150	1		1	1		3
STA 900+07 RT	STA 902+82 RT	HURRICANE CREEK	14	19	175		175		1	2	1	4	
STA 903+15 LT	STA 905+90 LT		14	19	175		175		1	2	1	4	
STA 957+40 RT	STA 959+84 RT	MOUND PRAIRIE CREEK SB IS	14	14	175	1	175	1		1	1		3
STA 957+40 RT	STA 959+84 RT	MOUND PRAIRIE CREEK SB OS	12	11	100	1	100	1		1	1	3	
STA 957+84 LT	STA 959+78 LT	MOUND PRAIRIE CREEK NB	61	12	125	1	125	1	1	1		3	
STA 962+53 LT	STA 964+72 LT	MOUND PRAIRIE CREEK NB IS	13	13	150	1	150	1		1	1		3
STA 962+53 LT	STA 964+72 LT	MOUND PRAIRIE CREEK NB OS	13	13	150	1	150	1		1	1	3	
STA 1027+97 LT	STA 1032+22 LT		98	25	325					2		5	
STA 1046+58 LT	STA 1049+58 LT		15	20	200		200		1	2	1	4	
PROJECT TOTAL			**1349**	**537**	**7950**	**14**	**7500**	**18**	**5**	**32**	**23**	**78**	**43**

NOTE: REMOVAL OF EXISTING ACP MOW STRIPS IS INCIDENTAL TO REMOVAL OF EXISTING GUARD RAIL.
[1] QUANTITY INCLUDED IN GRADING SUMMARY.

SH 155
QUANTITY SUMMARY

Texas Department of Transportation
SHEET 12 OF 13

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		30

DATE: 1/12/2022 2:05:42 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH155_GEN_SUM.dgn

EROSION CONTROL SUMMARY

LOCATION	ITEM 150	ITEM 506								
	[1] BLADING	ROCK FILTER DAMS (INSTALL) (TY 1)	ROCK FILTER DAMS (REMOVE)	EARTHWORK (EROSN & SEDMT CONT, IN VEH)	BACKHOE WORK (EROSION & SEDMT CONT)	TRACKHOE WORK (EROSION & SEDMT CONT)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL)(12")	BIODEG EROSN CONT LOGS (REMOVE)
	STA	LF	LF	CY	HR	HR	LF	LF	LF	LF
AS DIRECTED		240	240	100	40	40	200	200	400	400
AT MBGF							14320	14320		
AT DRIVEWAYS	57									
PROJECT TOTALS	**57**	**240**	**240**	**100**	**40**	**40**	**14520**	**14520**	**400**	**400**

NOTE: MULTIPLE MOVE-INS WILL BE REQUIRED TO MAINTAIN ADEQUATE VEGETATION IN COMPLIANCE WITH THE CONSTRUCTION GENERAL PERMIT.
[1] QUANTITY INCLUDED IN GRADING SUMMARY.

SUMMARY OF VEGETATION

LOCATION	ITEM 160	ITEM 164				ITEM 168
	[2] FURNISHING AND PLACING TOPSOIL (4")	BROADCAST SEED (PERM) (RURAL) (SANDY)	BOND FBR MTRX SEED (PERM) (RURAL) (SAND)	BONDED FBR MTRX SEED (TEMP) (WARM)	BONDED FBR MTRX SEED (TEMP) (COOL)	[1] VEGETATIVE WATERING
	SY	SY	SY	SY	SY	SY
AT DRIVEWAYS	38000	19000	38000	19000	19000	76000
AT MBGF	82170	41090	82170	41090	41090	164340
AT EDGE TREATMENT	13520	6760	13520	6760	6760	27040
PROJECT TOTALS	**133690**	**66850**	**133690**	**66850**	**66850**	**267380**

NOTE: MULTIPLE MOVE-INS WILL BE REQUIRED TO MAINTAIN ADEQUATE VEGETATION IN COMPLIANCE WITH THE CONSTRUCTION GENERAL PERMIT.
[1] QUANTITY INCLUDED IN BASIS OF ESTIMATE.
[2] CONTRACTOR SHALL REUSE 100% OF EXISTING TOPSOIL

SH 155
QUANTITY SUMMARY

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		31

DATE: 1/12/2022 2:05:43 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH155_GEN_SUM.dgn

CK1: DW1: CK2: DN1:

SUMMARY OF SMALL SIGNS

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

STATION	OFFSET	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
198+00	RT	1	D20-5T	CO RD 3113 → 3115 ←	24 X 42	X		TWT	1	WS	P		
214+00	LT	2	D20-5T	CO RD 3113 ← 3115 →	24 X 42	X		TWT	1	WS	P		
216+50	RT	3	D20-1TL	CO RD 3115 ←	24 X 24	X		TWT	1	WS	P		
228+00	LT	4	D20-1TR	CO RD 3115 →	24 X 24	X		TWT	1	WS	P		
339+00	RT	5	D20-1TR	CO RD 327 →	24 X 24	X		TWT	1	WS	P		
355+50	RT	6	D20-1TL	CO RD 327 ←	24 X 24	X		TWT	1	WS	P		
355+50	LT	7	D20-1TL	CO RD 327 ←	24 X 24	X		TWT	1	WS	P		
369+00	LT	8	D20-1TR	CO RD 327 →	24 X 24	X		TWT	1	WS	P		
408+50	RT	9	D20-1TL	CO RD 327 ←	24 X 24	X		TWT	1	WS	P		
425+50	LT	10	D20-1TR	CO RD 327 →	24 X 24	X		TWT	1	WS	P		
468+50	RT	11	D20-1TR	CO RD 319 →	24 X 24	X		TWT	1	WS	P		
481+50	RT	12	D20-1TR	CO RD 332 →	24 X 24	X		TWT	1	WS	P		
628+00	RT	13	D20-1TR	CO RD 435 →	24 X 24	X		TWT	1	WS	P		
648+50	LT	14	D20-1TL	CO RD 435 ←	24 X 24	X		TWT	1	WS	P		
745+00	RT	15	D20-1TR	CO RD 434 →	24 X 24	X		TWT	1	WS	P		
767+00	RT	16	D20-1TR	CO RD 434 →	24 X 24	X		TWT	1	WS	P		
1054+00	RT	17	D20-1TL	CO RD 3591 ←	24 X 24	X		TWT	1	WS	P		
1061+00	LT	18	D20-1TR	CO RD 3591 →	24 X 24	X		TWT	1	WS	P		

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

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

http://www.txdot.gov/

NOTE:

1. Sign supports 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).

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		0520	08	071	SH 155
4-16		DIST	COUNTY		SHEET NO.
8-16		TYL	ANDERSON		32

DATE: 1/12/2022 2:05:49 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390357\SH155_GEN_SOSS.dgn

CONSTRUCTION SEQUENCE

1. INSTALL PROJECT SIGNS AND TRAFFIC CONTROL.
2. INSTALL EROSION CONTROL DEVICES.
3. EXTEND CROSS DRAINAGE STRUCTURES.
4. PLACE EDGE TREATMENT. SHOULDER UP DISTURBED PAVEMENT EDGES DAILY.
5. REPLACE DRIVEWAY PIPE.
6. INSTALL MBGF AND MOW STRIP.
7. CONSTRUCT DRIVEWAYS.
8. PERFORM FLEXIBLE PAVEMENT REPAIR AT LOCATIONS AS DIRECTED.
9. PLACE OCST AND WORK ZONE PAVEMENT MARKINGS (NON-REMOV).
10. PLACE 1.5" PFC (WIDTH ON TYPICAL SECTIONS) AND SHORT TERM WORK ZONE PAVEMENT MARKINGS (TAPE).
11. PLACE PERMANENT PAVEMENT MARKINGS AND INSTALL PERMANENT SIGNS.
12. PERFORM FINAL CLEAN-UP AND REMOVE ANY REMAINING SEDIMENT CONTROL DEVICES.
13. REMOVE PROJECT SIGNS.

NOTE: WORK ZONE PAVEMENT MARKINGS SHALL BE PLACED AT THE END OF EACH WORKING DAY AS NEEDED.

1. DURING NONWORKING HOURS, AND WHEN A LANE CLOSURE IS NOT IN PLACE, NO EDGE DROP OFFS GREATER THAN 2" WILL BE ALLOWED.

2. SHOULDER UP WITH LIKE OR OTHERWISE APPROVED MATERIALS. THIS WILL BE IN ADDITION TO PROVIDING A 3:1 OR FLATTER SLOPE. PLACEMENT AND REMOVAL OF TEMPORARY MATERIAL WILL BE INCIDENTAL TO VARIOUS PAY ITEMS.

3. LANE CLOSURES WILL REQUIRE RUMBLE STRIPS AND PCMS.

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

SH 155
SEQUENCE OF WORK

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		33

DATE: 1/12/2022 2:06:05 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390361\SH155_TCP_SOW.dgn

CK: DW: CK: DN:

DATE: 1/12/2022 2:06:21 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_BC-21.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

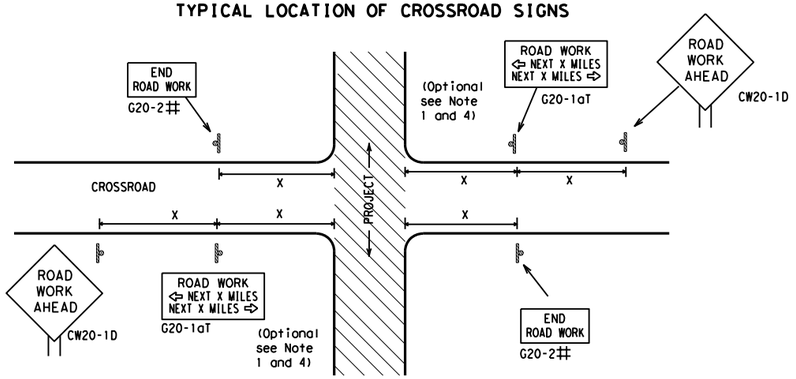
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	TYL	ANDERSON		34
5-10 5-21				

DATE: 1/12/2022 2:06:22 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_BC-21.dgn

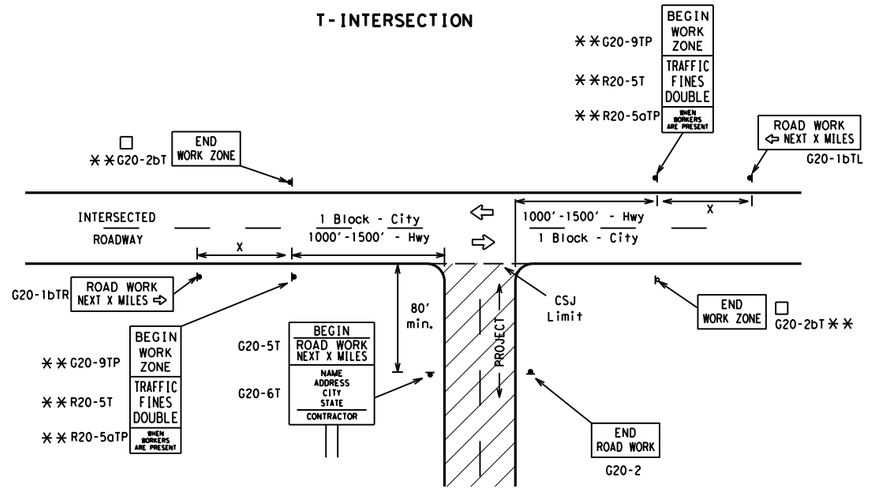
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

SIZE

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

SPACING

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

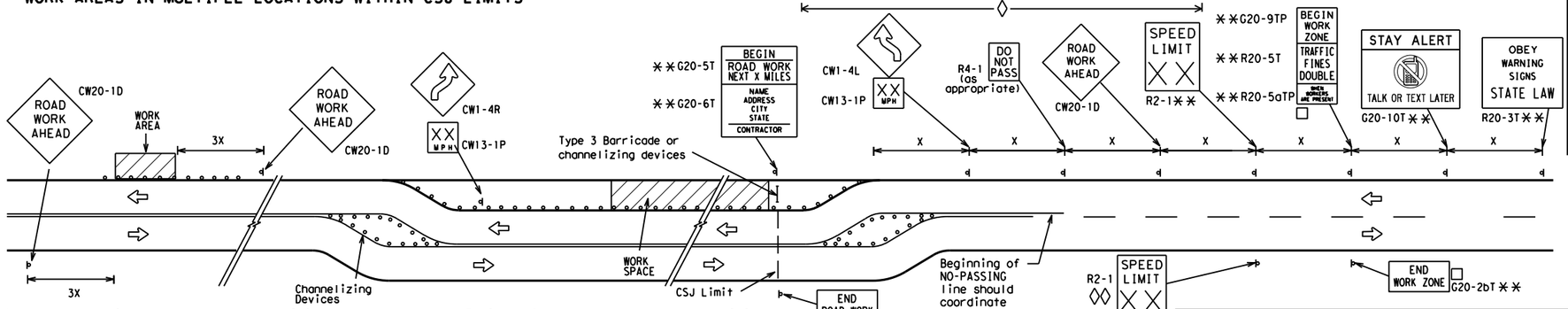
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

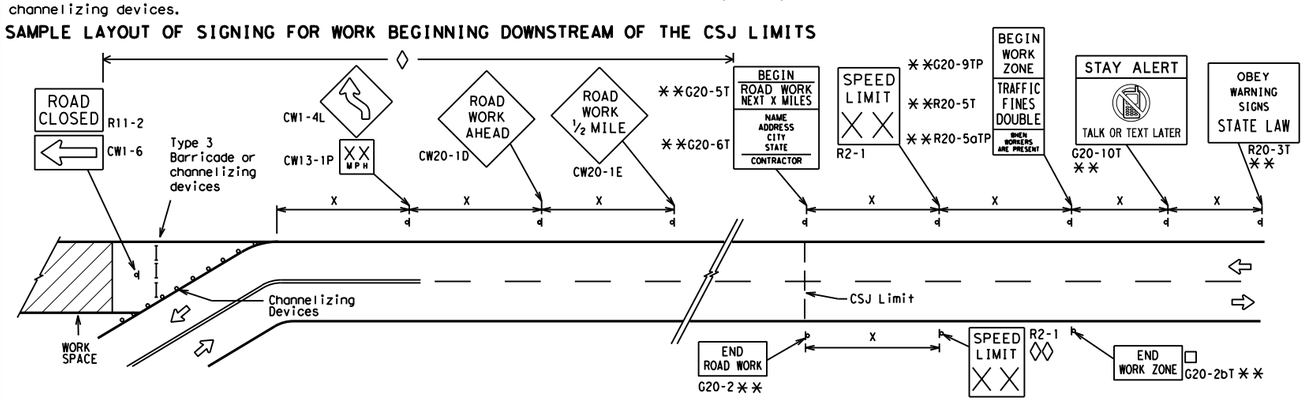
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	ANDERSON		35

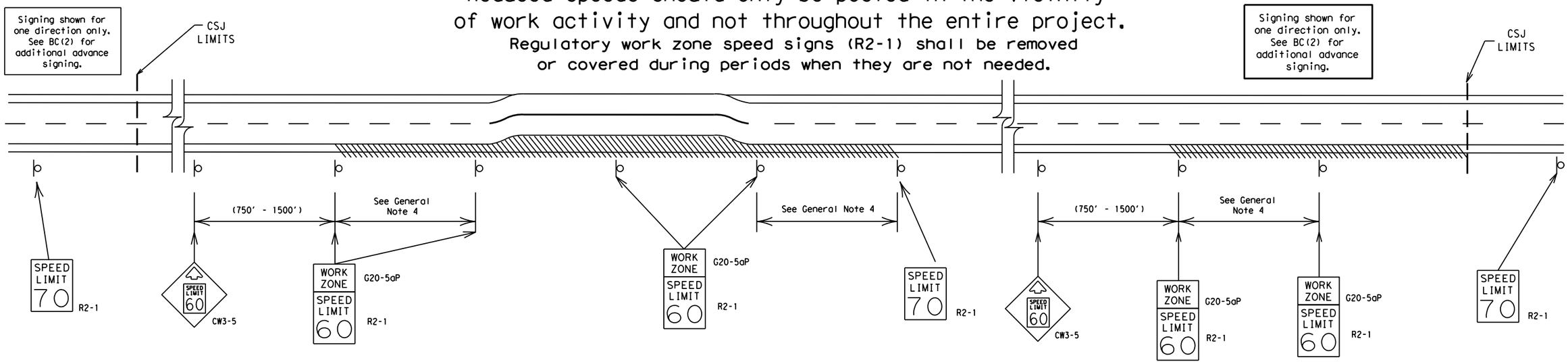
DATE: 1/12/2022 2:06:23 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_BC-21.dgn

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

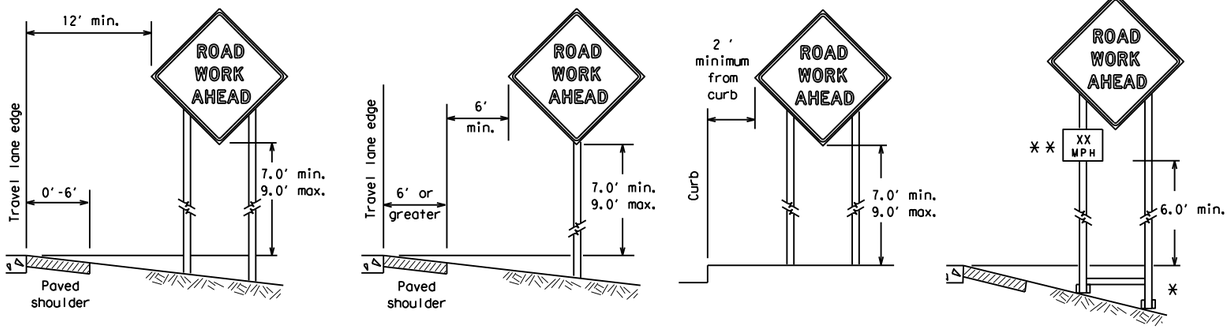
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	ANDERSON		36

DATE: 1/12/2022 2:06:23 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_BC-21.dgn

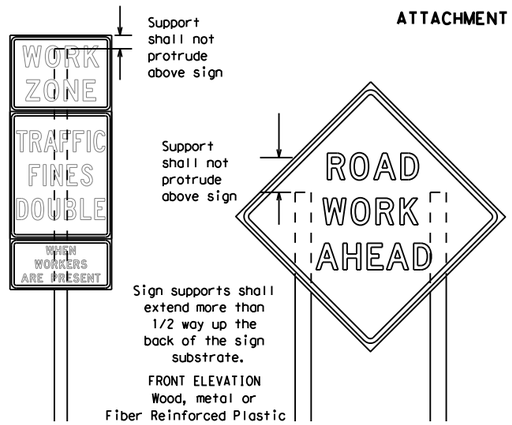
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

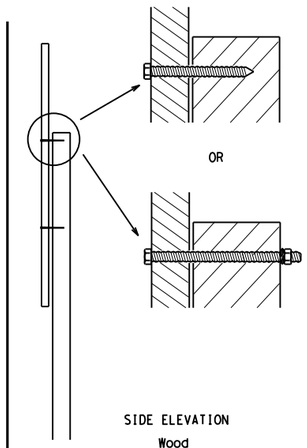


* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





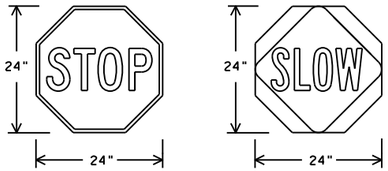
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

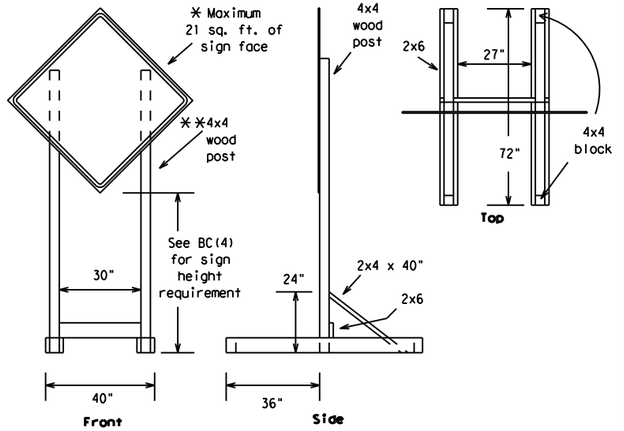
Texas Department of Transportation | Traffic Safety Division Standard

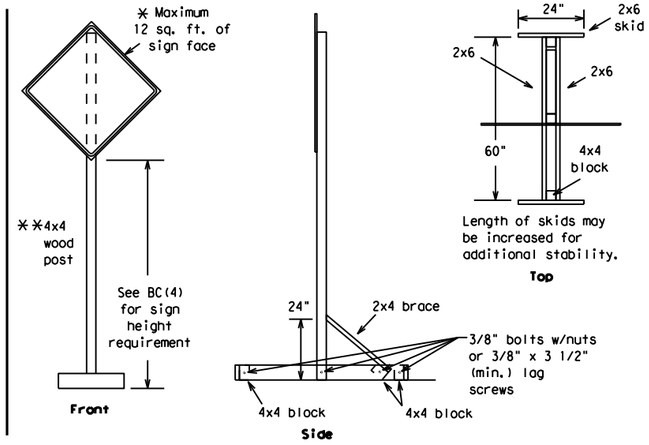
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	ANDERSON		37

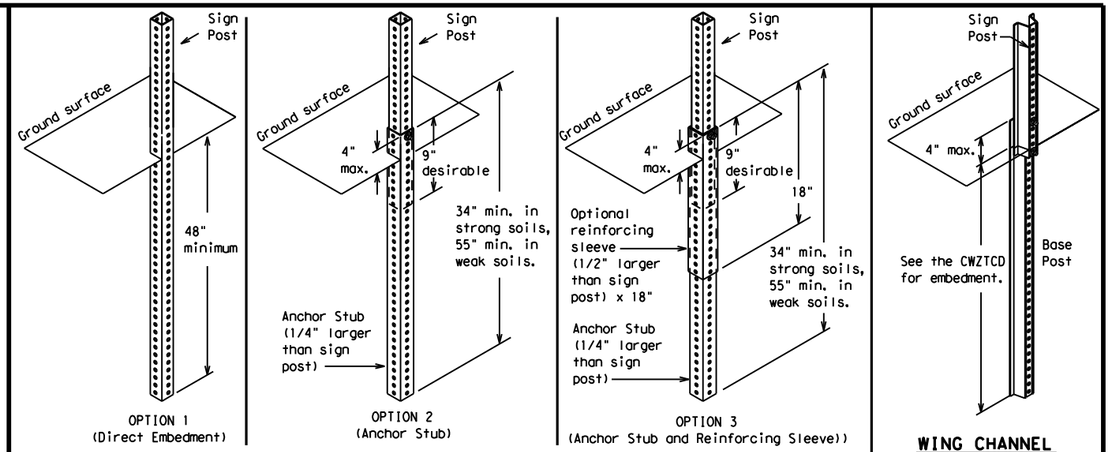
DATE: 1/12/2022 2:06:24 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_BC-21.dgn





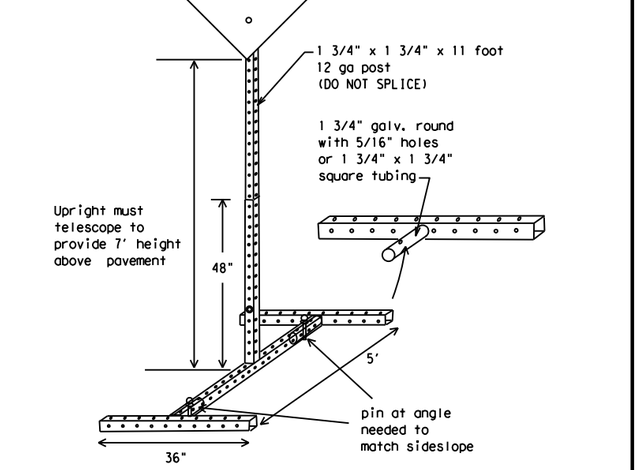
SKID MOUNTED WOOD SIGN SUPPORTS

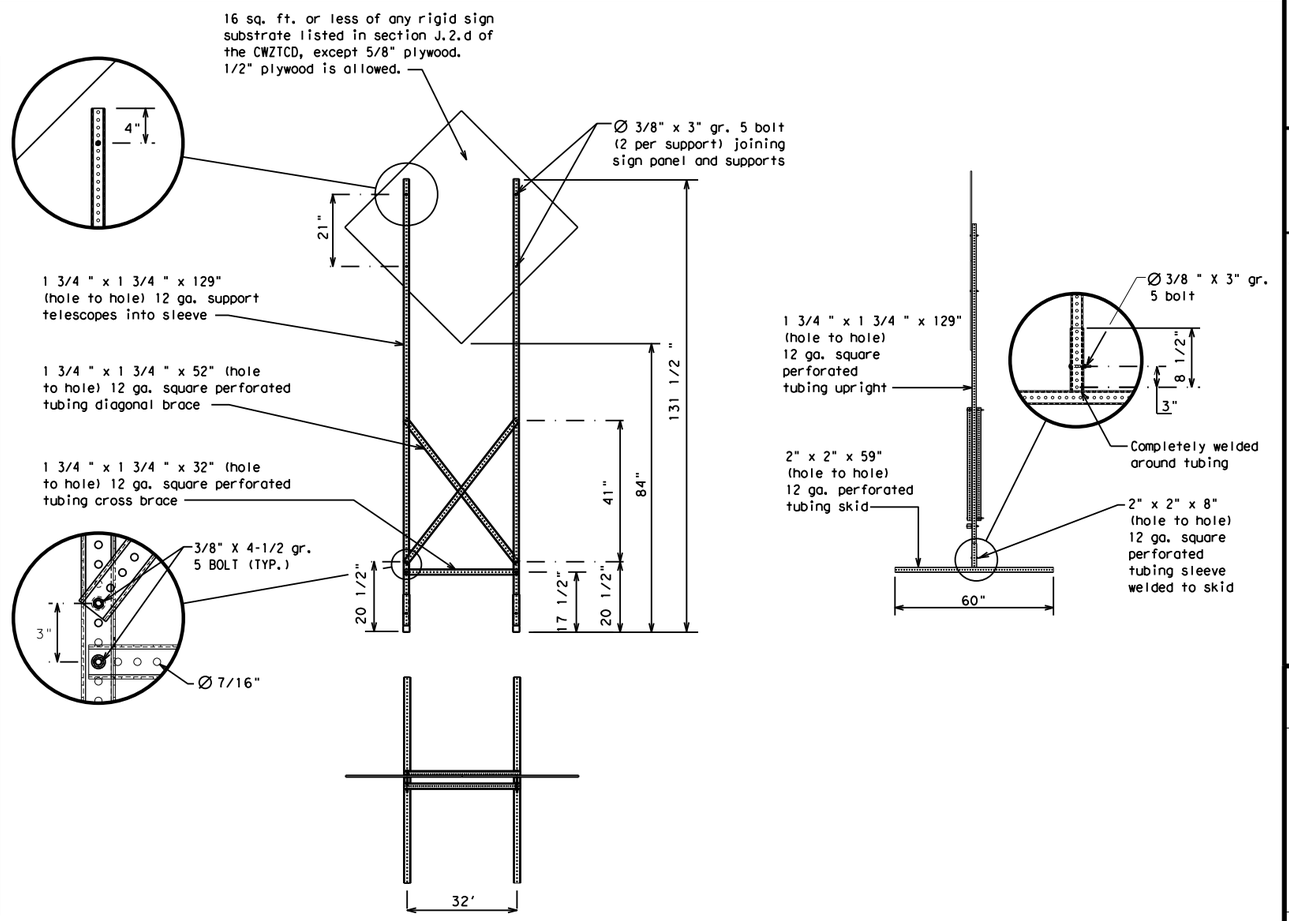
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS



GROUND MOUNTED SIGN SUPPORTS

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





SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	ANDERSON		38

DATE: 1/12/2022 2:06:25 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_BC-21.dgn

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

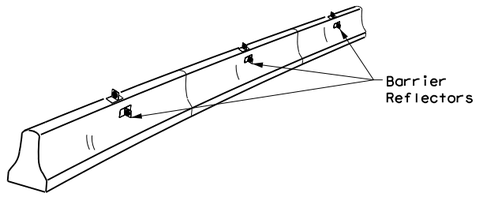
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	ANDERSON		39

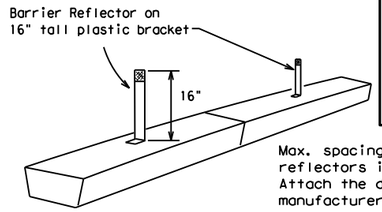
DATE: 1/12/2022 2:06:26 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_BC-21.dgn

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



CONCRETE TRAFFIC BARRIER (CTB)

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

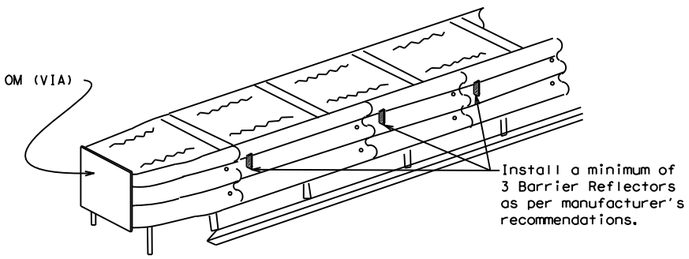


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)

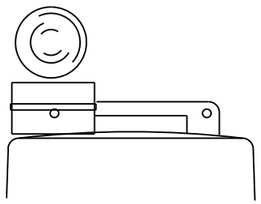


DELINEATION OF END TREATMENTS

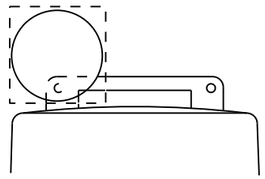
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

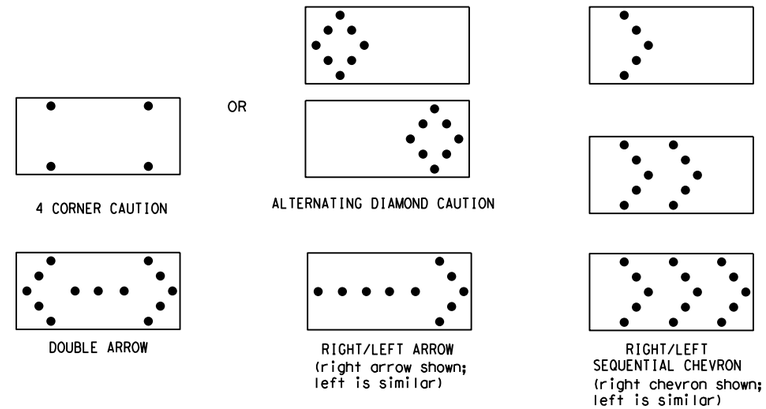
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	ANDERSON		40

DATE: 1/12/2022 2:06:27 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_BC-21.dgn

GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

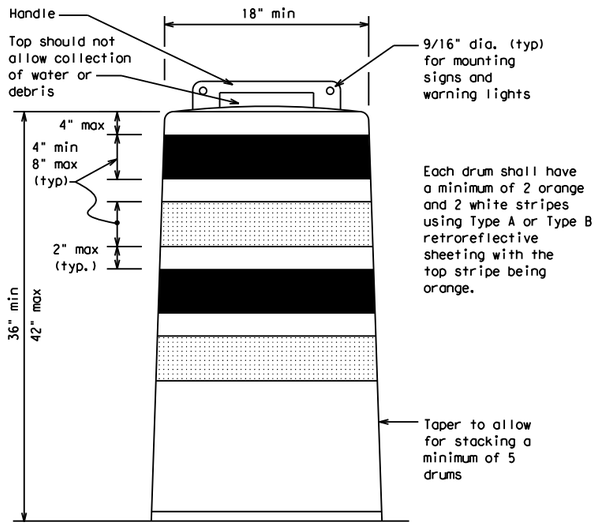
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

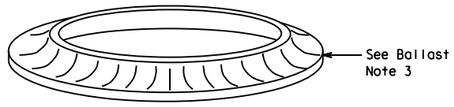
RETROREFLECTIVE SHEETING

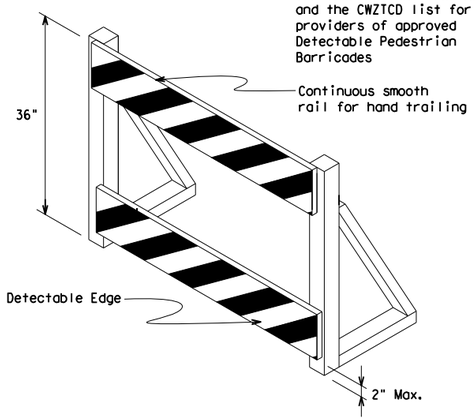
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

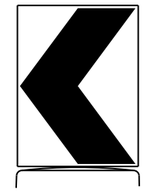




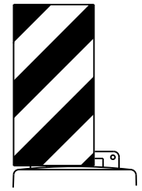


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation | Traffic Safety Division Standard

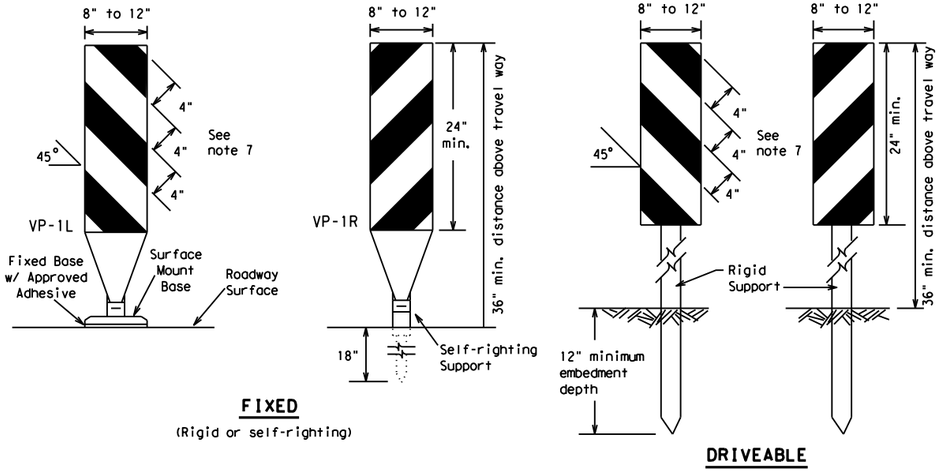
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	TYL	ANDERSON		41
7-13				

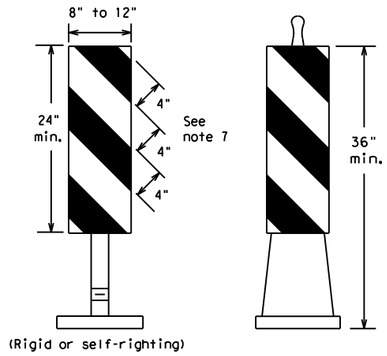
102

DATE: 1/12/2022 2:06:28 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_BC-21.dgn



FIXED
(Rigid or self-righting)

DRIVEABLE

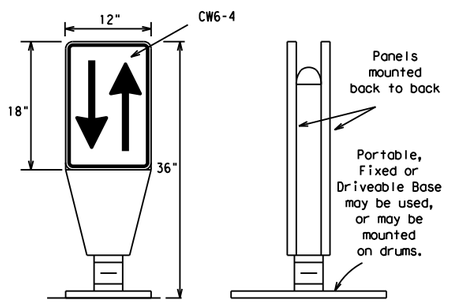


(Rigid or self-righting)

PORTABLE

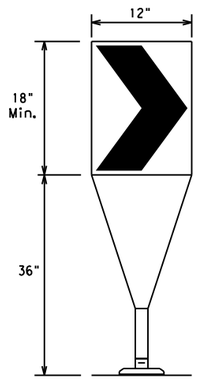
VERTICAL PANELS (VPs)

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



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



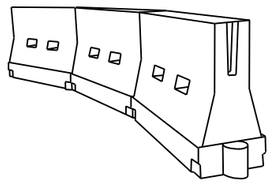
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

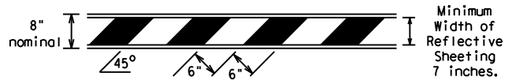
BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	ANDERSON		42

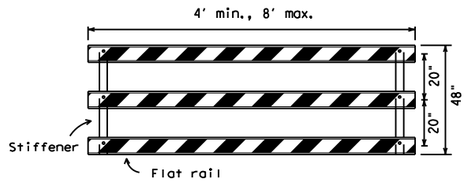
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



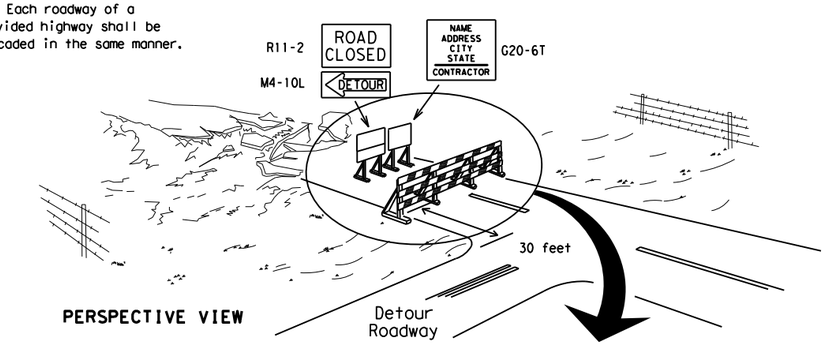
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

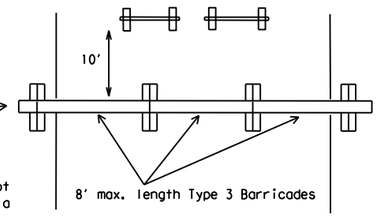
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

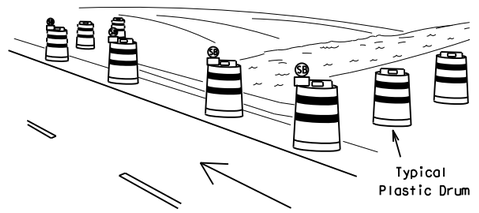
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

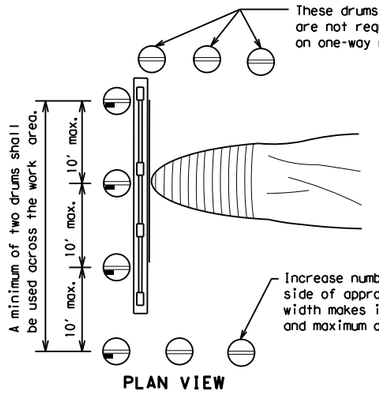
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

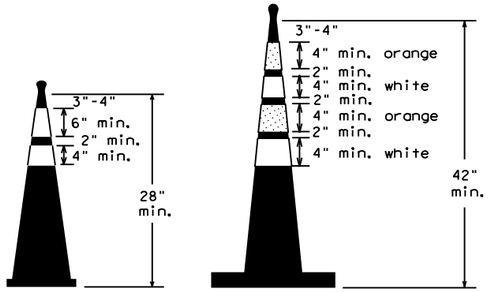
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



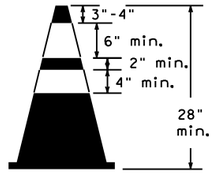
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

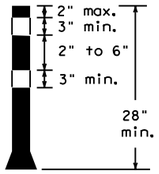
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

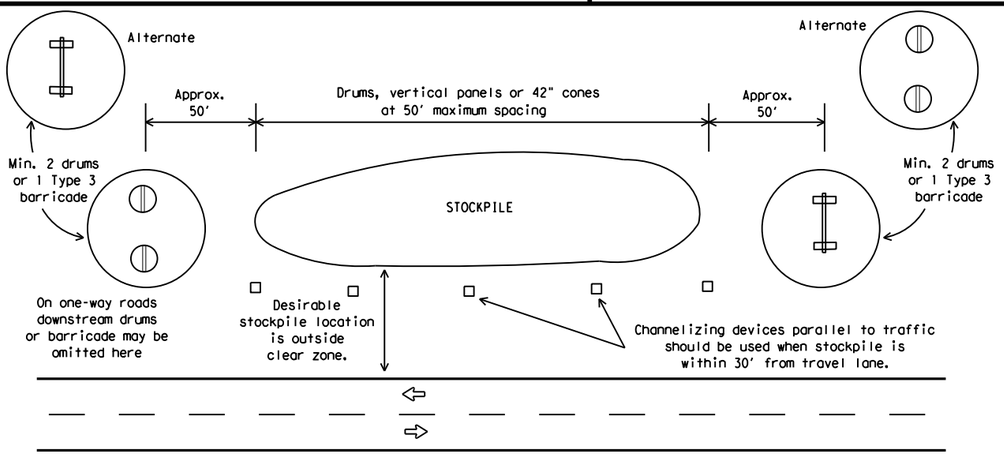


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	TYL	ANDERSON		43

104

DATE: 1/12/2022 2:06:28 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_BC-21.dgn

DATE: 1/12/2022 2:06:29 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_BC-21.dgn

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

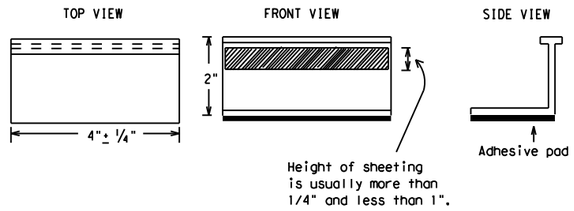
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

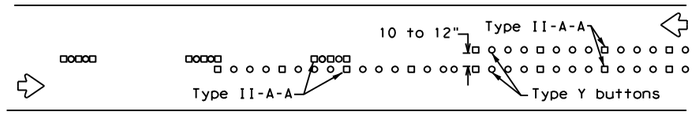
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	TYL	ANDERSON		44
11-02 8-14				

105

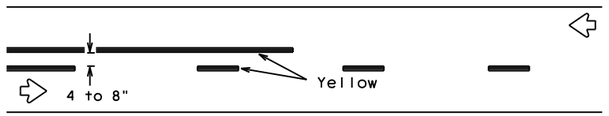
DATE: 1/12/2022 2:06:30 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_BC-21.dgn

PAVEMENT MARKING PATTERNS

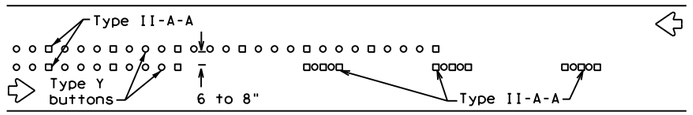
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



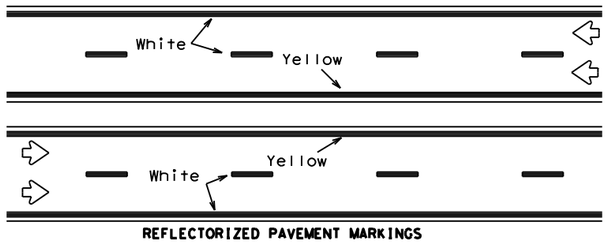
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



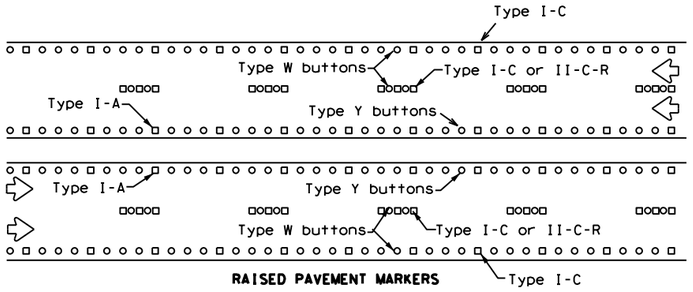
RAISED PAVEMENT MARKERS - PATTERN B

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

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



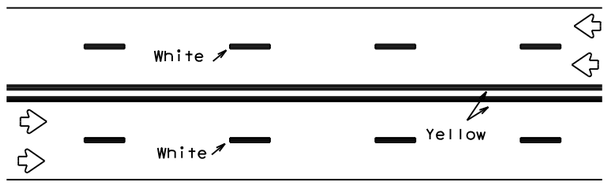
REFLECTORIZED PAVEMENT MARKINGS



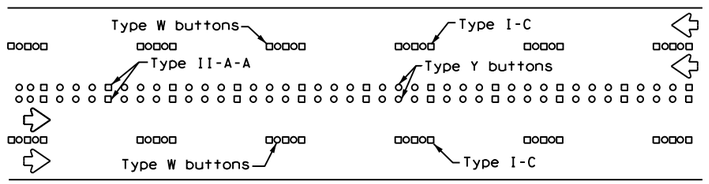
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



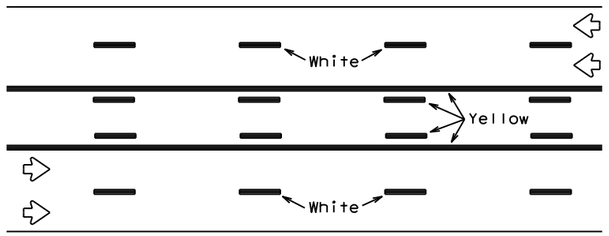
REFLECTORIZED PAVEMENT MARKINGS



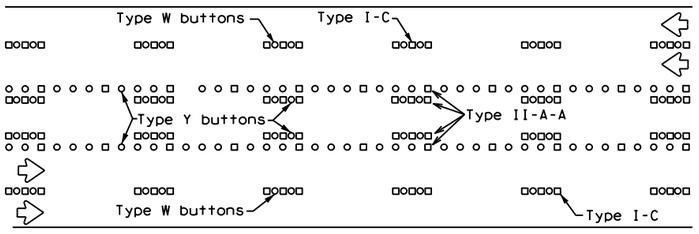
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

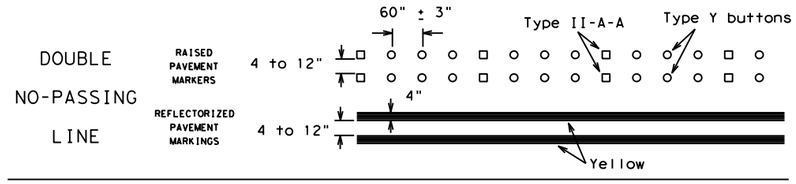
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

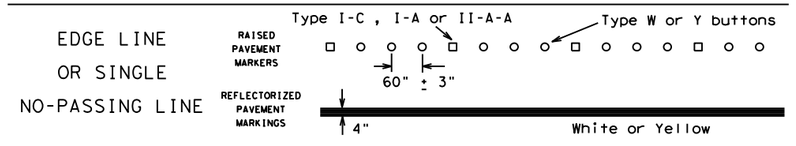
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

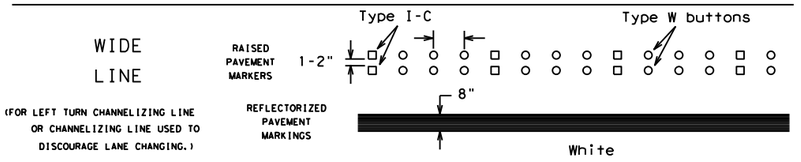


EDGE LINE OR SINGLE NO-PASSING LINE



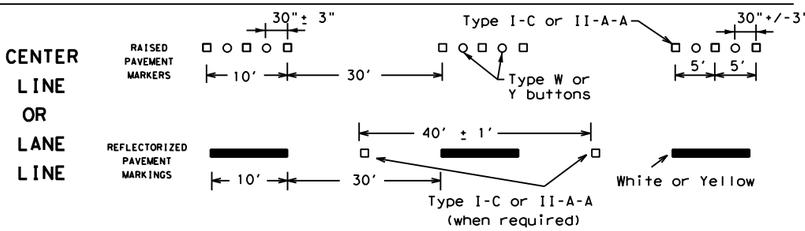
WIDE LINE

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

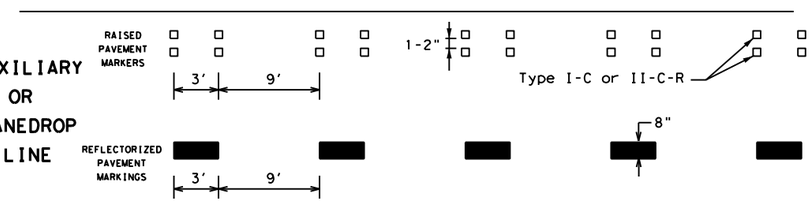


BROKEN LINES

CENTER LINE OR LANE LINE

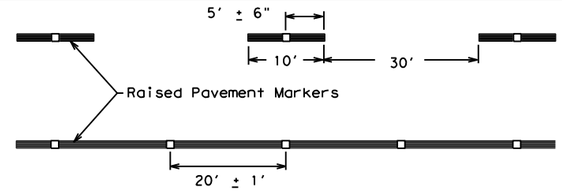


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

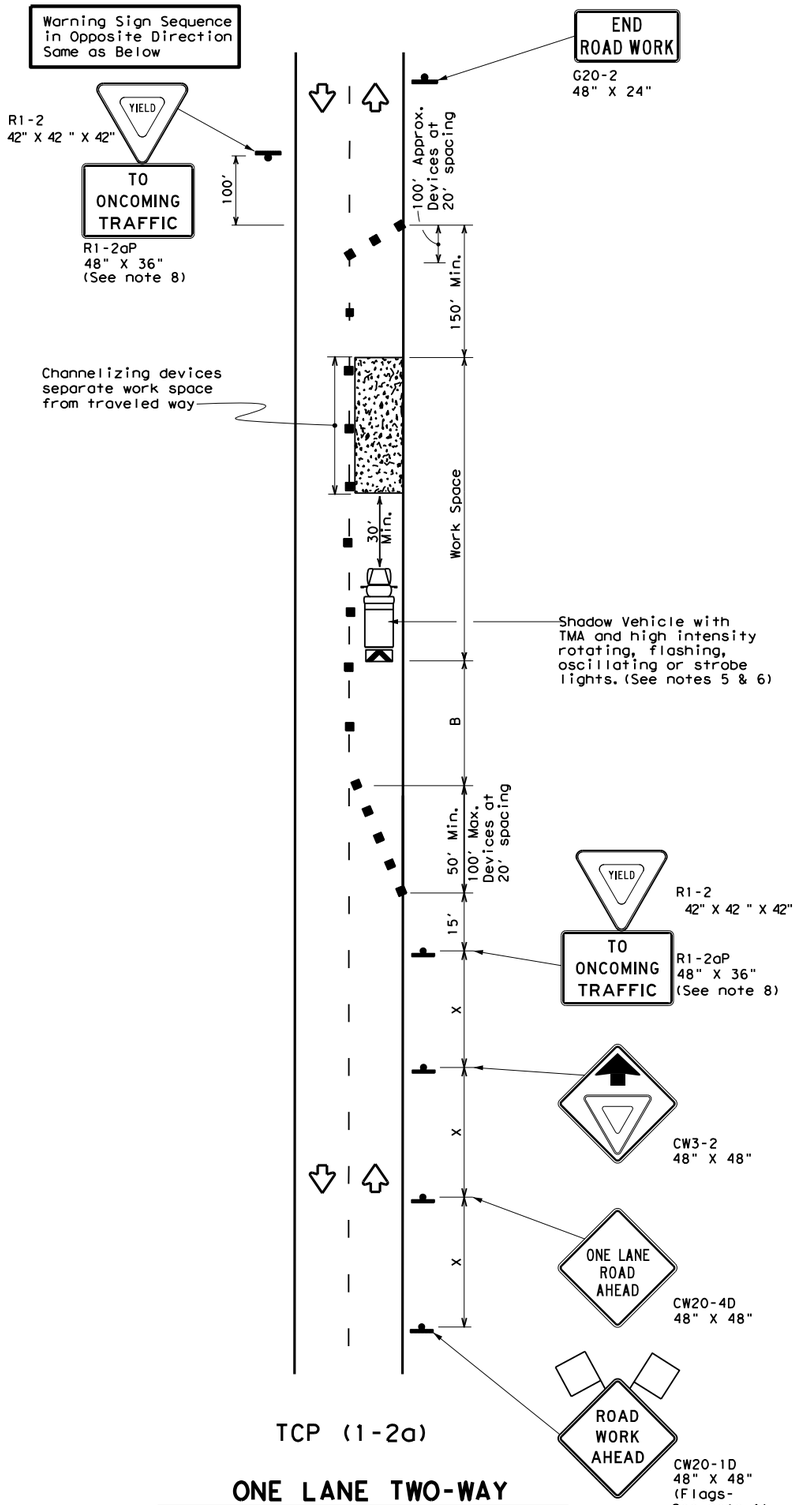
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		45

106

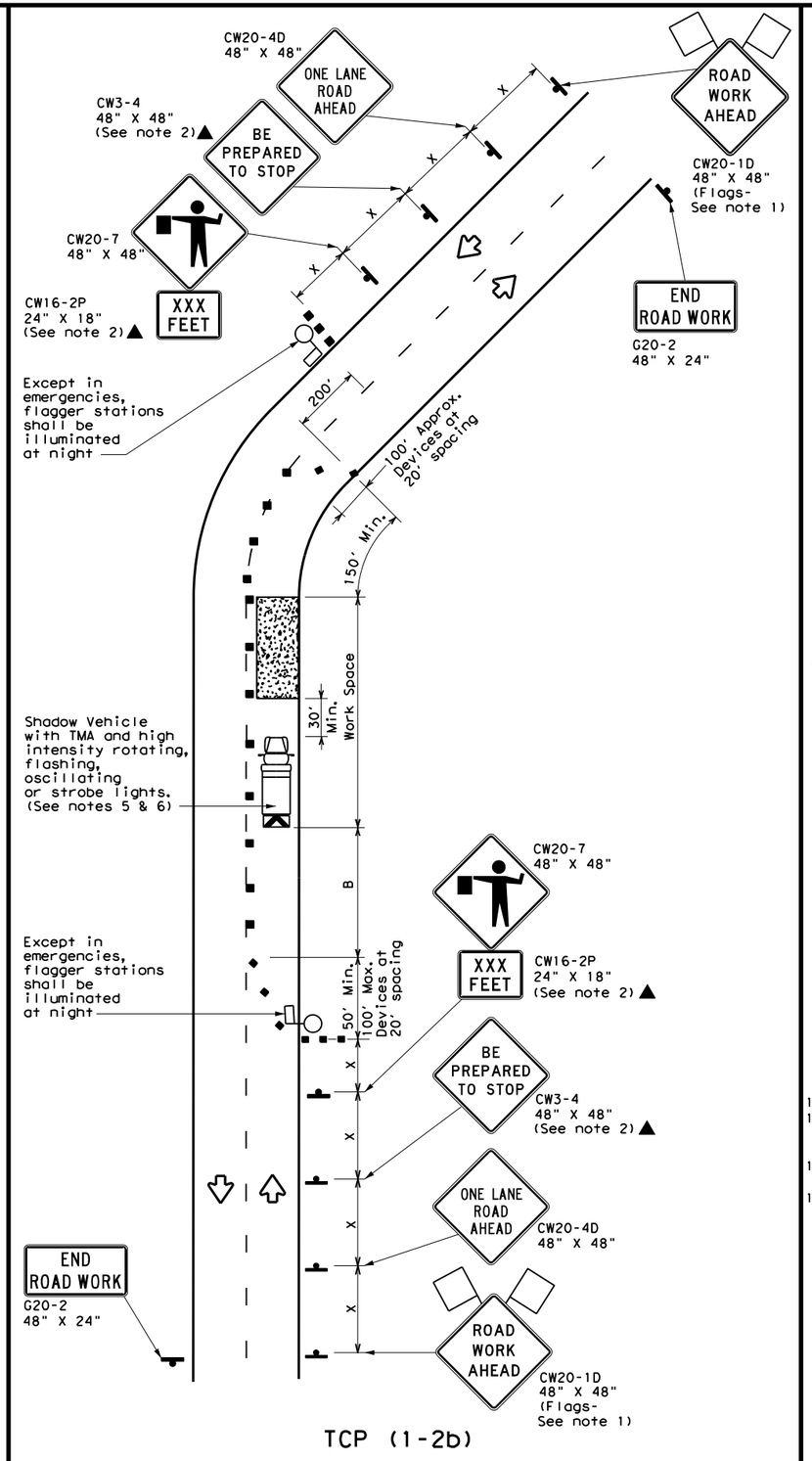
DATE: 1/12/2022 2:06:36 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_TCP(1-2)-18.dgn



TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY CONTROL WITH FLAGGERS

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

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

TCP (1-2b)

9. Flaggers should use two-way radios or other methods of communication to control traffic.
10. Length of work space should be based on the ability of flaggers to communicate.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

Texas Department of Transportation

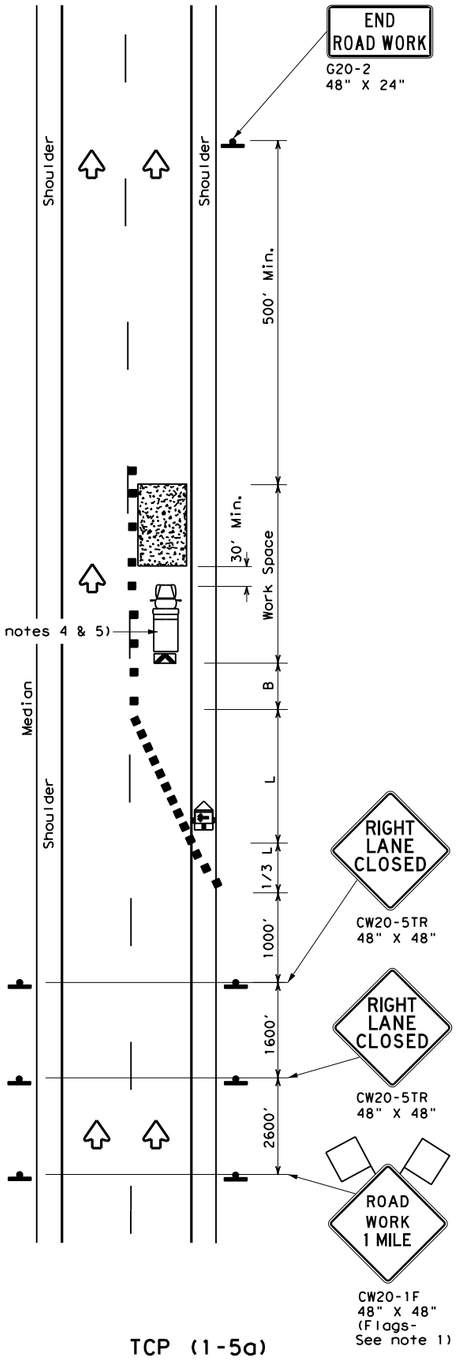
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-18

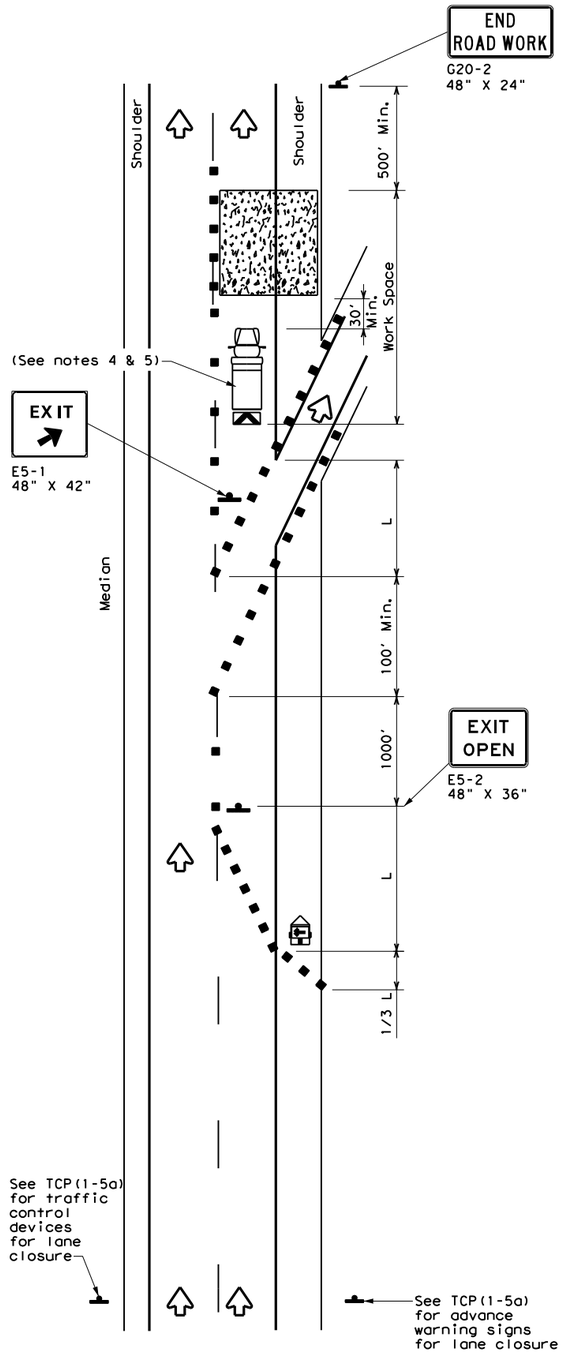
FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		46

DATE: 1/12/2022 2:06:41 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_TCP(1-5)-18.dgn



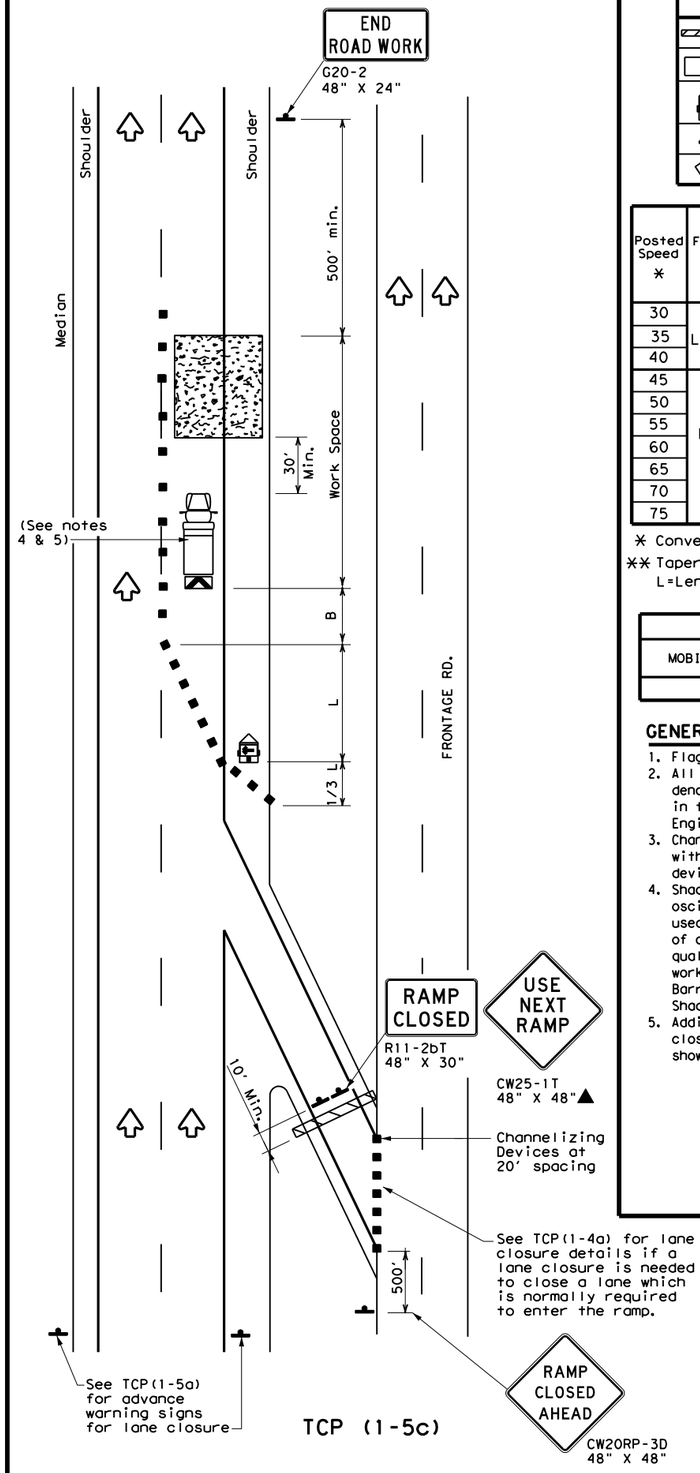
TCP (1-5a)

ONE LANE CLOSURE



TCP (1-5b)

LANE CLOSURE NEAR EXIT RAMPS



TCP (1-5c)

LANE CLOSURE NEAR ENTRANCE RAMPS

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

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

Texas Department of Transportation

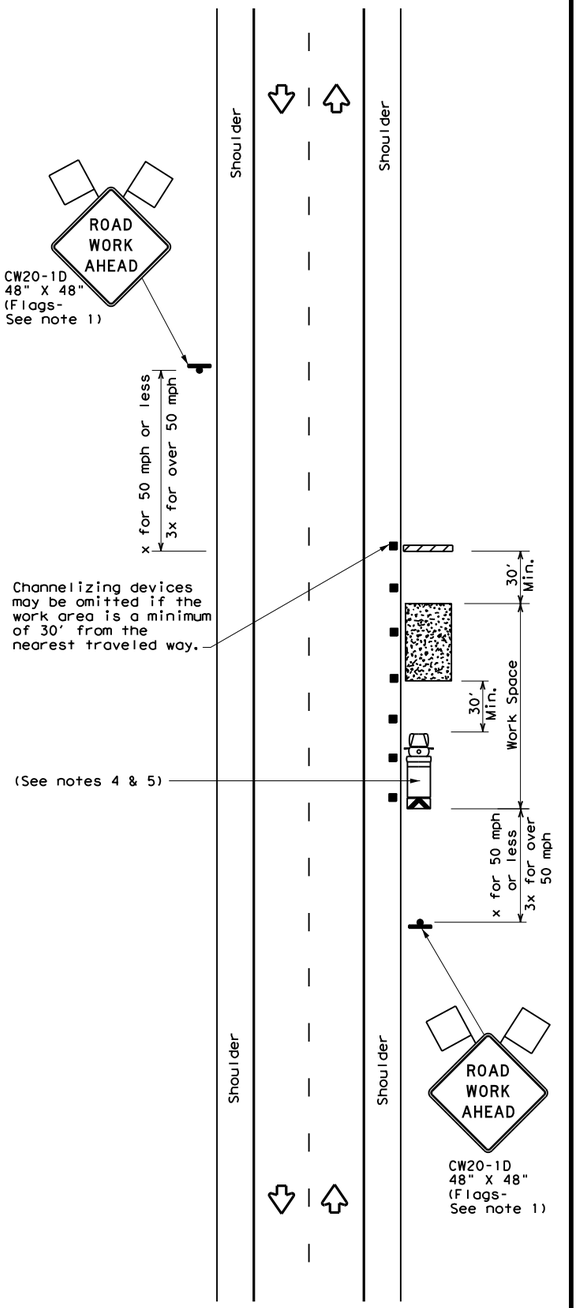
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES FOR DIVIDED HIGHWAYS

TCP(1-5)-18

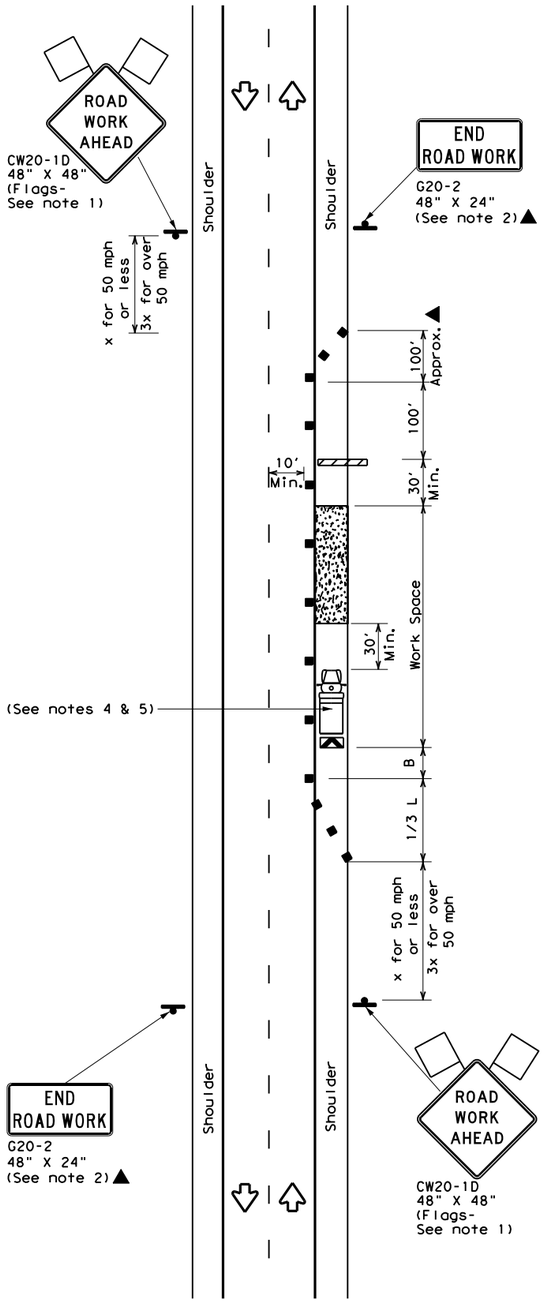
FILE: tcp1-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT February 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-18	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		47

DATE: 1/12/2022 2:06:46 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_(2-1)-18.dgn



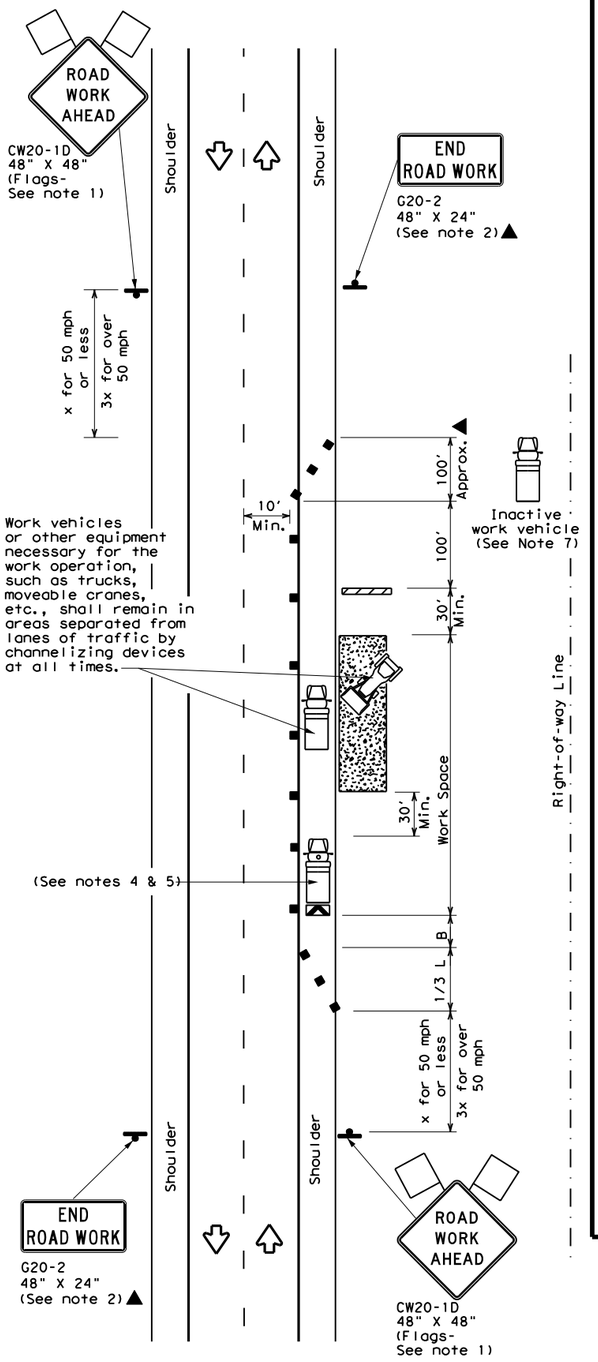
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

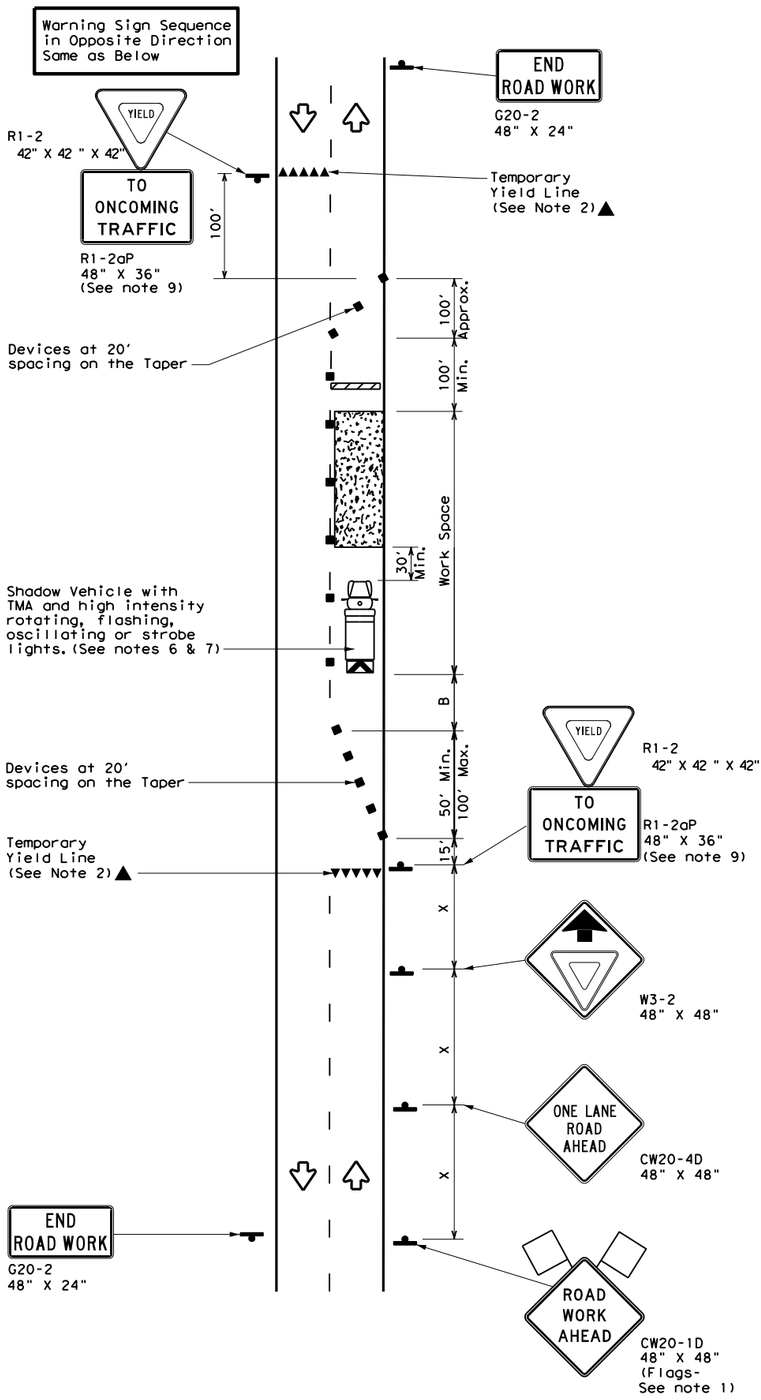
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

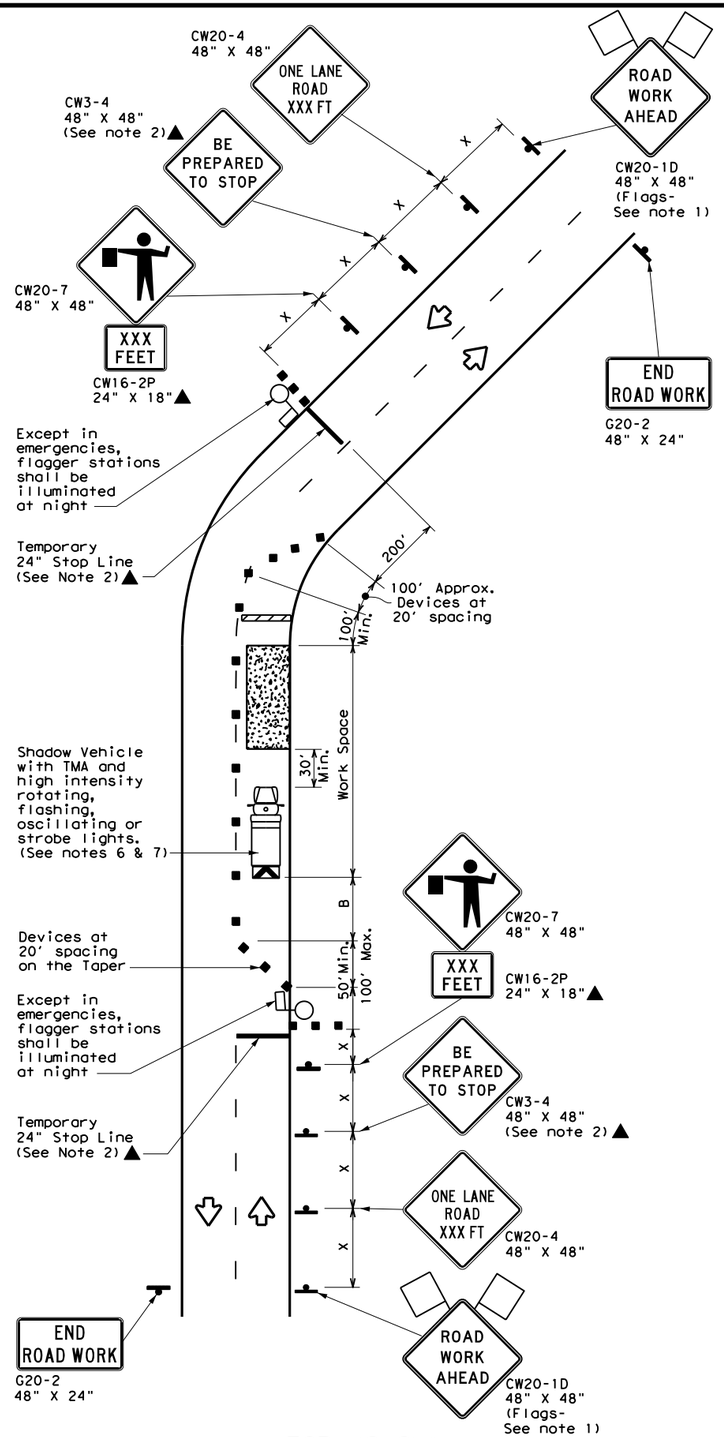
TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	TYL	ANDERSON		48
1-97 2-18				

DATE: 1/12/2022 2:06:51 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_TCP(2-2)-18-tcp2-2-18.dgn



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



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

LEGEND

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L=\frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L=WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

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

TYPICAL USAGE

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

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

TCP (2-2b)

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

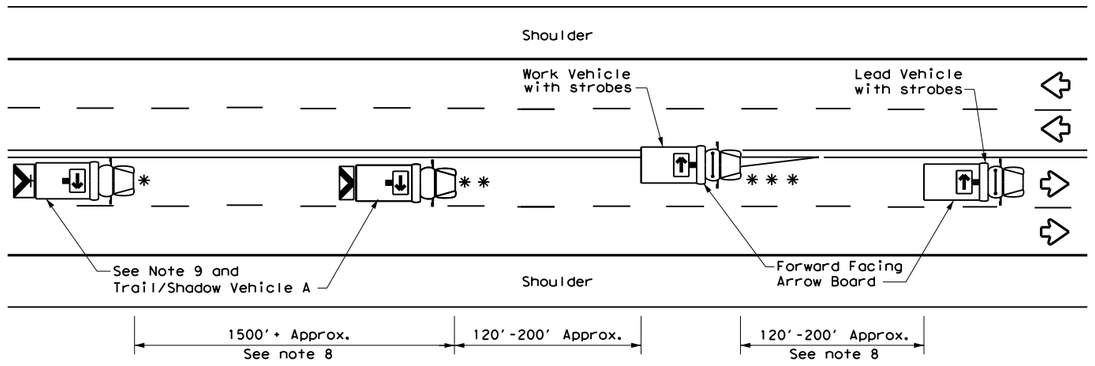
Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

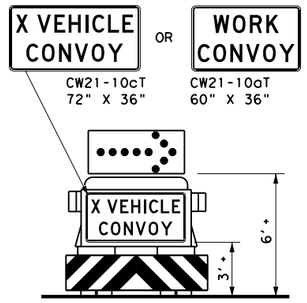
FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	TYL	ANDERSON		49
4-98 2-18				

DATE: 1/12/2022 2:06:55 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_TCP(3b1)-13-22.dgn



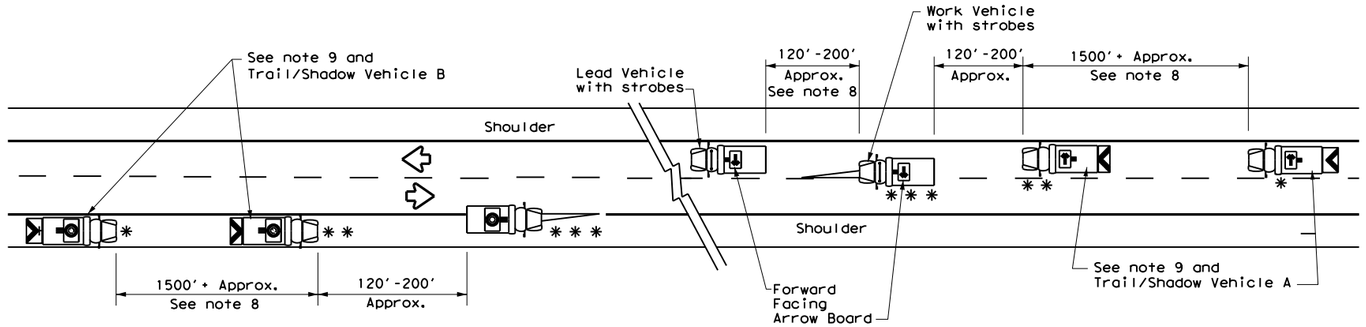
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

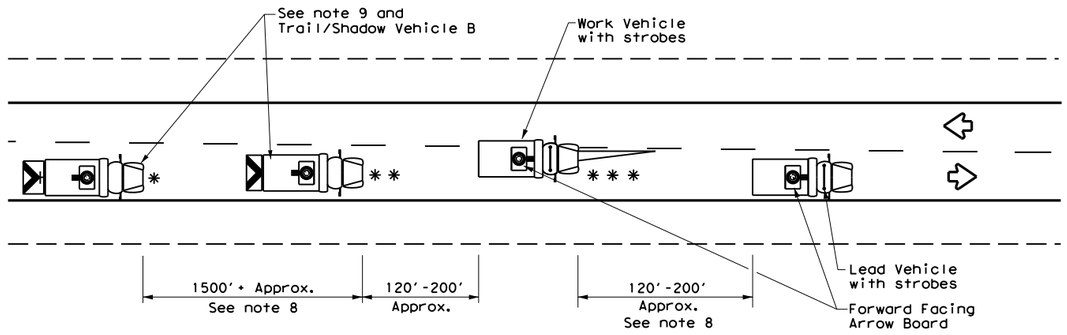


WORK ON SHOULDER

WORK ON TRAVEL LANE

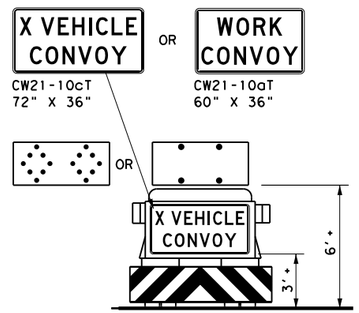
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

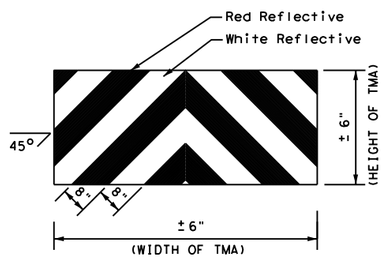
with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.
2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and TRAIL VEHICLE are required.
4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.
5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.
6. Each vehicle shall have two-way radio communication capability.
7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.
9. "X VEHICLE CONVOY" (CW21-10cT) or "WORK CONVOY" (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" X 48" diamond shaped "WORK CONVOY"(CW21-10T) or "X VEHICLE CONVOY" (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The "X VEHICLE CONVOY" sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.
10. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a "DO NOT PASS" (R4-1) sign should be placed on the back of the rearmost protection vehicle.



STRIPING FOR TMA

Texas Department of Transportation

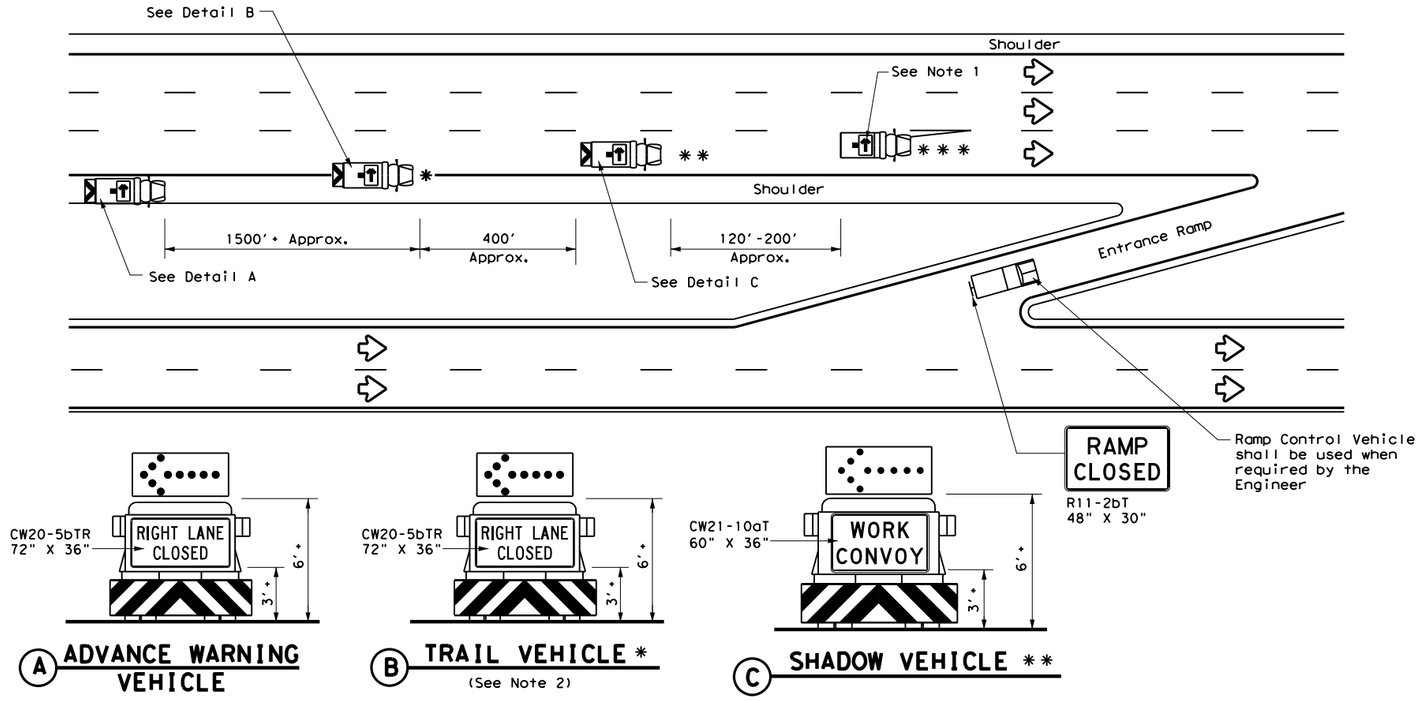
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

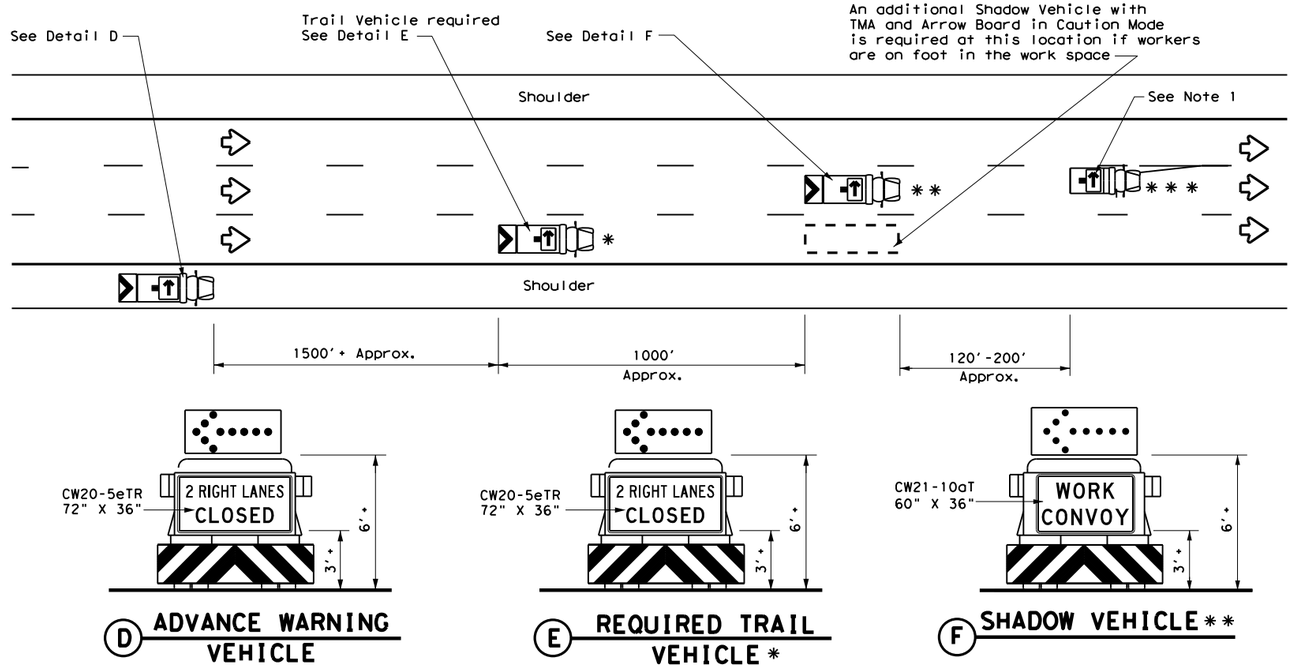
TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	TYL	ANDERSON		50
1-97				

DATE: 1/12/2022 2:06:59 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_TCP(3-2)-13-22.dgn



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



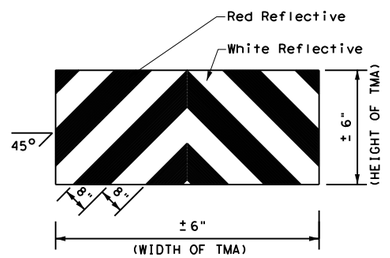
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

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

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

GENERAL NOTES

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



STRIPING FOR TMA

Texas Department of Transportation

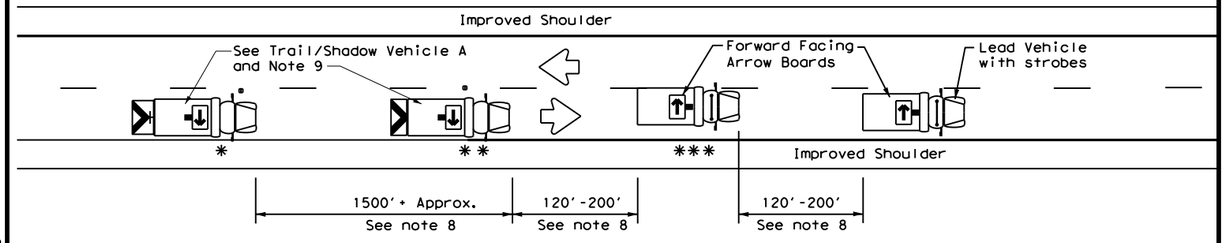
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS

TCP(3-2)-13

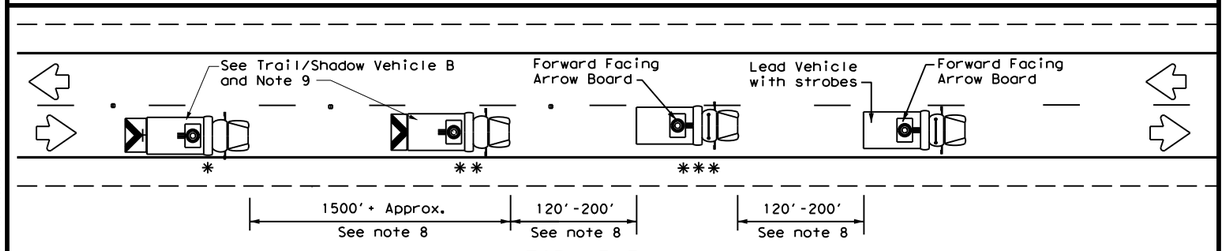
FILE: tcp3-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	TYL	ANDERSON		51
1-97				

176



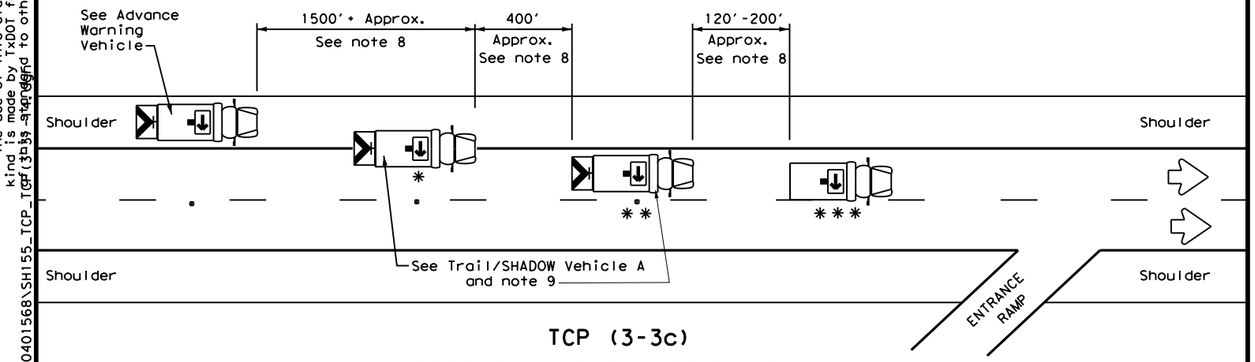
TCP (3-3a)

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



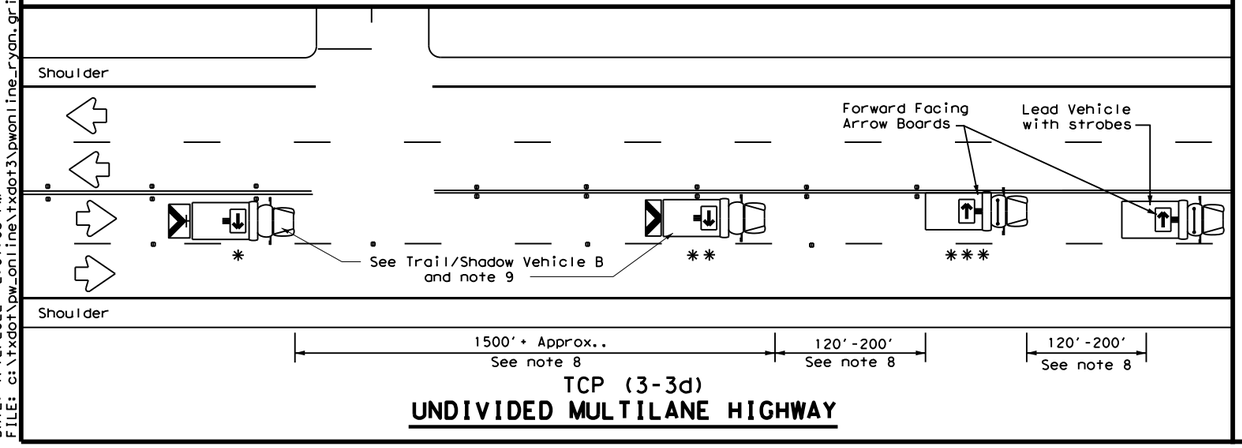
TCP (3-3b)

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



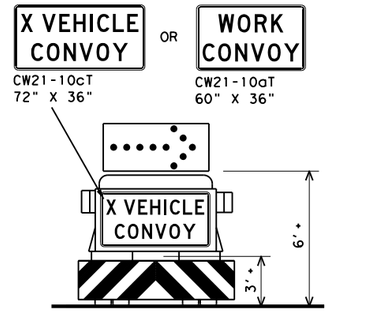
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



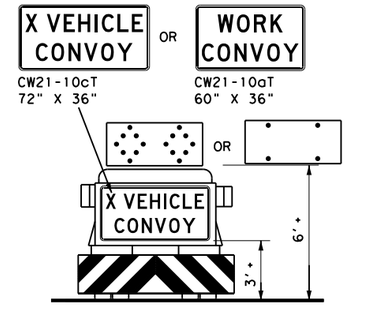
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



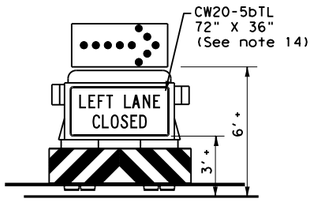
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

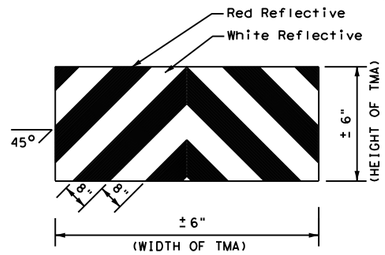


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

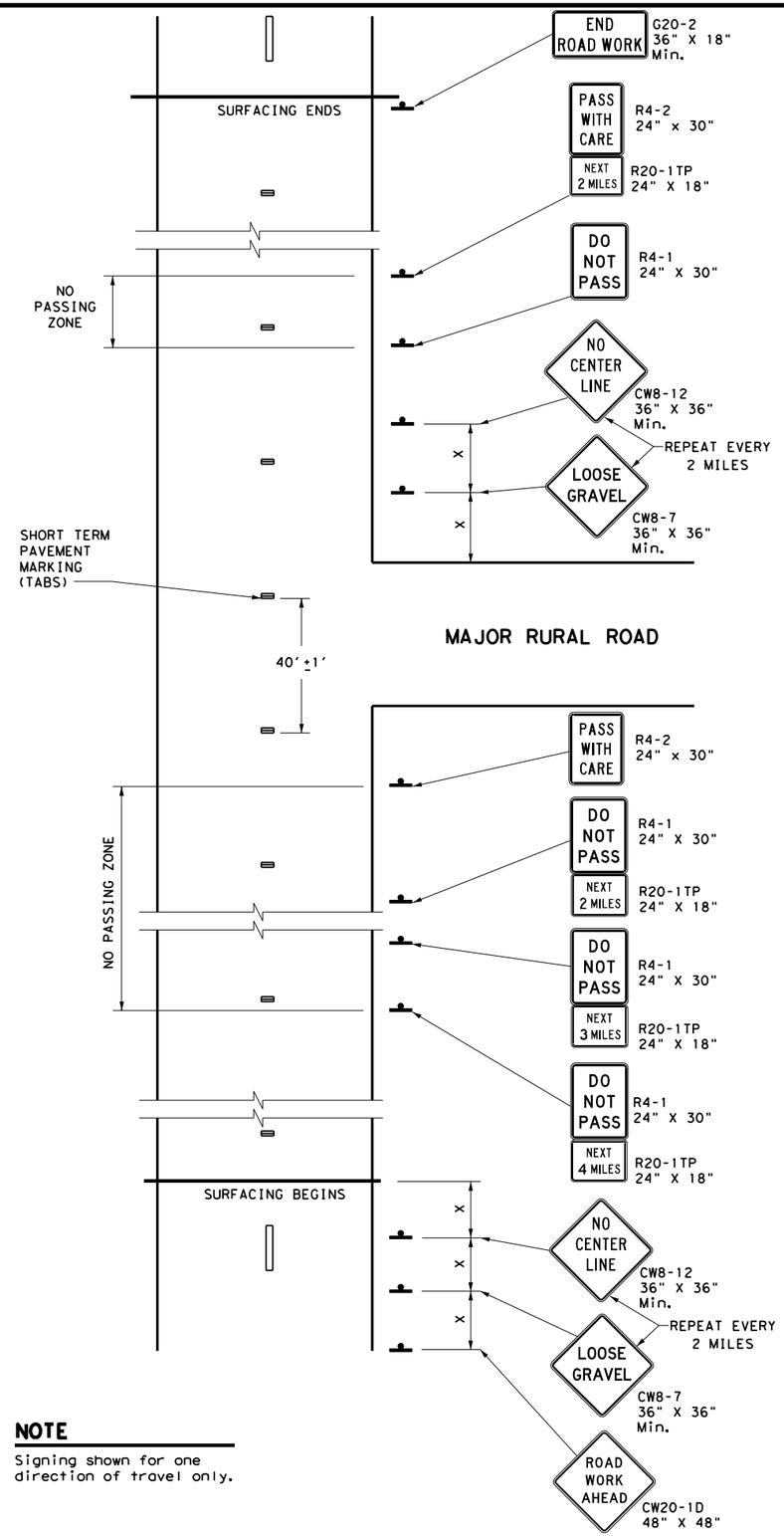
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
MOBILE OPERATIONS
RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL
TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	TYL	ANDERSON		52
1-97 7-14				

DATE: 1/12/2022 2:07:03 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_TCP(3b3-3)-14.dgn

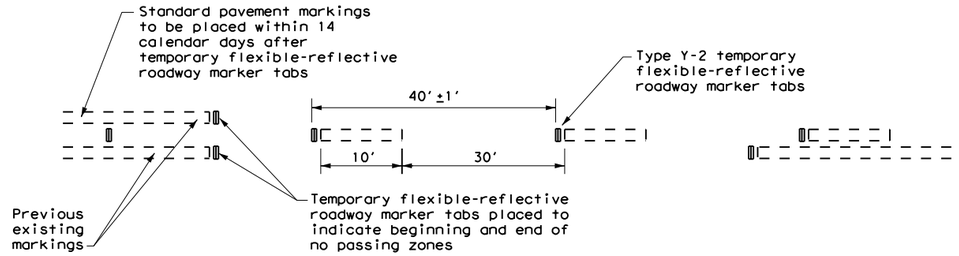
DATE: 1/12/2022 2:07:09 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_tcp7-1-13.dgn



NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

"DO NOT PASS" SIGN (R4-1) and NO-PASSING ZONES

A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.

B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.

C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshield and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.

D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.

"NO CENTER LINE" SIGN (CW8-12)

A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.

B. At the time construction activity obliterates the existing center line markings(low volume roads may not have an existing centerline), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.

C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.

"LOOSE GRAVEL" SIGN (CW8-7)

A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.

B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

PAVEMENT MARKINGS

A. Temporary markings for surfacing projects shall be Temporary Flexible-reflective Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement
no more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the reflective strip shall be removed.

B. Tabs shall not be used to simulate edge lines.

C. Tab placement for overlay/inlay operations shall be as shown on the WZ(STPM) standard sheet.

COORDINATION OF SIGN LOCATIONS

A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.

B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T)sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.

Posted Speed *	Minimum Sign Spacing "X" Distance
30	120'
35	160'
40	240'
45	320'
50	400'
55	500'
60	600'
65	700'
70	800'
75	900'

* Conventional Roads Only

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

GENERAL NOTES

1. The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where tabs must be placed prior to the surfacing operation which will cover or obliterate the existing pavement markings.
2. The devices shown on this sheet are to be used to supplement those required by the BC Standards or others required elsewhere in the plans.
3. Signs shall be erected as detailed on the BC Standards or the Compliant Work Zone Traffic Control Devices List (CWZTCD) on supports approved for Long-Term / Intermediate-Term Work Zone Sign Supports.
4. When surfacing operations take place on divided highways, freeways or expressways, the size of diamond shaped construction warning signs shall be 48" x 48".
5. Signs on divided highways, freeways and expressways will be placed on both right and left sides of the roadway based on roadway conditions as directed by the Engineer.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

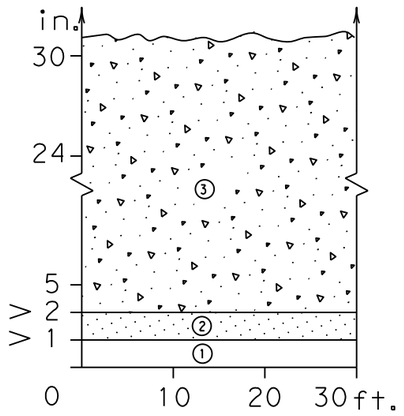
TCP(7-1)-13

FILE:	tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	March 1991	CONT	SECT	JOB	HIGHWAY
REVISIONS		0520	08	071	SH 155
4-92 4-98		DIST	COUNTY		SHEET NO.
1-97 7-13		TYL	ANDERSON		53

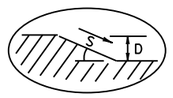
DATE: 1/12/2022 2:07:22 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d039036\SH155_TCP_EDGE.dgn

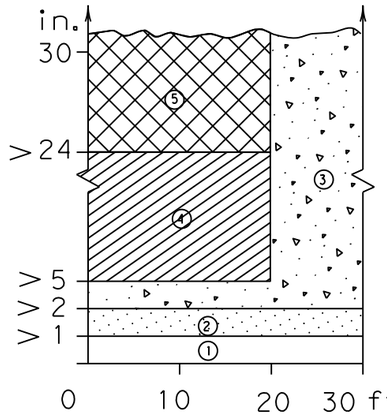
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

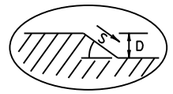


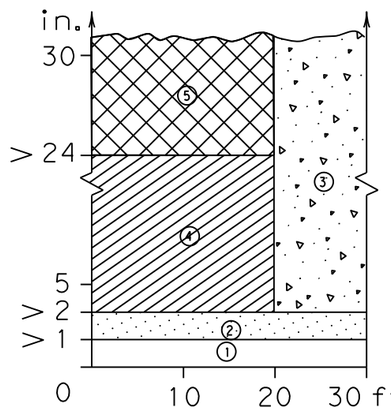
Edge Condition I
S = (3:1) (or flatter)



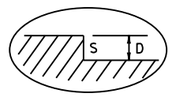


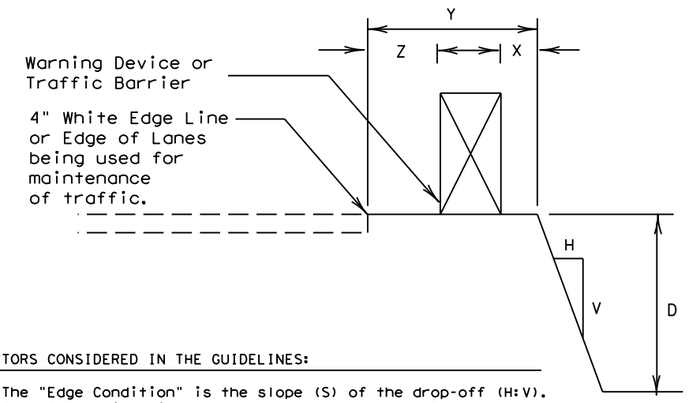
Edge Condition II
S = ((2.99):1) to (1:1)





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





FACTORS CONSIDERED IN THE GUIDELINES:

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

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

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

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

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

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

Edge Condition Notes:

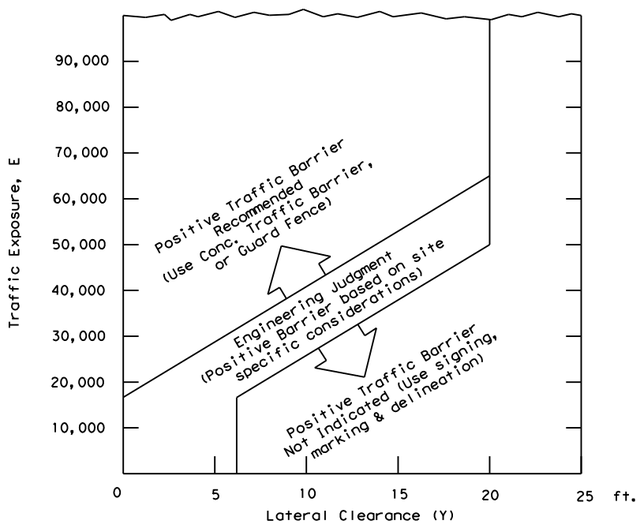
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

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

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

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

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



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

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

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

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

Engineer's Seal

J. Ryan Griffin

Date 01/13/2022

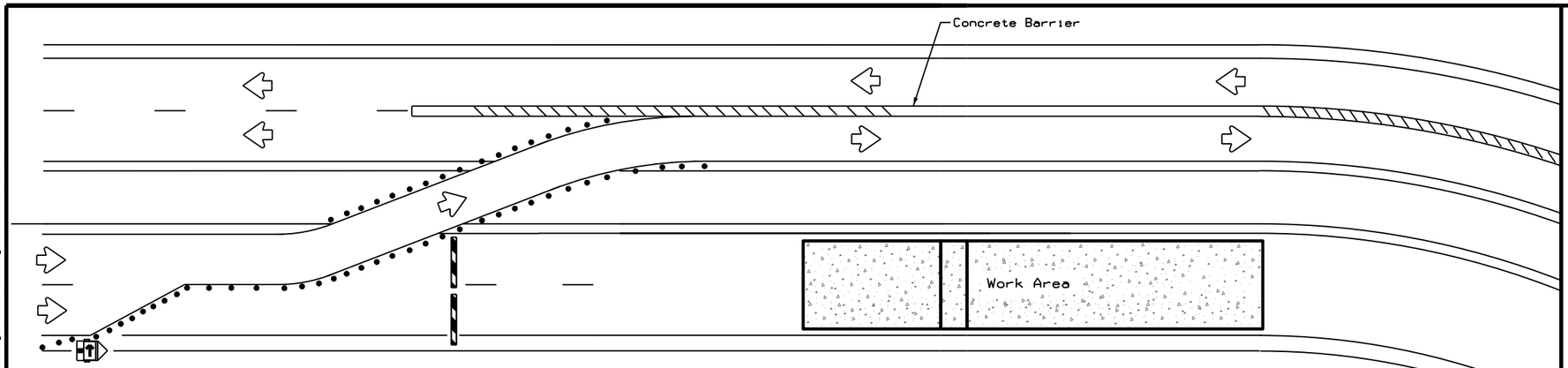
Texas Department of Transportation
Traffic Operations Division

TREATMENT FOR VARIOUS EDGE CONDITIONS

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

REVISIONS	CONT	SECT	JOB	HIGHWAY
03-01	0520	08	071	SH 155
08-01 correct typos	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		54

DATE: 1/12/2022 2:07:34 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_WZ(TD)17.dgn



NOTES:

1. Length of Safety Glare screen will be specified elsewhere in the plans.
2. The cumulative nominal length of the modular safety glare screen units shall equal the length of the individual sections of temporary concrete traffic barrier on which they are installed so the joint between barrier sections will not be spanned by any one safety glare screen unit.
3. Screen Panel/blades will be designed such that reflective sheeting conforming with Departmental Material Specification DMS-8300, Sign Face Materials, Type B or C Yellow, minimum size of 2 inches by 12 inches can be attached to the edge of the panel/blade. The sheeting shall be attached to one glare screen panel/blade per section of concrete barrier not to exceed a spacing of 30 feet. Barrier reflectors are not necessary when panel/blades are installed with reflective sheeting as described.
4. Payment for these devices will be under statewide Special Specification "Modular Glare Screens for Headlight Barrier."
5. This detail is only intended to show types of locations where Glare Screens would be appropriate. Required signing and other devices shall be as shown elsewhere in the plans.

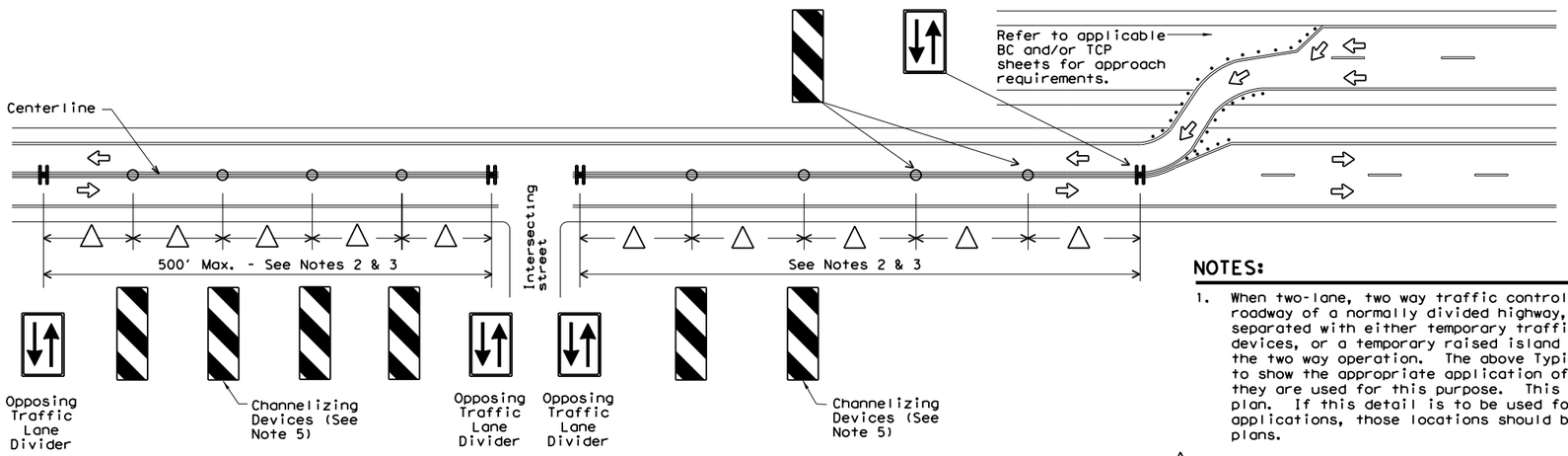
BARRIER DELINEATION WITH MODULAR GLARE SCREENS

LEGEND	
	Type 3 Barricade
• • •	Channelizing Devices
	Trailer Mounted Flashing Arrow Board
	Sign
\\\\	Safety glare screen

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
DELINEATORS AND OBJECT MARKERS	DMS-8600
MODULAR GLARE SCREENS FOR HEADLIGHT BARRIER	DMS-8610

Only pre-qualified products shall be used. A copy of the Compliant Work Zone Traffic Control Devices List" CWZTCD)describes pre-qualified products and their sources and may be found at the following web address:

http://www.txdot.gov/business/resources/producer-list.html



VERTICAL PANELS & OPPOSING TRAFFIC LANE DIVIDERS (OTLD) SEPARATING TWO-WAY TRAFFIC ON NORMALLY DIVIDED HIGHWAYS

NOTES:

1. When two-lane, two way traffic control must be maintained on one roadway of a normally divided highway, opposing traffic shall be separated with either temporary traffic barriers, channelizing devices, or a temporary raised island throughout the length of the two way operation. The above Typical Application is intended to show the appropriate application of channelizing devices when they are used for this purpose. This is not a traffic control plan. If this detail is to be used for other types of roads or applications, those locations should be stated elsewhere in the plans.

△2. Space devices according to the Tangent Spacing shown on the Device Spacing table on BC(9) but not exceeding 100'.

3. Every fifth device should be an OTLD except when spaced closer to accommodate an intersection. An OTLD should be the first device on each side of intersecting streets or roads.
4. Locations where surface mount bases with adhesives or self-righting devices will be required in order to maintain them in their proper position should be noted elsewhere in the plans.
5. Channelizing devices are to be vertical panels, 42" cones or tubular markers that are at least 36" tall. Tubular markers used to separate traffic should have a rubber base weighing at least 30 pounds. Tubular markers that are 42" tall or more shall have four bands of reflective material as detailed for 42" cones on BC(10). Tubular markers less than 42" but at least 36" tall shall have three bands of 3" wide white reflective material spaced 2" apart. Reflective material shall meet DMS-8300, Type A.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TYPICAL DETAILS

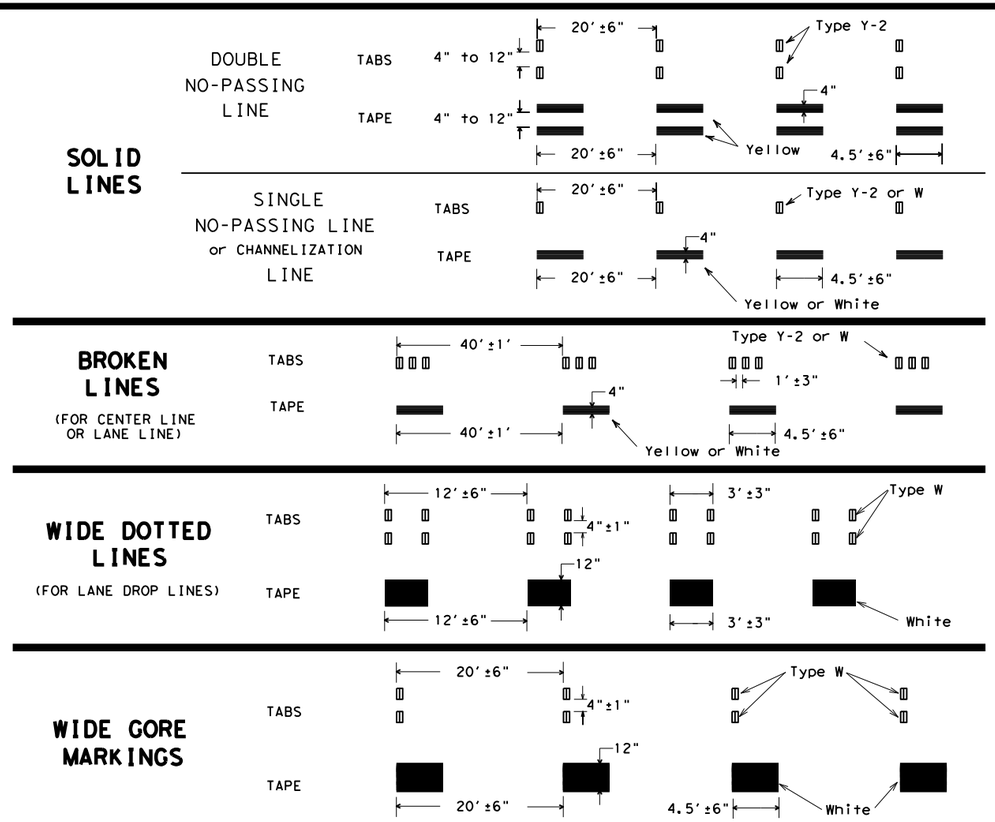
WZ(TD)-17

FILE: wztd-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-17 4-98 3-03 7-13	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		55

110

DATE: 1/12/2022 2:07:39 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_WZSTPM-13.dgn

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



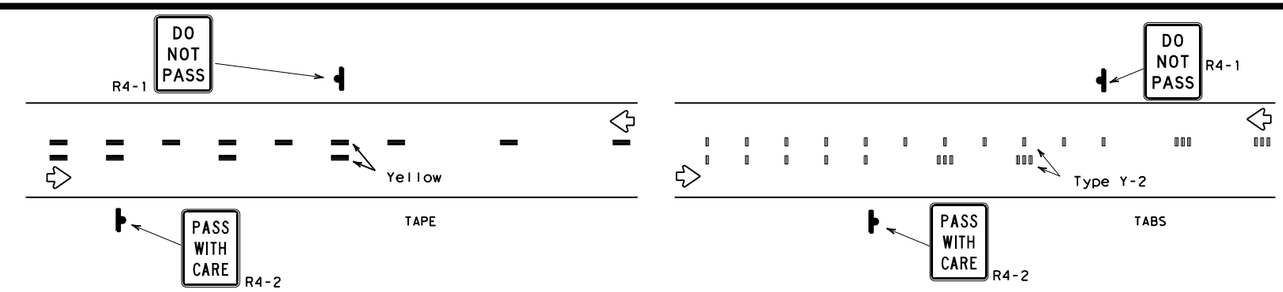
NOTES:

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

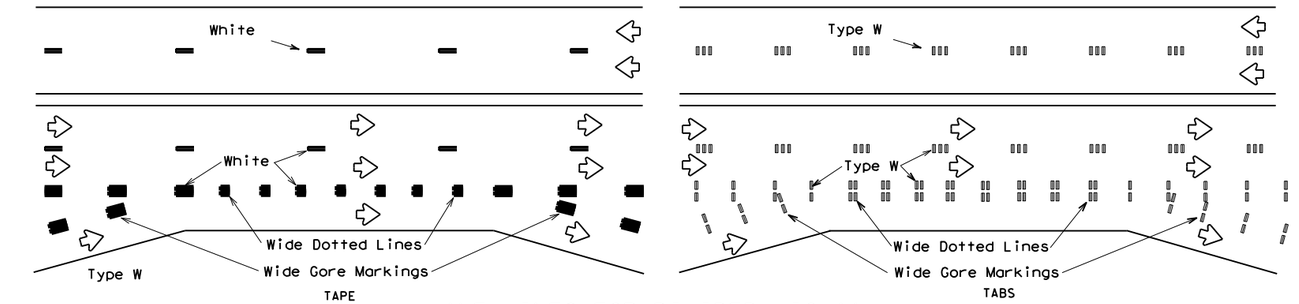
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

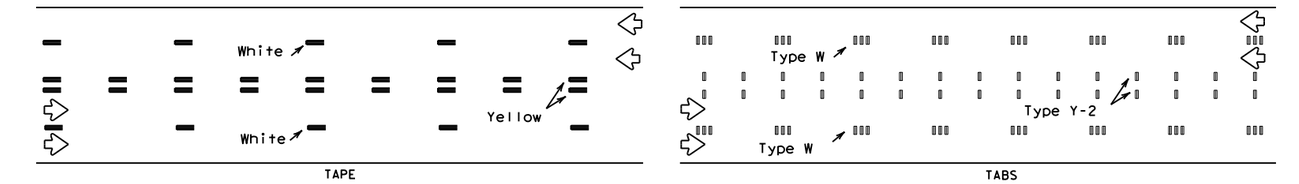
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



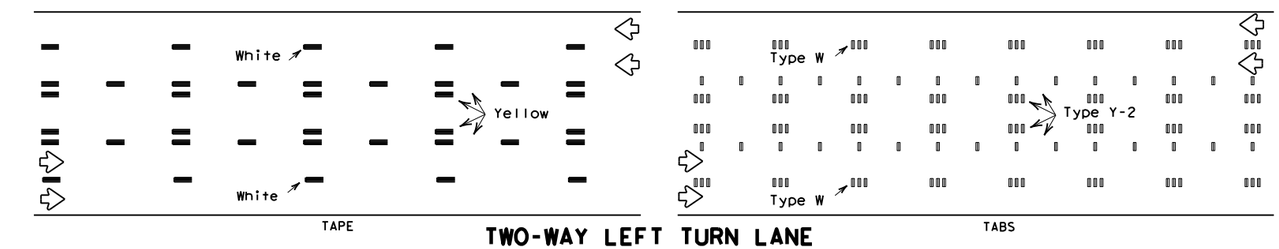
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



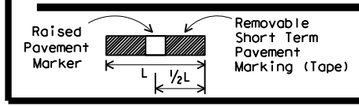
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

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

RAISED PAVEMENT MARKERS

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

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

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:
   http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

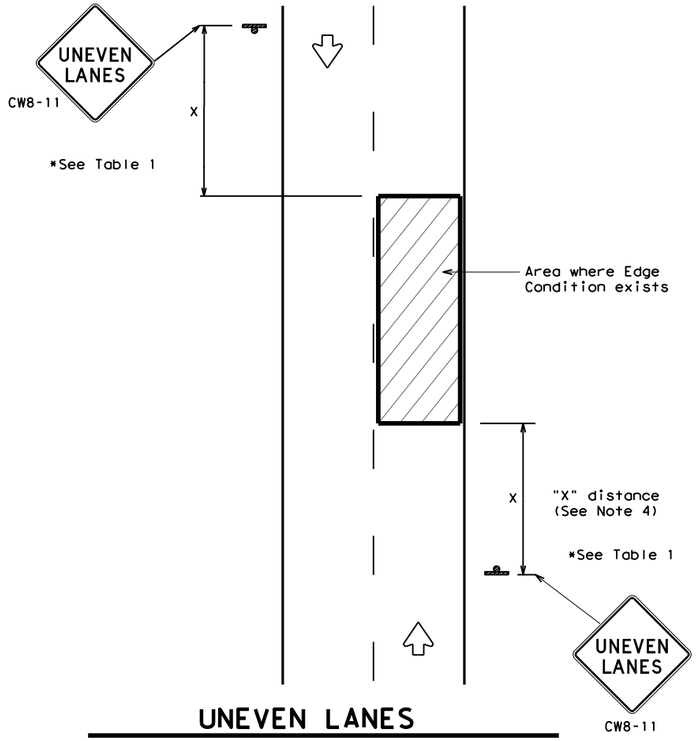
Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

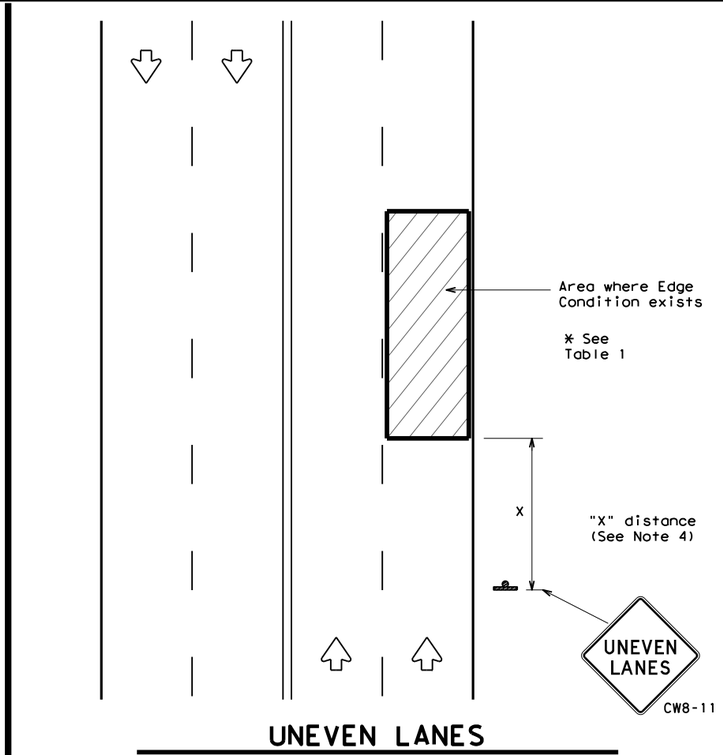
WZ(STPM)-13

FILE:	wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS		0520	08	071	SH 155
1-97		DIST	COUNTY		SHEET NO.
3-03		TYL	ANDERSON		56
7-13					

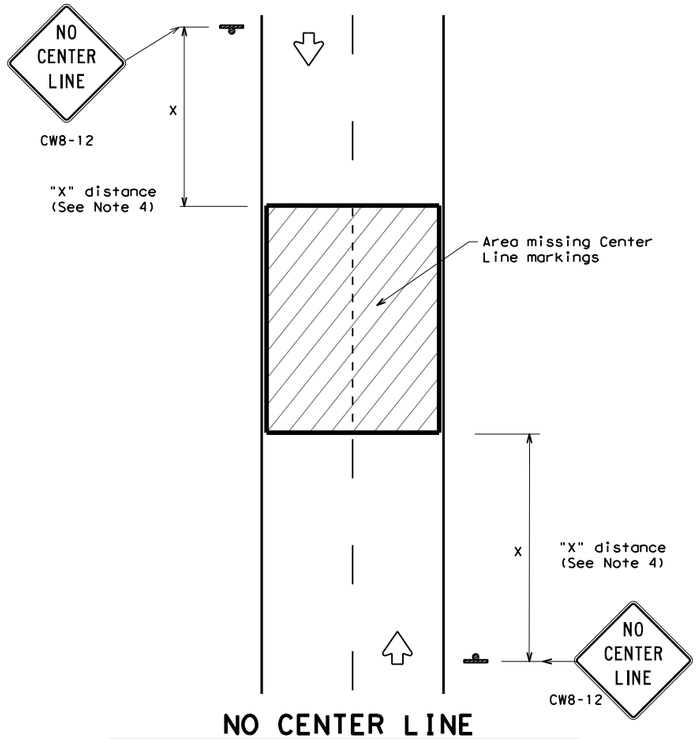
DATE: 1/12/2022 2:07:44 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_wzu1-13.dgn



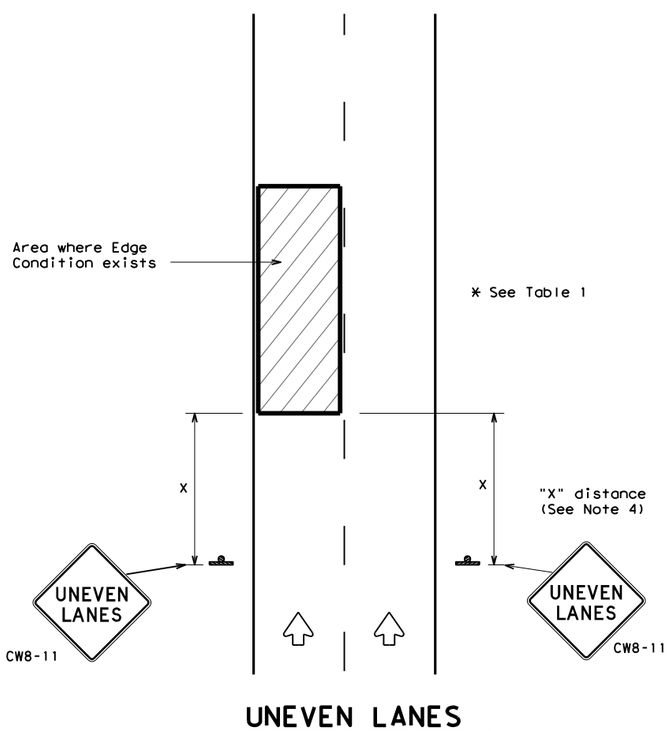
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

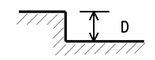
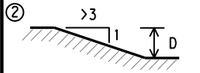
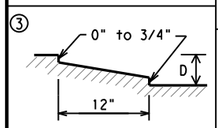
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

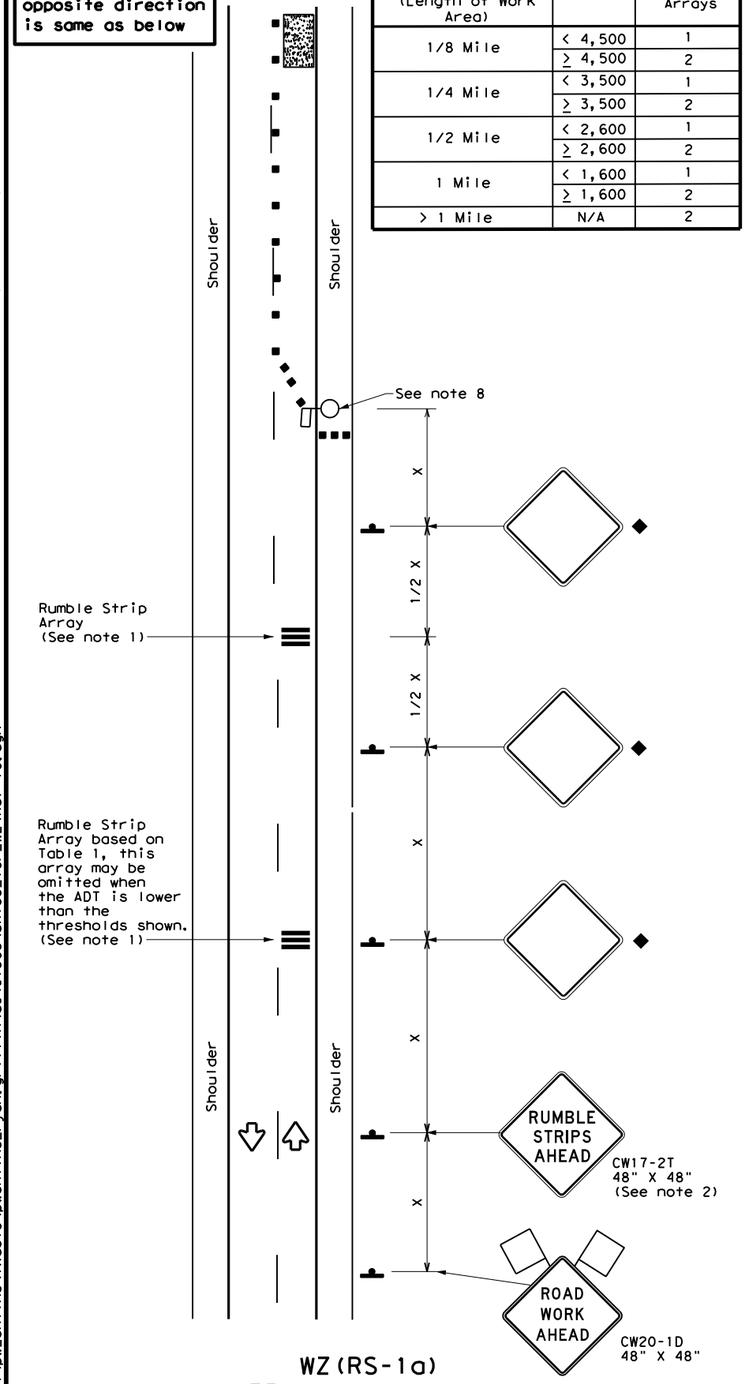
WZ(UL)-13

FILE: wzu1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	TYL	ANDERSON		57

DATE: 1/12/2022 2:07:48 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401568\SH155_TCP_WZRS16.dgn

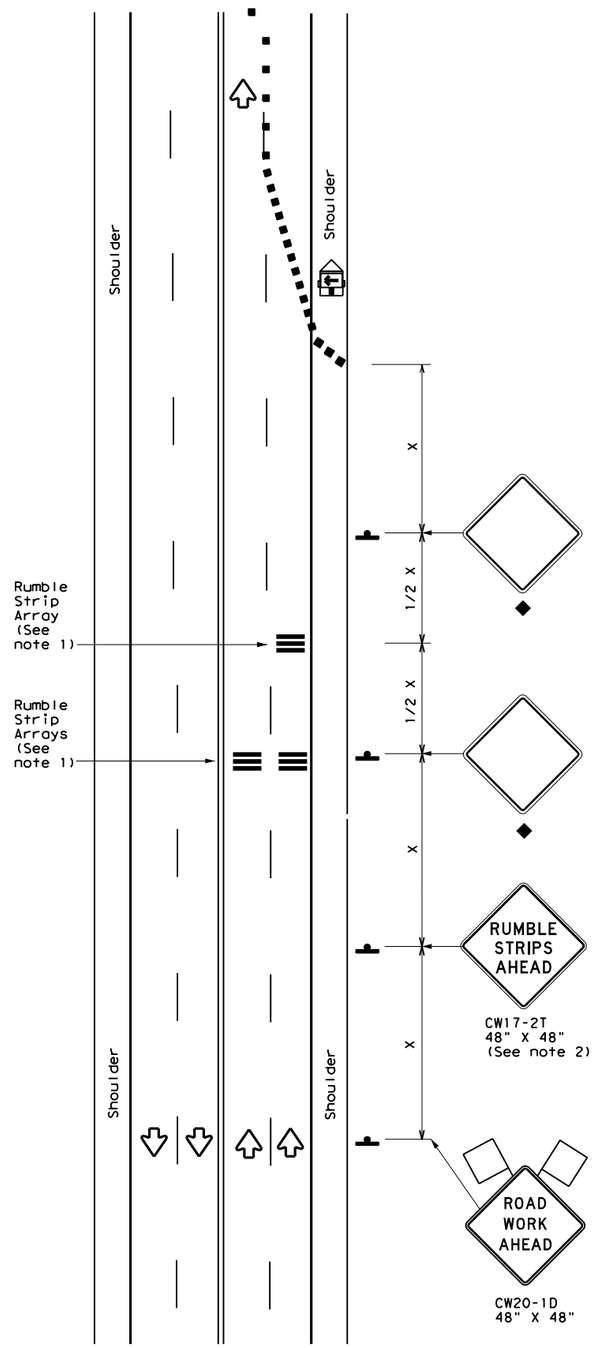
Warning sign and rumble strip sequence in opposite direction is same as below

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



WZ(RS-1a)
75 mph or Less

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)
75 mph or Less

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

TABLE 2	
Speed	Approximate distance between strips in an Array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
> 55 MPH	20'

Texas Department of Transportation

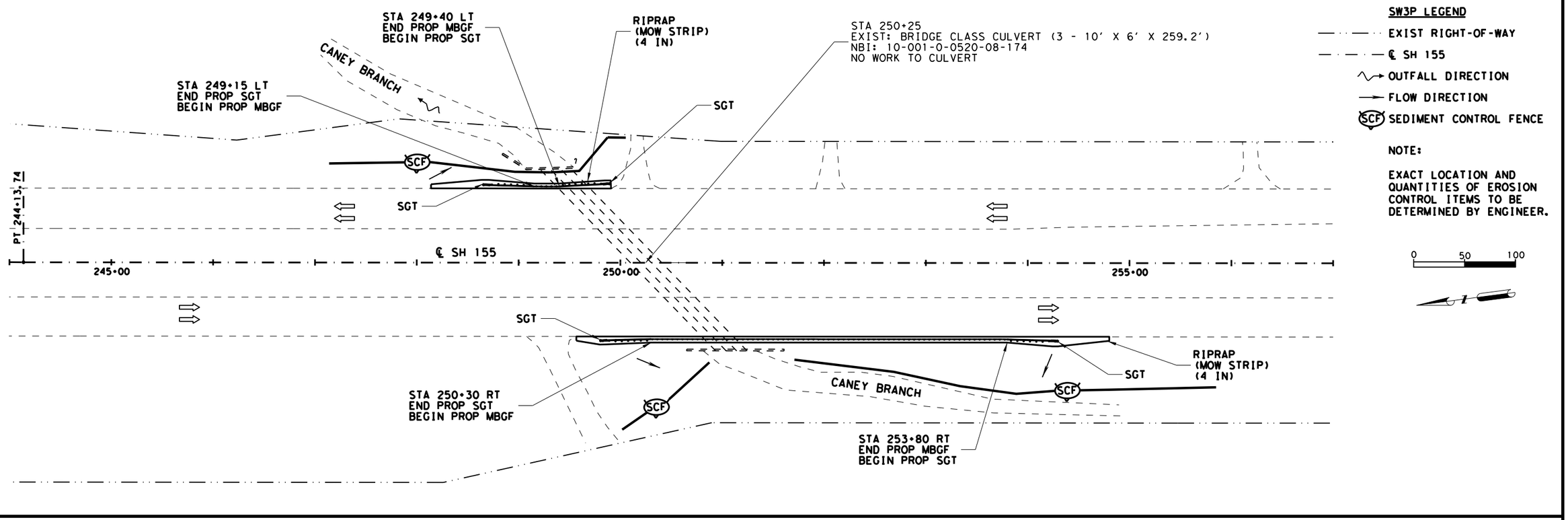
Traffic Operations Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-16

FILE: wzrs16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
2-14	DIST	COUNTY		SHEET NO.
4-16	TYL	ANDERSON		58

117



DATE: 1/12/2022 2:08:01 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390362\SH155_ROW_MBGF_1.dgn

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER

J. Ryan Griffin

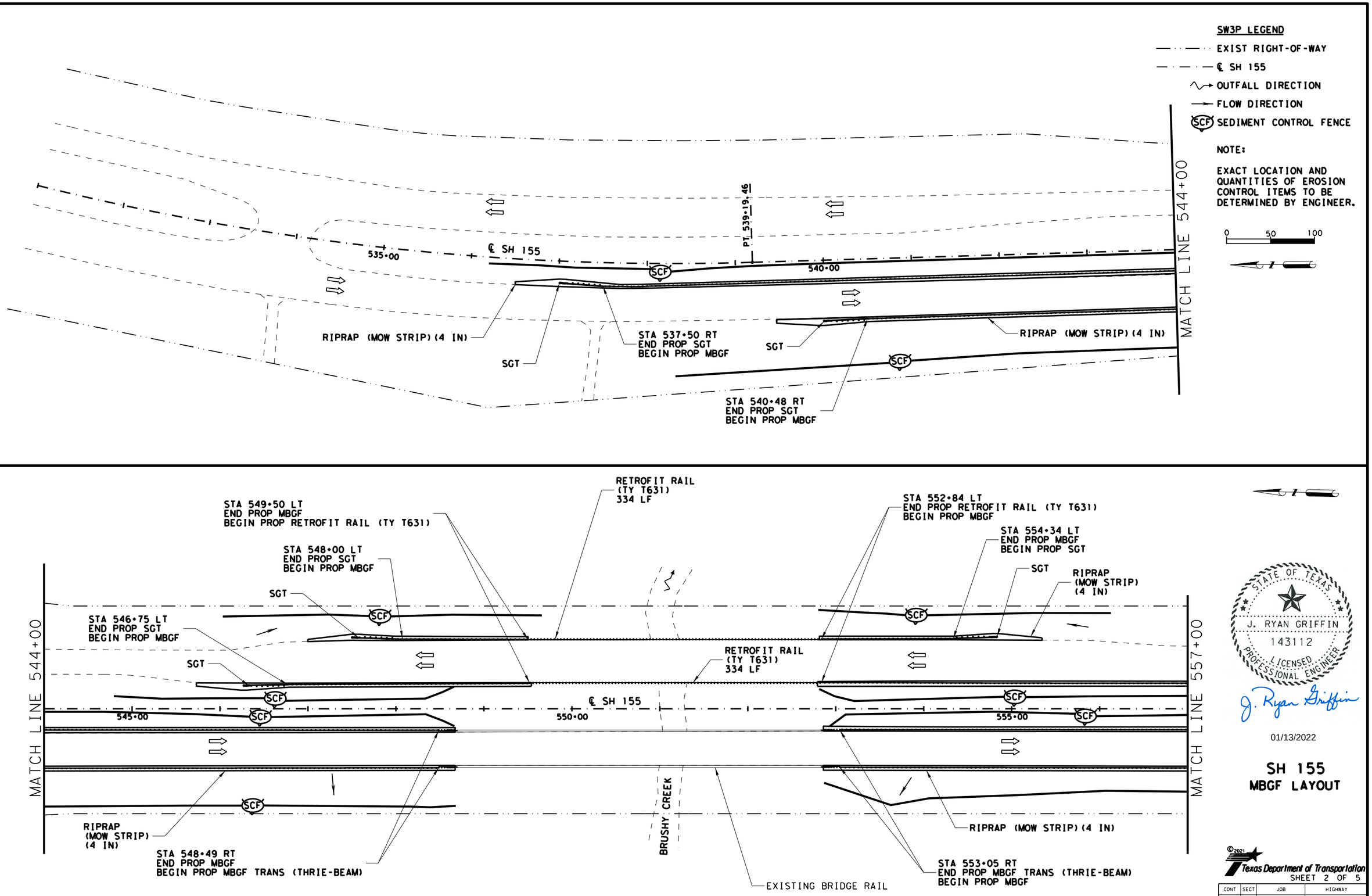
01/13/2022

SH 155
MBGF LAYOUT

Texas Department of Transportation

SHEET 1 OF 5

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		59



STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

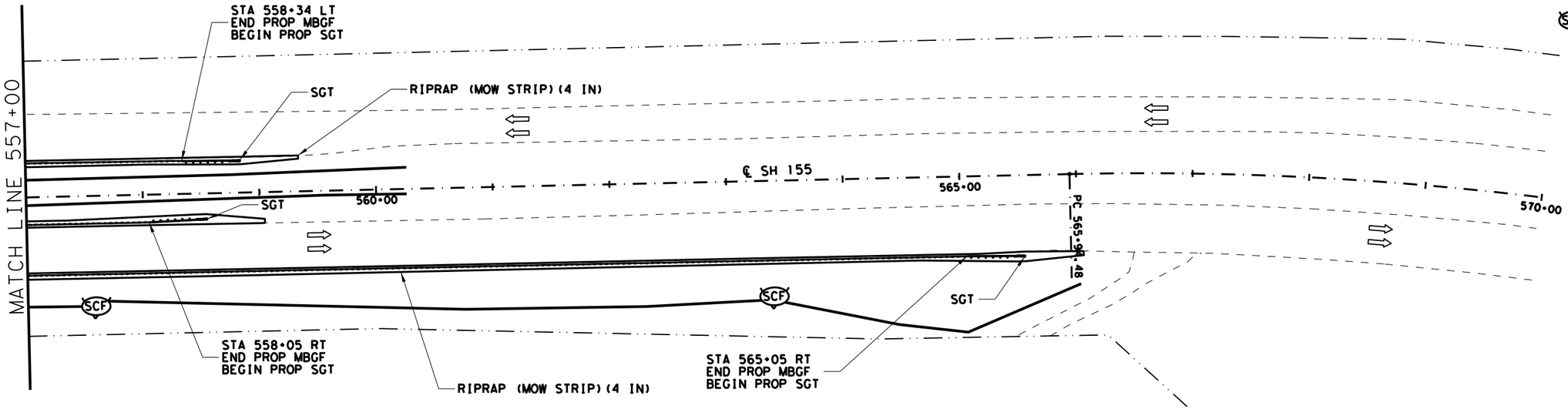
SH 155
MBGF LAYOUT

Texas Department of Transportation

SHEET 2 OF 5

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		60

DATE: 1/12/2022 2:08:05 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390362\SH155_ROW_MBGF_2.dgn



SW3P LEGEND

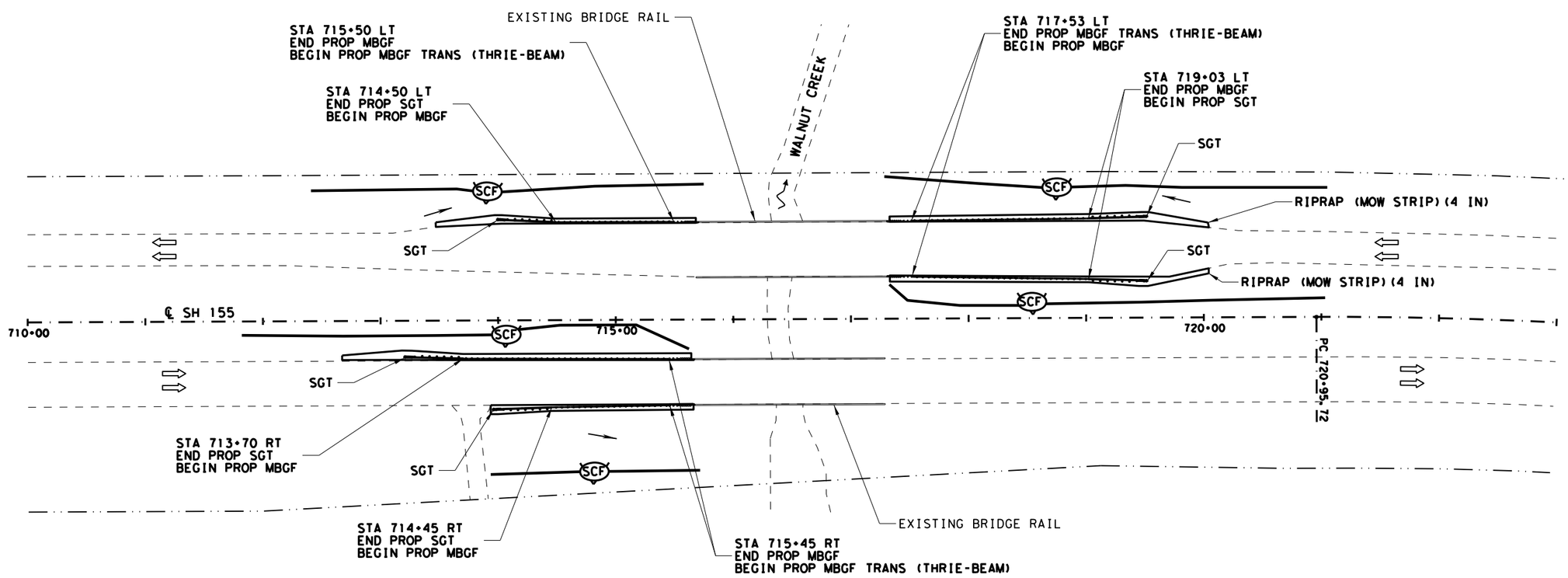
- EXIST RIGHT-OF-WAY
- ℄ SH 155
- OUTFALL DIRECTION
- FLOW DIRECTION
- SCF SEDIMENT CONTROL FENCE

NOTE:

EXACT LOCATION AND QUANTITIES OF EROSION CONTROL ITEMS TO BE DETERMINED BY ENGINEER.

1

0 50 100



1

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

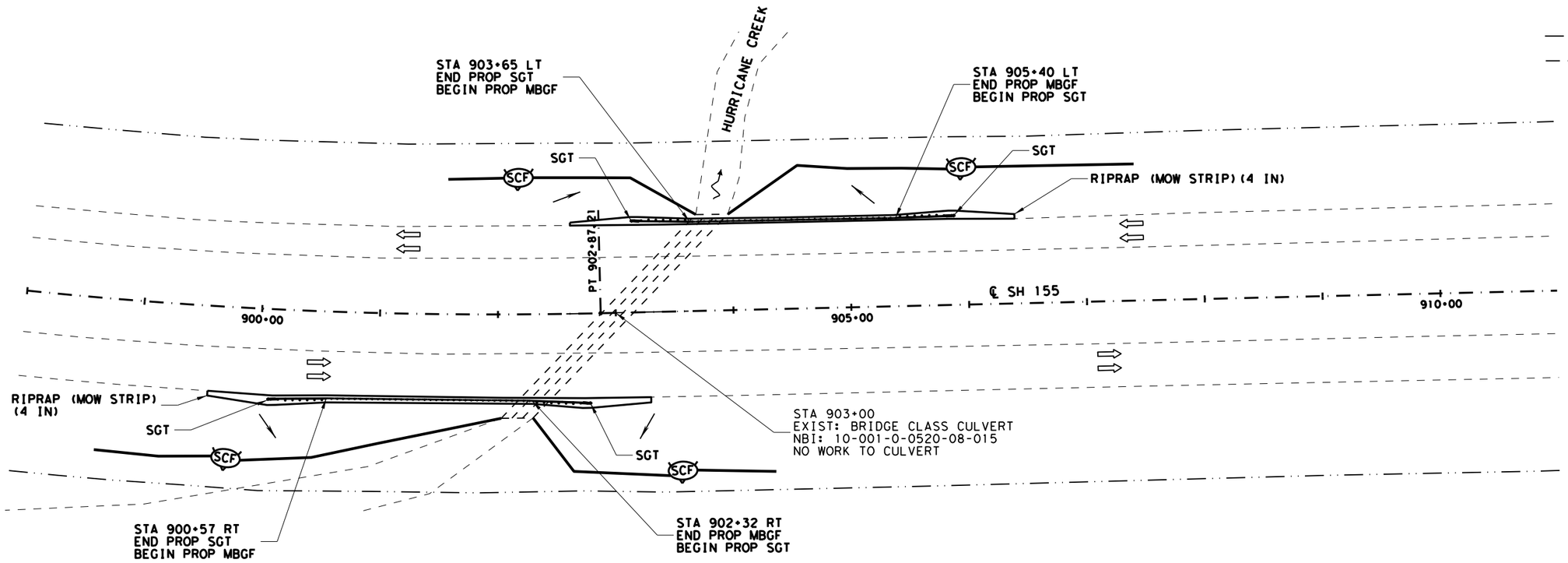
SH 155
MBGF LAYOUT

Texas Department of Transportation

SHEET 3 OF 5

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		61

DATE: 1/12/2022 2:08:10 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390362\SH155_ROW_MBGF_3.dgn



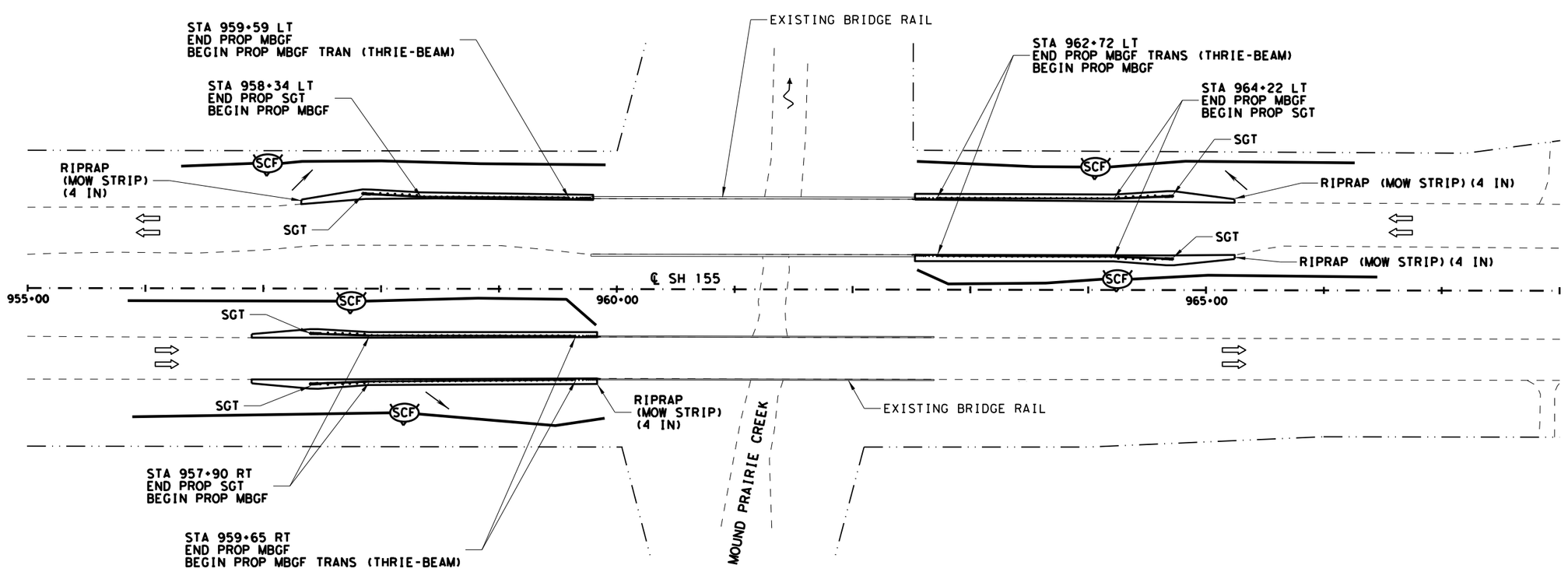
SW3P LEGEND

- EXIST RIGHT-OF-WAY
- ℄ SH 155
- OUTFALL DIRECTION
- FLOW DIRECTION
- SCF SEDIMENT CONTROL FENCE

NOTE:

EXACT LOCATION AND QUANTITIES OF EROSION CONTROL ITEMS TO BE DETERMINED BY ENGINEER.

0 50 100



STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

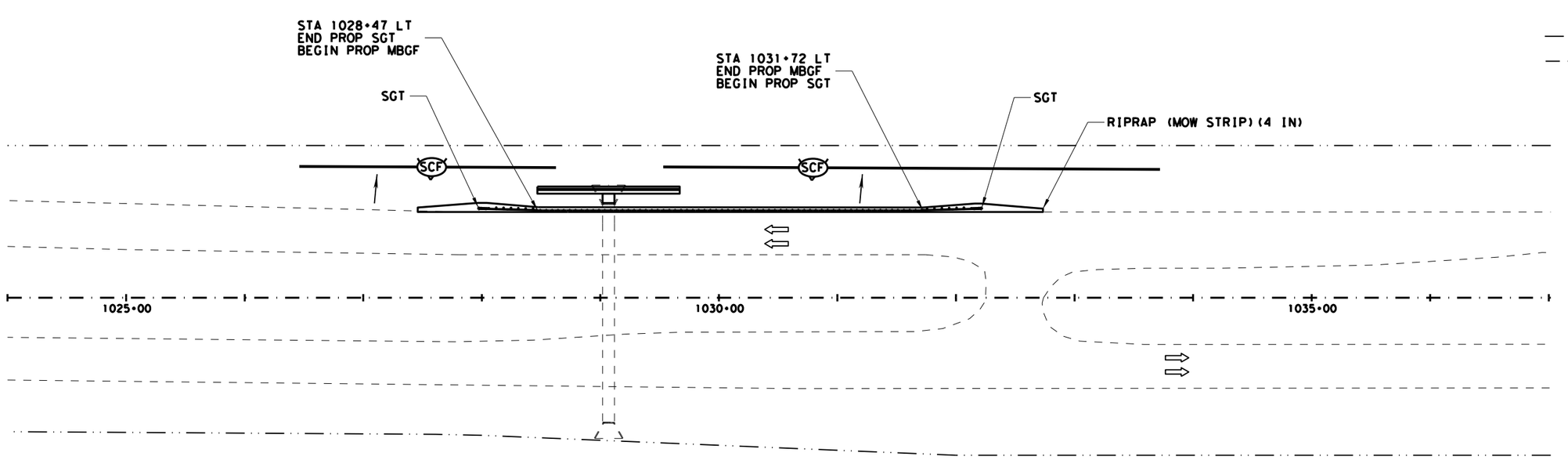
SH 155
MBGF LAYOUT

Texas Department of Transportation

SHEET 4 OF 5

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		62

DATE: 1/12/2022 2:08:14 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390362\SH155_ROW_MBGF_4.dgn



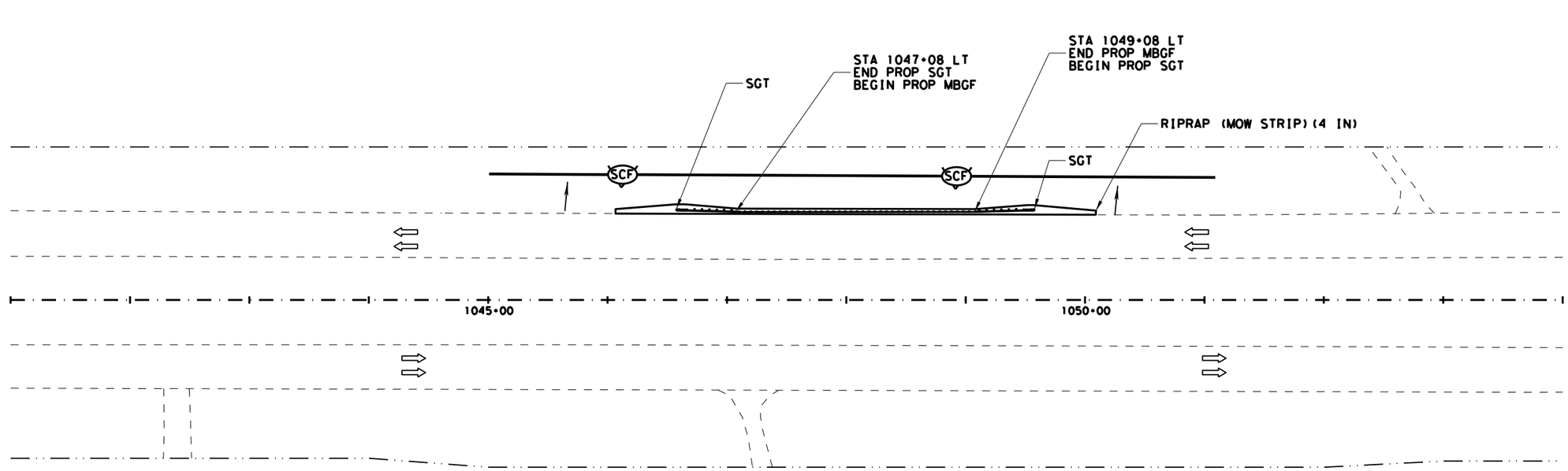
SW3P LEGEND

- EXIST RIGHT-OF-WAY
- ℄ SH 155
- OUTFALL DIRECTION
- FLOW DIRECTION
- SCF SEDIMENT CONTROL FENCE

NOTE:

EXACT LOCATION AND QUANTITIES OF EROSION CONTROL ITEMS TO BE DETERMINED BY ENGINEER.

0 50 100



STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

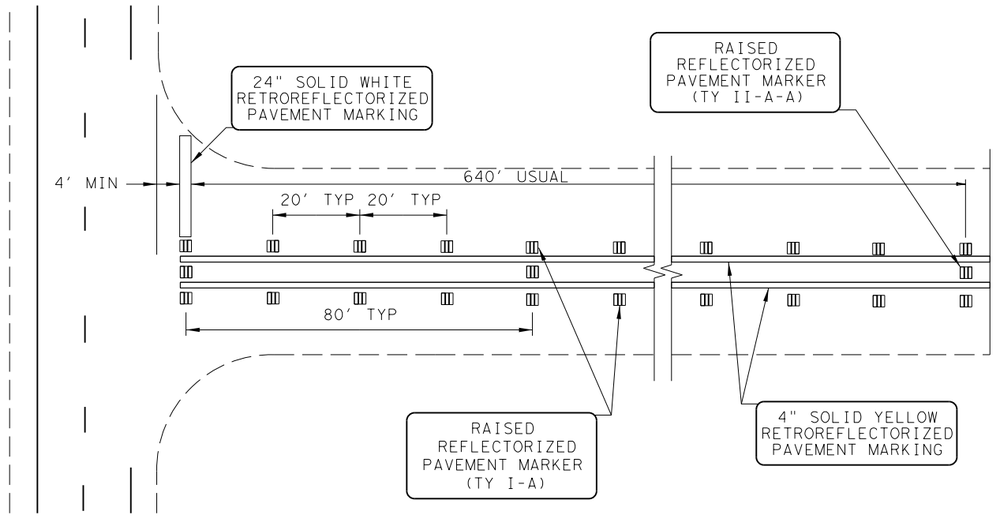
SH 155
MBGF LAYOUT

Texas Department of Transportation

SHEET 5 OF 5

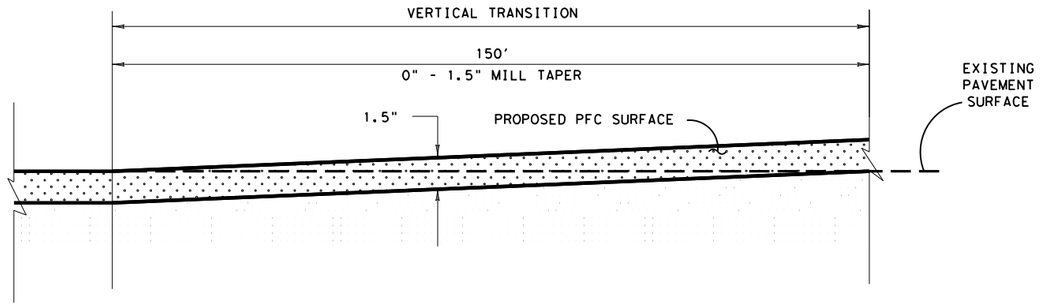
CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		63

DATE: 1/12/2022 2:08:18 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390362\SH155_ROW_MBGF_5.dgn



PAVEMENT MARKING TREATMENT
AT STATE MAINTAINED HIGHWAY INTERSECTIONS

REVISED: 05/2018



STA 159+60	BEGIN PROJECT	STA 161+10
STA 171+70	CADDO CREEK BRIDGE	STA 173+20
STA 176+80	CADDO CREEK BRIDGE	STA 178+30
STA 548+02	BRUSHY CREEK BRIDGE NB	STA 549+52
STA 547+28	BRUSHY CREEK BRIDGE SB	STA 548+78
STA 552+82	BRUSHY CREEK BRIDGE NB	STA 554+32
STA 552+78	BRUSHY CREEK BRIDGE SB	STA 554+28
STA 714+24	WALNUT CREEK BRIDGE NB	STA 715+74
STA 714+23	WALNUT CREEK BRIDGE SB	STA 715+73
STA 717+24	WALNUT CREEK BRIDGE NB	STA 718+74
STA 717+25	WALNUT CREEK BRIDGE SB	STA 718+75
STA 958+32	MOUND PRAIRIE CREEK BRIDGE NB	STA 959+82
STA 958+39	MOUND PRAIRIE CREEK BRIDGE SB	STA 959+89
STA 962+52	MOUND PRAIRIE CREEK BRIDGE NB	STA 964+02
STA 962+62	MOUND PRAIRIE CREEK BRIDGE SB	STA 964+12
STA 1170+50	END PROJECT NB	STA 1172+00
STA 1170+50	END PROJECT SB	STA 1172+00

VERTICAL TAPER DETAIL

NOTE: CONTRACTOR MUST OBTAIN APPROVAL FROM ENGINEER BEFORE MILLING TAPERS FOR BUTT JOINTS. THE BUTT JOINTS ARE NOT TO BE MILLED UNTIL IMMEDIATELY PRIOR TO SURFACE OPERATION.

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

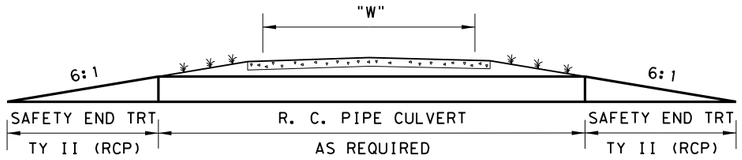
SH 155
MISCELLANEOUS
DETAILS

Texas Department of Transportation

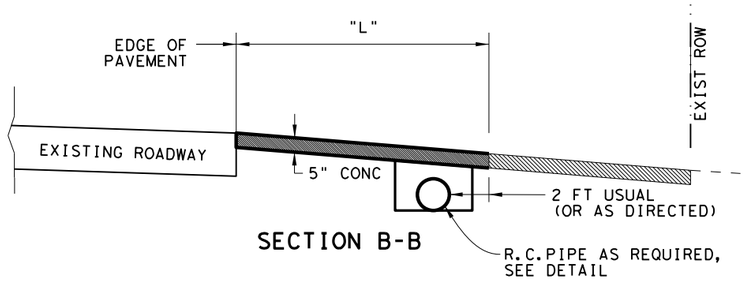
SHEET 1 OF 5

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		64

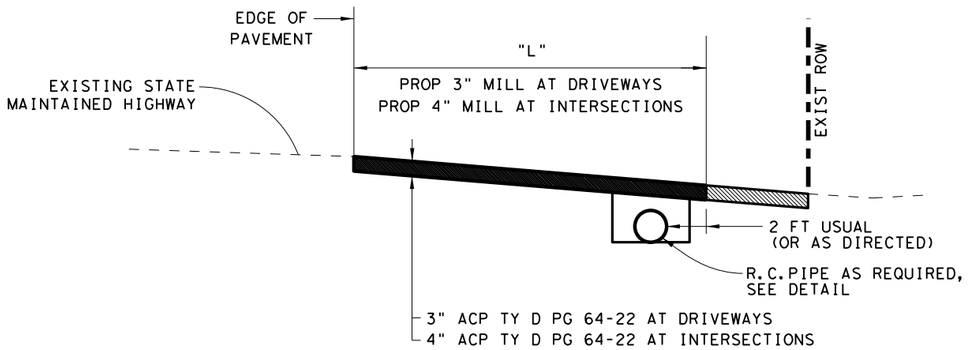
DATE: 1/12/2022 2:08:23 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390362\SH155_RDW_MISC.dgn



DRIVEWAY AND INTERSECTION TYPICAL SECTION

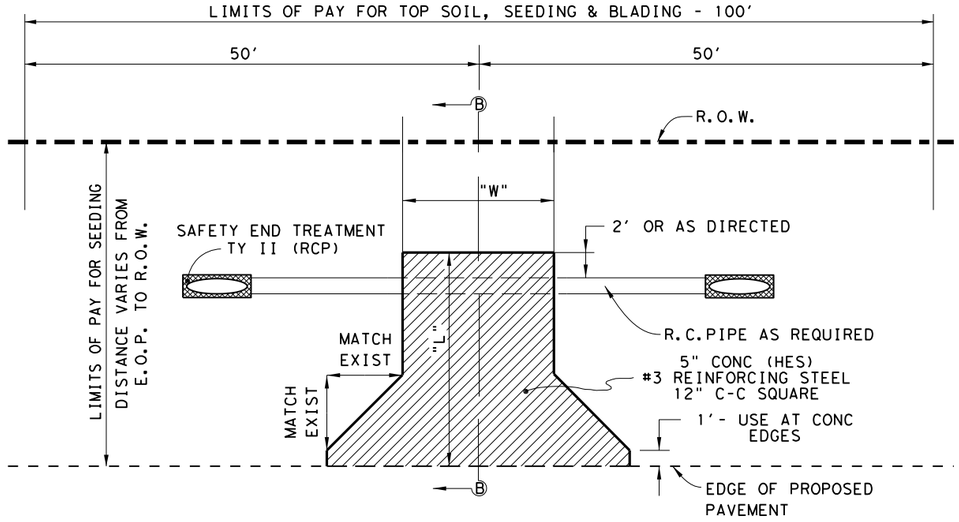


SECTION B-B



NOTE: TY D 64-22 MATERIAL, SUBSIDIARY TO ITEM 530

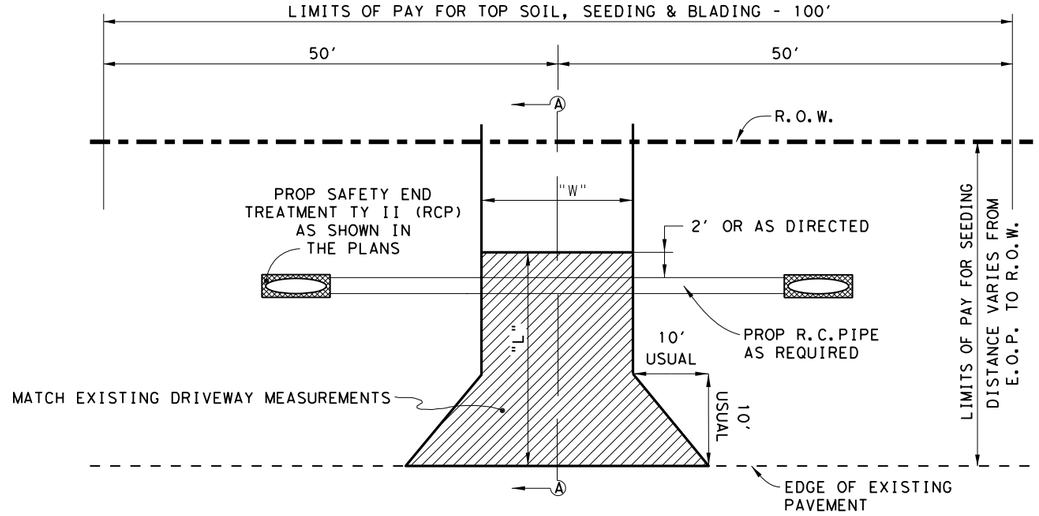
SECTION A-A



DRIVEWAY DETAILS
CONCRETE DRIVEWAYS

N.T.S.

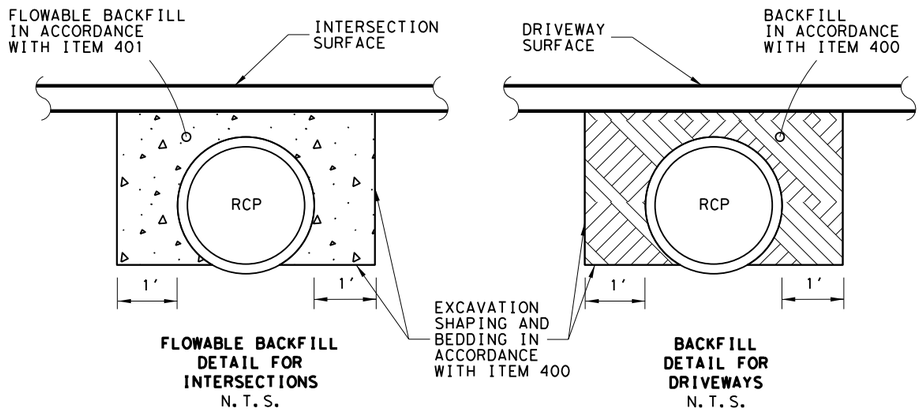
NOTE: SEE DRIVEWAY SUMMARY TABLE
FOR "W" & "L" DIMENSION



DRIVEWAY AND INTERSECTION DETAILS
EXIST ASPHALT, GRAVEL, DIRT DRIVEWAYS, AND INTERSECTIONS

N.T.S.

NOTE: SEE DRIVEWAY SUMMARY TABLE
FOR "W" & "L" DIMENSION



FLOWABLE BACKFILL DETAIL FOR INTERSECTIONS
N.T.S.

BACKFILL DETAIL FOR DRIVEWAYS
N.T.S.

R.C. PIPE DETAIL

NOTE: EXCAVATION, SHAPING, BEDDING, AND BACKFILL ARE SUBSIDIARY TO ITEM 464.
FLOWABLE BACKFILL WILL BE PAID FOR AS PROVIDED IN ITEM 401, "FLOWABLE BACKFILL".

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

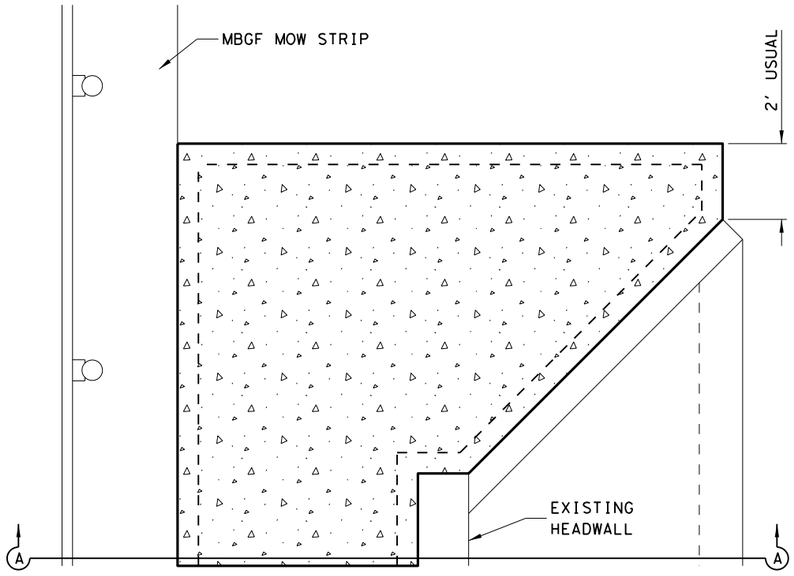
SH 155
MISCELLANEOUS
DETAILS

Texas Department of Transportation

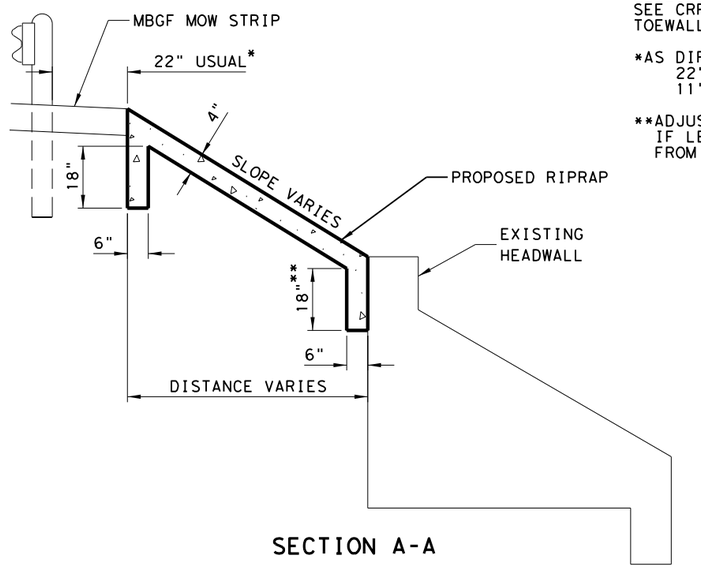
SHEET 2 OF 5

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		65

DATE: 1/12/2022 2:08:23 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390362\SH155_RDW_MISC.dgn



PARTIAL PLAN



SECTION A-A

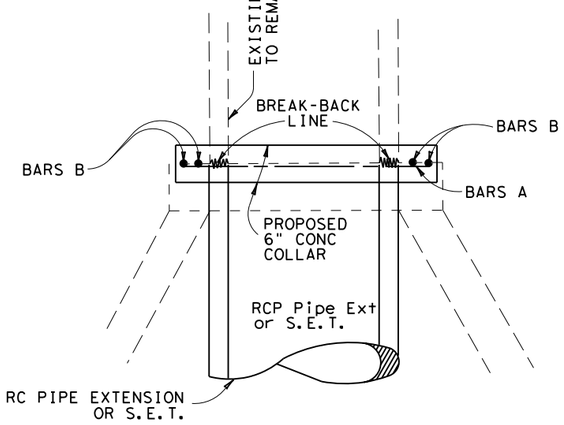
NOTES:
SEE CRR FOR REINFORCEMENT REQUIREMENTS
TOEWALL IS REQUIRED ON ENTIRE PERIMETER

*AS DIRECTED:
22" USUAL FOR NEW LOCATIONS
11" MIN. FOR EXISTING LOCATIONS

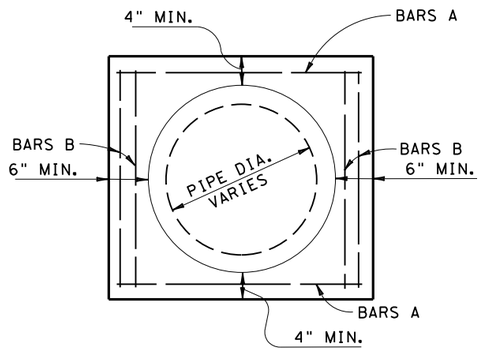
**ADJUST AS NEEDED FOR TOP OF CULVERT
IF LESS THAT 12", INCREASE TOEWALL
FROM 6" TO 12" WIDE.

RIPRAP DETAIL BETWEEN MBGF MOWSTRIP AND HEADWALL

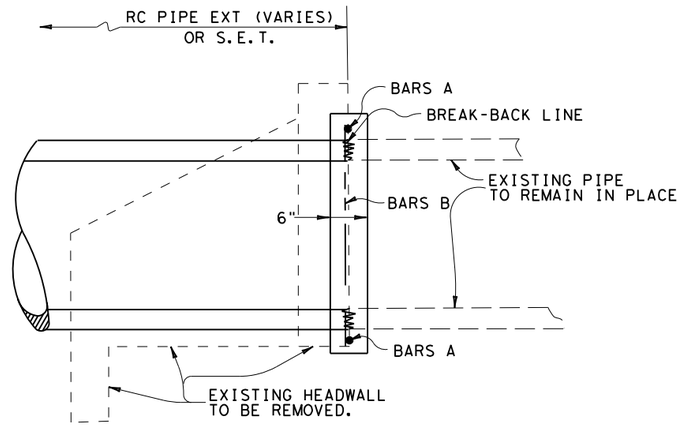
N.T.S.



PLAN VIEW



END VIEW



LONGITUDINAL ELEVATION

CONCRETE COLLAR DETAIL

N.T.S.

NOTE:
A CL "C" CONC COLLAR SHALL BE USED AT LOCATIONS AS SHOWN IN THE PLANS WHERE ONLY THE EXISTING HEADWALL OR LESS THAN A FULL JOINT OF PIPE IS TO BE REMOVED PRIOR TO THE INSTALLATION OF THE CULVERT EXTENSION.
A CONCRETE COLLAR SHALL BE USED AT LOCATIONS WHERE AN EXISTING METAL PIPE CULVERT IS BEING EXTENDED WITH RC PIPE OR A SAFETY END TREATMENT.
A CONCRETE COLLAR SHALL BE USED AT ALL 15, 30 AND 45 DEGREE PIPE BEND JOINT CONNECTIONS.
REINFORCING STEEL (BARS A & B) SHALL BE #4 BARS CUT IN THE FIELD TO FIT.
CONCRETE COLLARS SHALL CONFORM TO INSIDE DIAMETER OF PIPE CULVERTS.

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER

J. Ryan Griffin

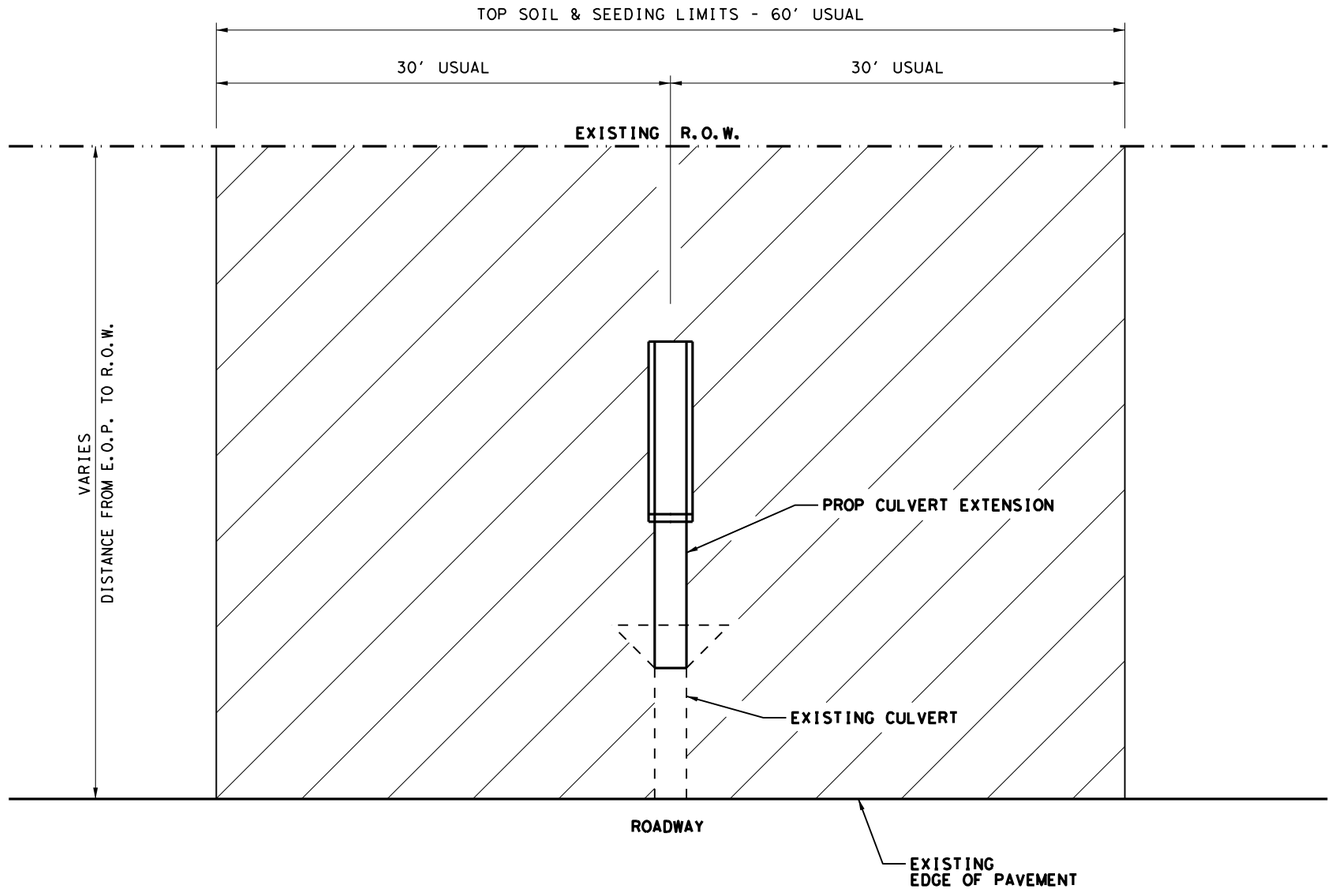
01/13/2022

SH 155
MISCELLANEOUS
DETAILS

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		66

DATE: 1/12/2022 2:08:24 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390362\SH155_RDW_MISC.dgn



SEEDING & BLADING AT CULVERT EXTENTIONS

NTS

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

SH 155
MISCELLANEOUS
DETAILS

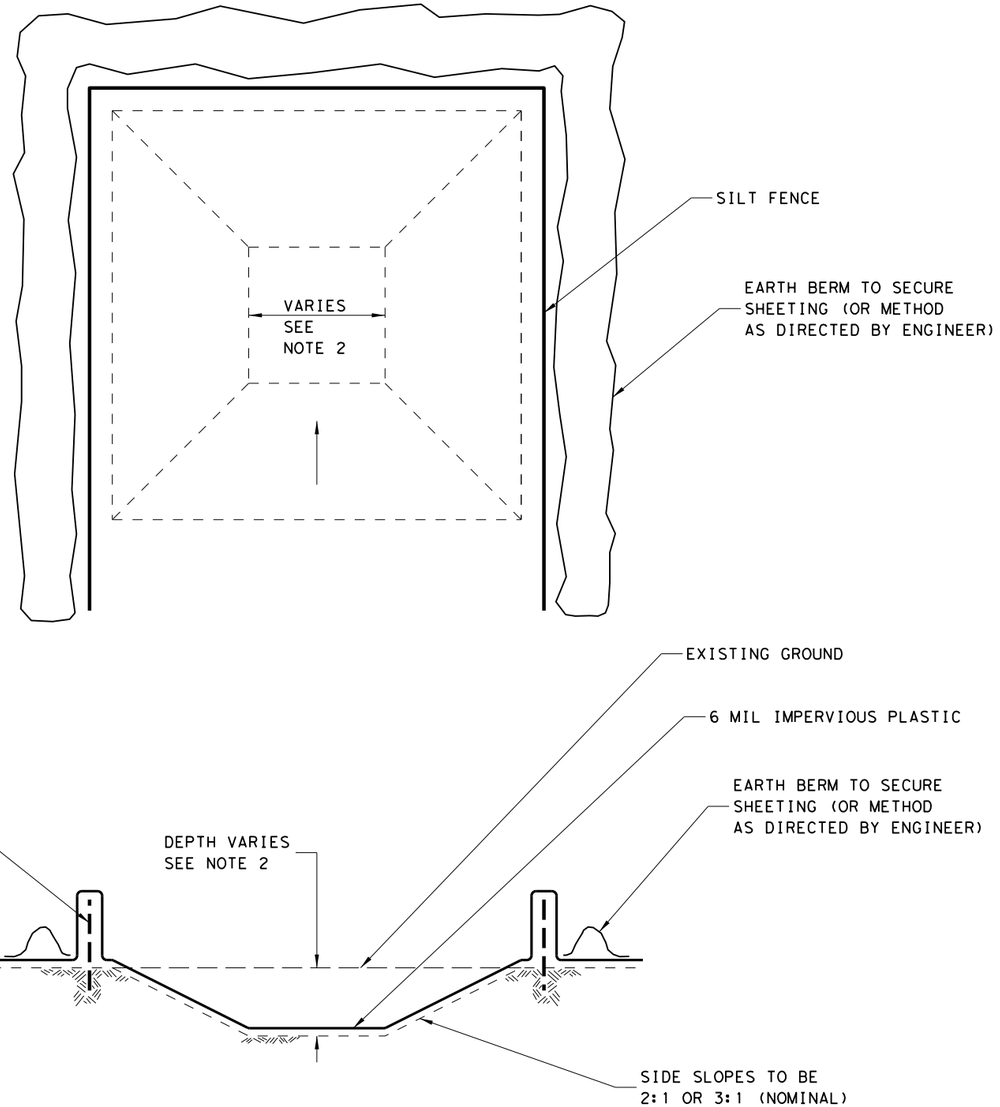
Texas Department of Transportation

SHEET 4 OF 5

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		67

DATE: 1/12/2022 2:08:24 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390362\SH155_RDW_MISC.dgn

CK:
DW:
CK:
DN:



CONCRETE WASHOUT AREA

NOT TO SCALE
(SEE NOTE 2)

NOTES

1. CONCRETE WASHOUT AREA(S) SHALL BE INSTALLED PRIOR TO CONCRETE PLACEMENT ON SITE. THE CONCRETE WASHOUT AREA SHALL BE ENTIRELY SELF-CONTAINED.

2. THE CONTRACTOR SHALL SUBMIT THE DESIGN, LOCATION AND SIZING OF OF THE CONCRETE WASHOUT AREA(S) WITH THE PROJECT'S EROSION AND SEDIMENTATION CONTROL PLAN AND SHALL BE APPROVED BY THE ENGINEER.

LOCATION: WASHOUT AREA(S) ARE TO BE LOCATED AT LEAST 50 FEET FROM ANY STREAM, WETLAND, STORM DRAINS, OR OTHER SENSITIVE RESOURCE. THE FLOOD CONTINGENCY PLAN MUST ADDRESS THE CONCRETE WASHOUT IF THE WASHOUT IS TO BE LOCATED WITHIN THE FLOODPLAN.

SIZE: THE WASHOUT MUST HAVE SUFFICIENT VOLUME TO CONTAIN ALL LIQUID AND CONCRETE WASTE GENERATED BY WASHOUT OPERATIONS INCLUDING, BUT NOT LIMITED TO, OPERATIONS ASSOCIATED WITH GROUT AND MORTAR.

3. SURFACE DISCHARGE IS UNACCEPTABLE, THERFORE EARTH BERM OR OTHER CONTROL MEASURES, AS APPROVED BY THE ENGINEER, SHOULD BE USED AROUND THE PERIMETER OF THE CONCRETE WASHOUT AREA FOR CONTAINMENT.

4. SIGNS SHOULD BE PLACED AT THE CONSTRUCTION ENTRANCE, AT THE CONCRETE AREA(S) AND ELSEWHERE AS NECESSARY TO CLEARLY INDICATE THE LOCATION OF THE CONCRETE WASHOUT TO OPERATORS OF CONCRETE TRUCKS AND PUMP RIGS. WASHOUT AREA(S) SHOULD BE FLAGGED WITH SAFETY FENCING OR OTHER APPROVED METHOD.

5. CONCRETE WASH-OUT AREAS SHALL BE LINED WITH IMPERVIOUS PLASTIC WITH A MINIMUM THICKNESS OF 6 MILS AND BE REPLACED IF DAMAGED DURING CLEAN-OUT OF HARDENED CONCRETE FROM THE WASH-OUT AREA.

6. WASHOUT AREA(S) ARE TO BE INSPECTED AT LEAST ONCE A WEEK FOR STRUCTURAL INTEGRITY, ADEQUATE HOLDING CAPACITY AND CHECKED FOR LEAKS, TEARS, OR OVERFLOWS. (AS DIRECTED BY THE CONSTRUCTION SITE ENVIRONMENTAL INSPECTION REPORT) WASHOUT AREA(S) SHOULD BE CHECKED AFTER HEAVY RAINS.

7. HARDENED CONCRETE WASTE SHOULD BE REMOVED AND DISPOSED OF WHEN THE WASTE HAS ACCUMULATED TO HALF OF THE CONCRETE WASHOUT'S HEIGHT. THE WASTE CAN BE STORED AT AN UPLAND LOCATION, AS APPROVED BY THE ENGINEER. ALL CONCRETE WASTE SHALL BE DISPOSED OF IN A MANNER CONSISTENT WITH ALL APPLICABLE LAWS, REGULATIONS, AND GUIDELINES.

8. PAYMENT FOR THIS ITEM IS TO BE INCLUDED UNDER THE GENERAL COST OF THE WORK FOR THE PROJECT, INCLUDING SITE RESTORATION.

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

SH 155
MISCELLANEOUS DETAILS

Texas Department of Transportation

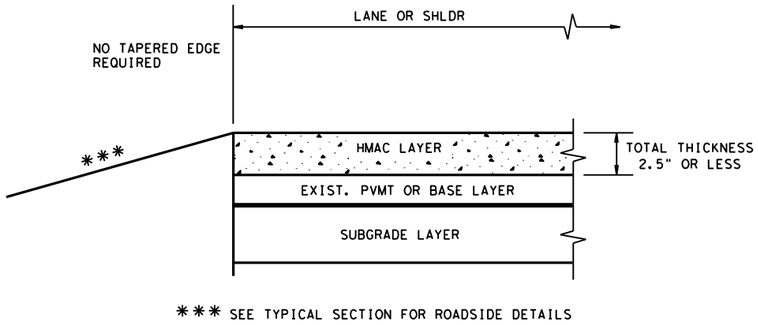
SHEET 5 OF 5

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		68

DATE: 1/12/2022 2:08:25 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390362\SH155_RDW_MISC.dgn

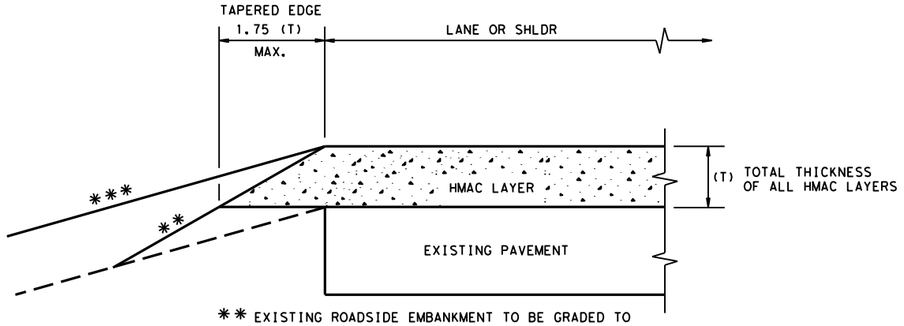
DN: CK: DW: CK:

DATE: 1/12/2022
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401603\SH155_RDW_tehmac11.dgn



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

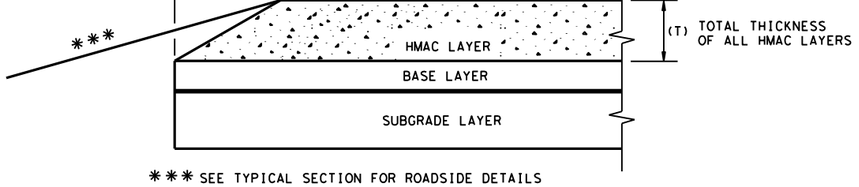
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS



** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

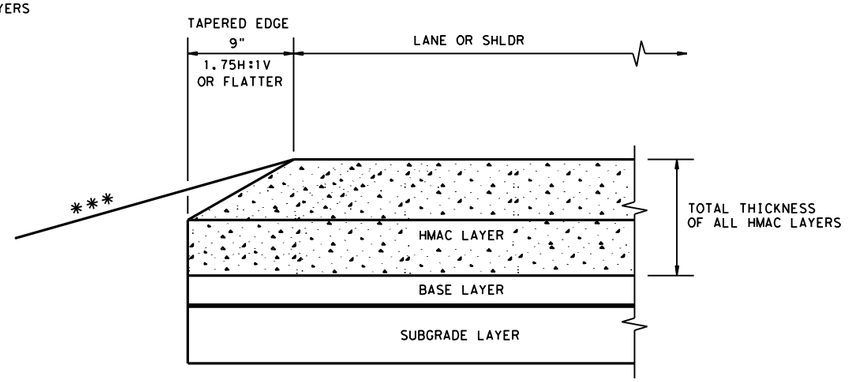
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2
OVERLAY OF EXISTING PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4
NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 5" OR GREATER

(NOT TO SCALE)

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, A VERTICAL EDGE IS PERMISSIBLE FOR HMAC PLACED GREATER THAN 5" BELOW THE EDGE OF PAVEMENT AND FOR THICKNESS OF HMAC LESS THAN 2.5".
2. FOR FURTHER INFORMATION REGARDING THE ROADSIDE AND PAVEMENT DETAILS, SEE TYPICAL SECTIONS.
3. PAYMENT FOR TAPERED EDGE WILL BE IN ACCORDANCE WITH APPLICABLE ITEMS IN THE CONTRACT.
4. THE SLOPE OF THE TAPERED EDGE SHALL BE 1.75H:1V OR FLATTER.
5. THE TAPERED EDGE SHALL BE PRODUCED BY USE OF A SCREED ATTACHMENT CAPABLE OF PRODUCING A SMOOTH COMPACTED SURFACE. ADDITIONAL COMPACTING EFFORT BEHIND THE SCREED IS NOT REQUIRED.

Texas Department of Transportation

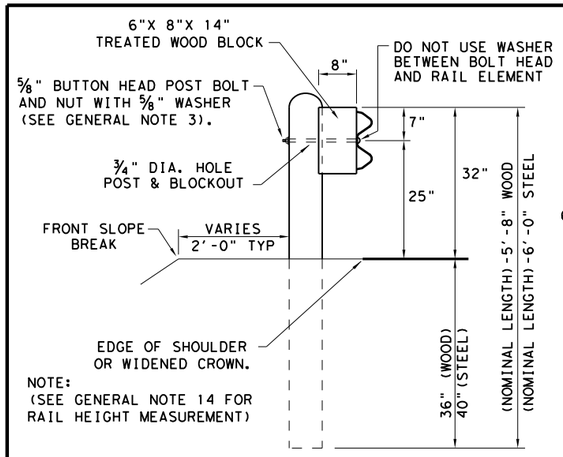
Design Division Standard

TAPERED EDGE DETAILS HMAC PAVEMENT

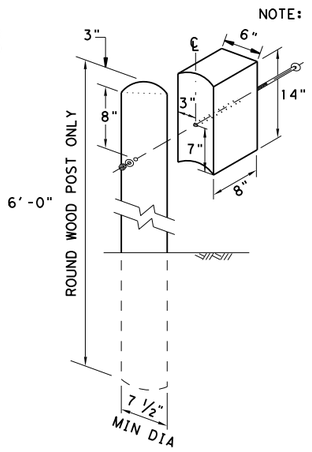
TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
©TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		69

DATE: 1/12/2022
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401603\SH155_RDW_GF(31)-19.dgn

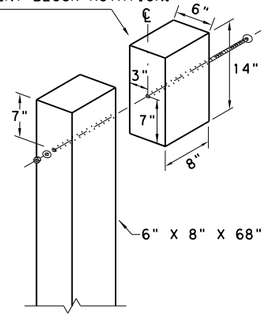


TYPICAL POST PLACEMENT

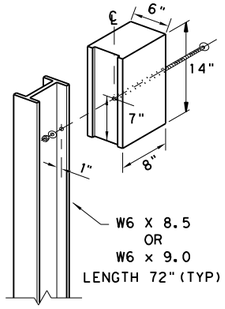


WOOD BLOCK TO ROUND WOOD POST

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

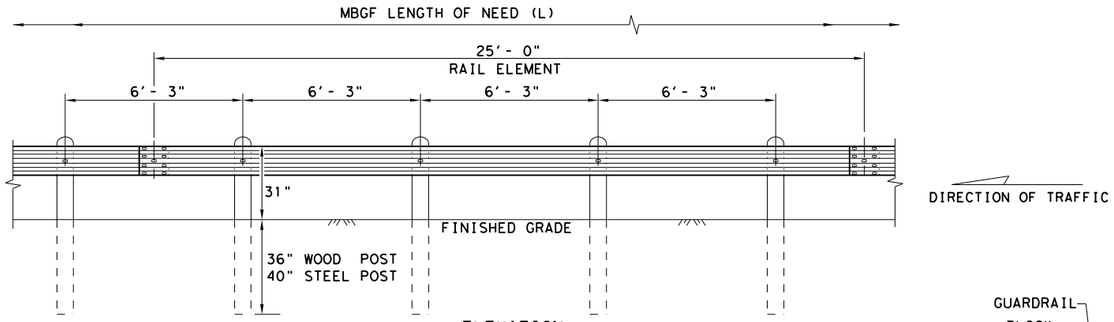


WOOD BLOCK TO RECTANGULAR WOOD POST



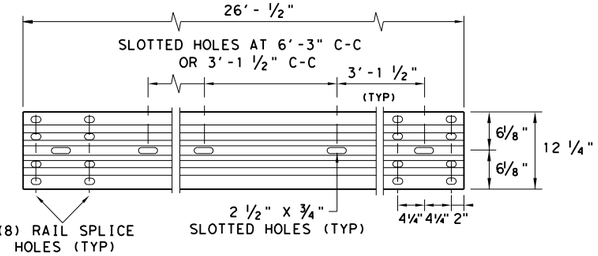
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION
MID-SPAN RAIL SPLICE

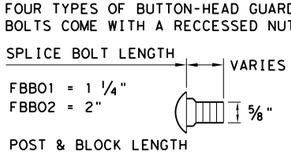
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

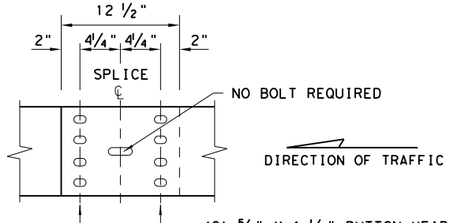
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



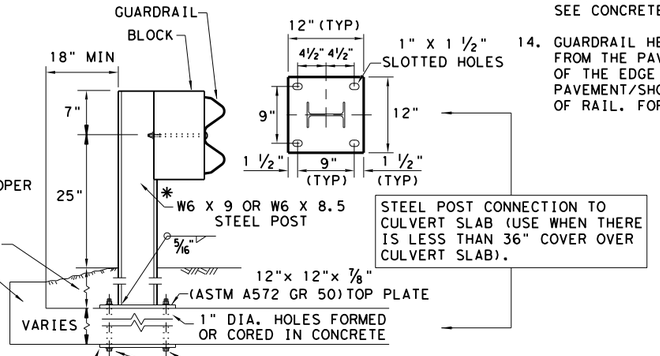
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

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

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

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

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

GENERAL NOTES

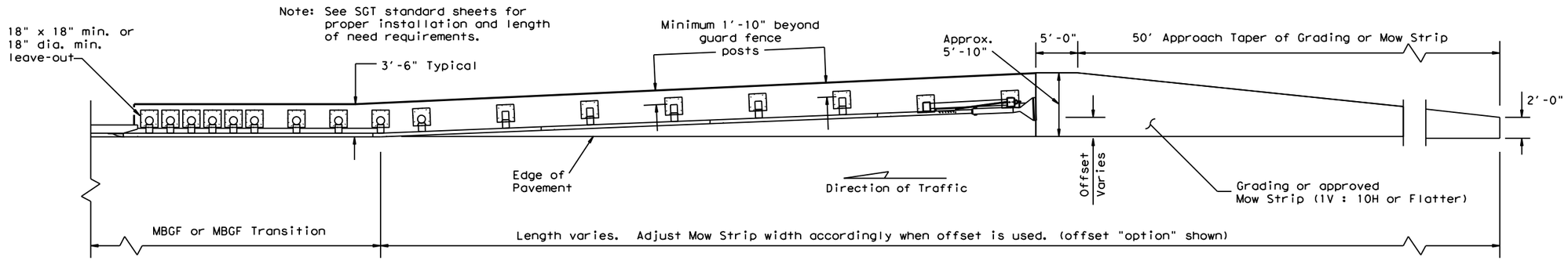
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS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

Texas Department of Transportation — Design Division Standard

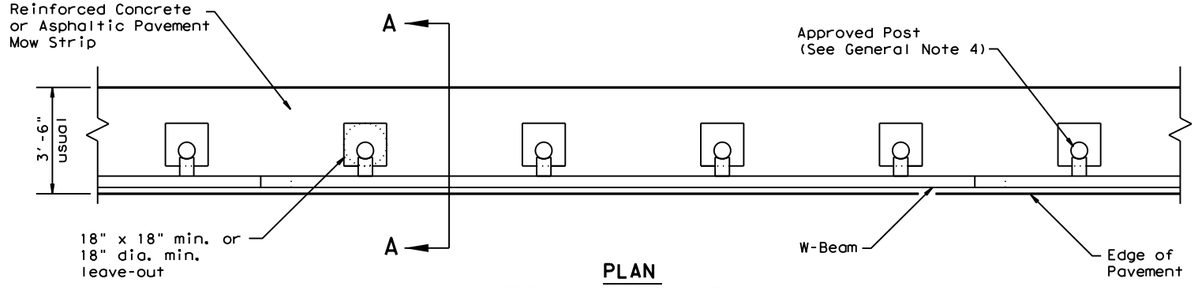
METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		70

DATE: 1/12/2022
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401603\SH155_RDW_GF(31)MS-19.dgn

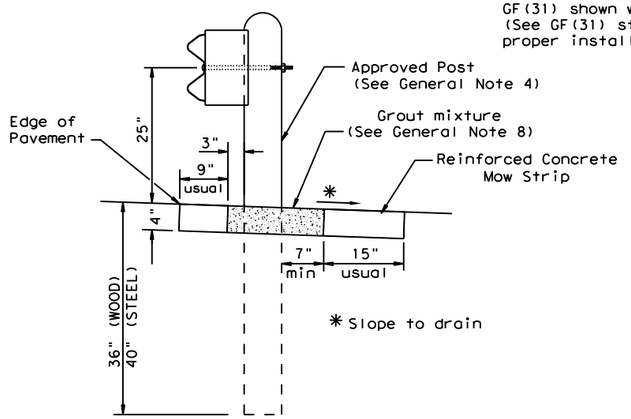


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



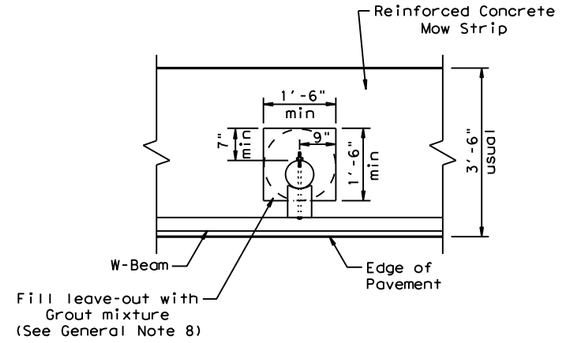
PLAN

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



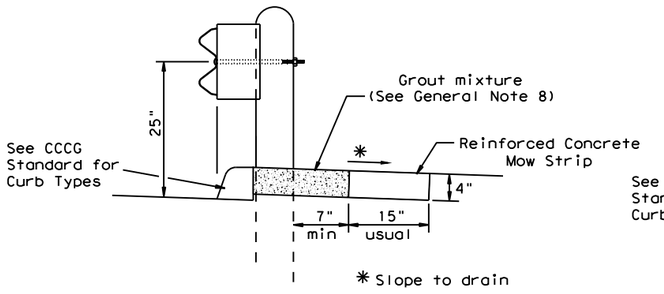
SECTION A-A

Typical



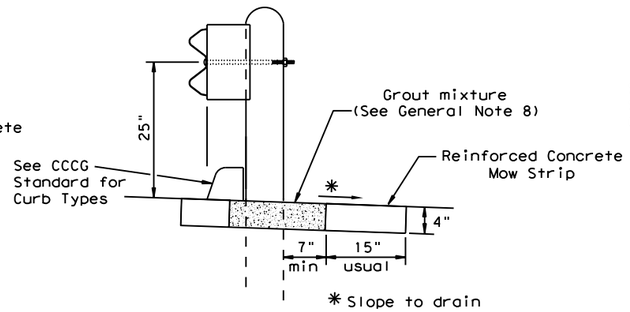
MOW STRIP DETAIL

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



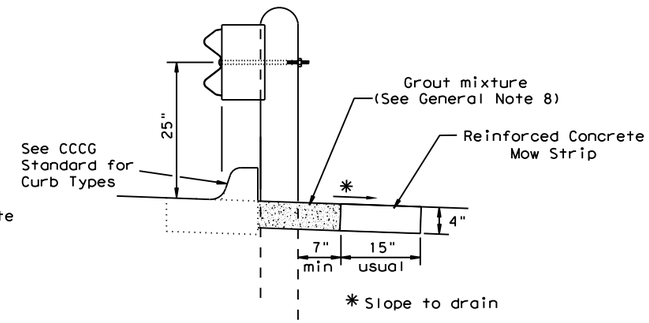
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

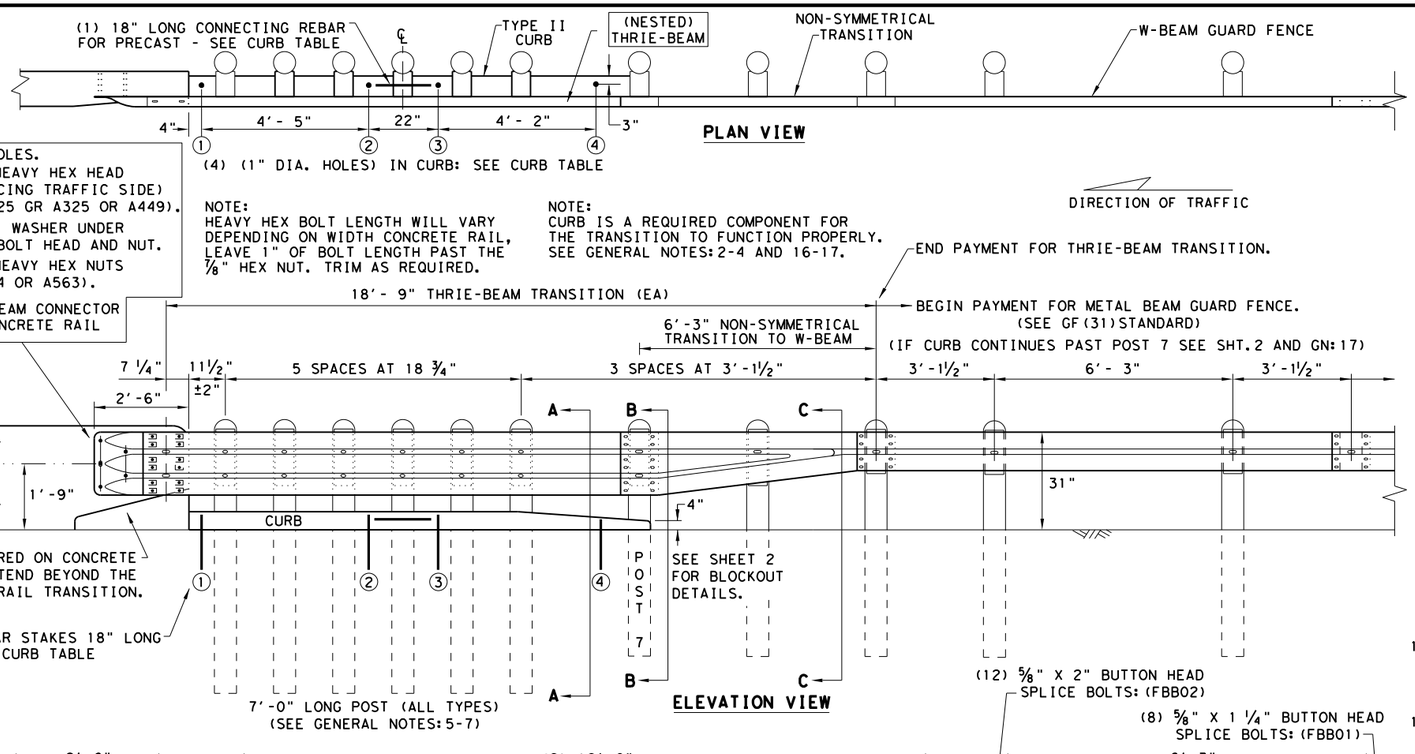
Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		71

DATE: 1/12/2022
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401603\SH155_RDW_GF(31)TRTL3-20.dgn



GENERAL NOTES

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

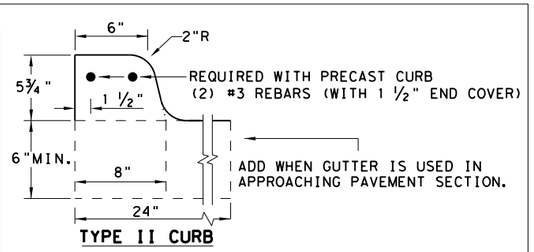
THRIE-BEAM TERMINAL - CURB TABLE

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

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

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

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



TYPE II CURB

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

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

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation — Design Division Standard

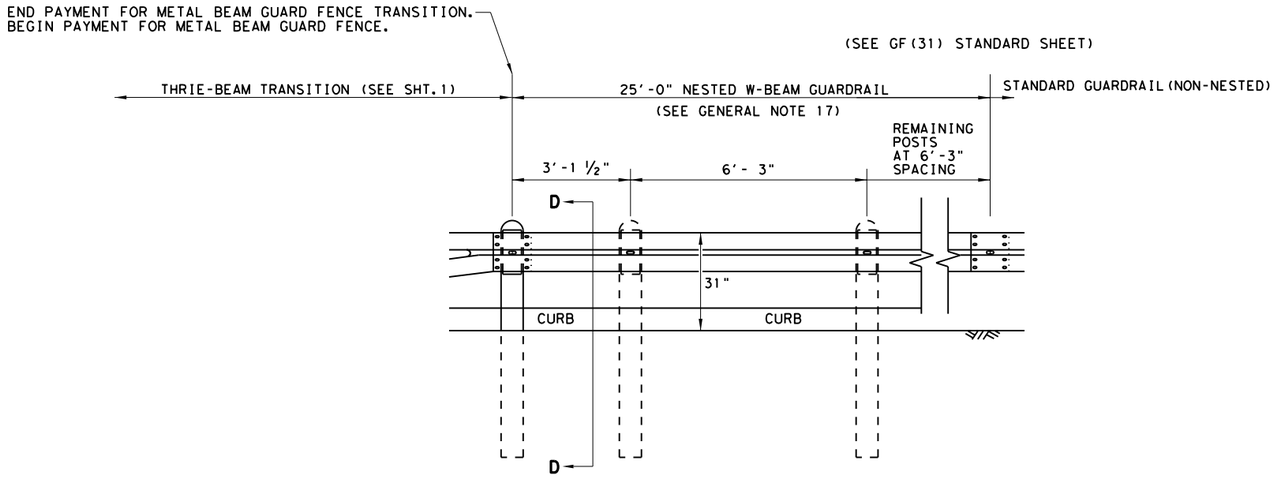
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

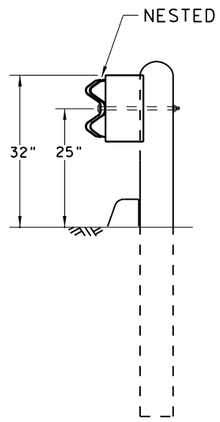
FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		72

DATE: 1/12/2022
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401603\SH155_ROW_GF(31)TRTL3-20.dgn

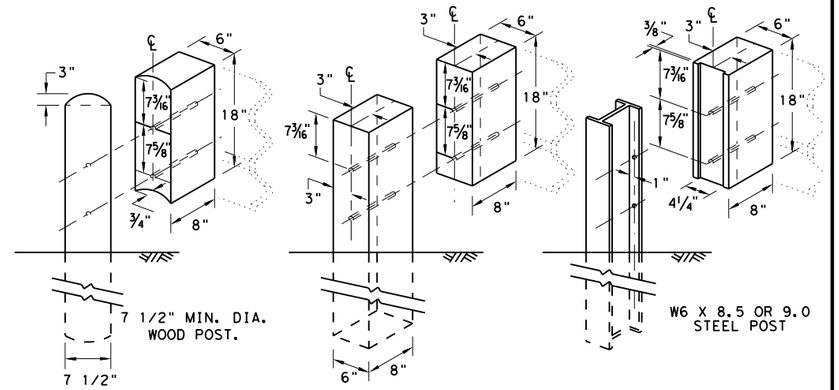
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

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

GF(31)TR TL3-20

FILE: gf31trt1320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG	
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0520	08	071	SH 155	
	DIST	COUNTY		SHEET NO.	
	TYL	ANDERSON		73	

DATE: 1/12/2022
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401603\SH155_RDW_SGT(10S)31-16.dgn

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

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

LINE AT THE BACK OF POST #2 THRU #8

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

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

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

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

POST(1)

POST(0)

TRAFFIC FLOW

PLAN VIEW

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

BEGIN LENGTH OF NEED

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

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼"

3'-1 ½" 6'-3" 6'-3"

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

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

OUTSIDE SLOTS CUTOUT
(2)½" X 6'-9 ⅝"

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

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

SoftStop ANCHOR RAIL (12GA) PN: 15215G

SoftStop FACE SEE GN(3) & NOTE:B

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

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE:C

SEE NOTE:A

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

13/16" DIA. YIELDING HOLES

13/16" DIA. YIELDING HOLES

SEE DETAIL 3

6'-1⅜"

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

POST 40" DEPTH (TYP 1-8)

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

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

POST(2) 6'-0" (SYTP) PN: 15000G

POST(1) 4'-9 ½" SYTP PN: 15203G

POST(0) 6'-5 ⅜" PN: 15205A

ELEVATION VIEW

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

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

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

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

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

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16" DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

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

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

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

ALTERNATE BLOCKOUT SEE GENERAL NOTE:6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR.DH PN: 3245G

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

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE:A

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

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

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

TRAFFIC FLOW

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

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

FINISHED GRADE

SECTION VIEW B-B

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

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

POST(2)

FINISHED GRADE

SECTION VIEW A-A

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

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

POST 17"- ½" HEIGHT

4'-9 ½"

13/16" DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

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

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

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

2'-0" MAX. RAIL OFFSET

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

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

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

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

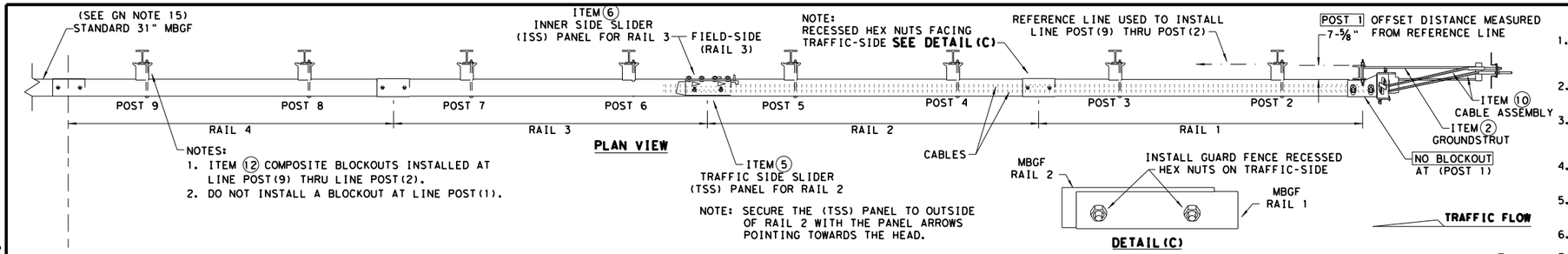
Texas Department of Transportation

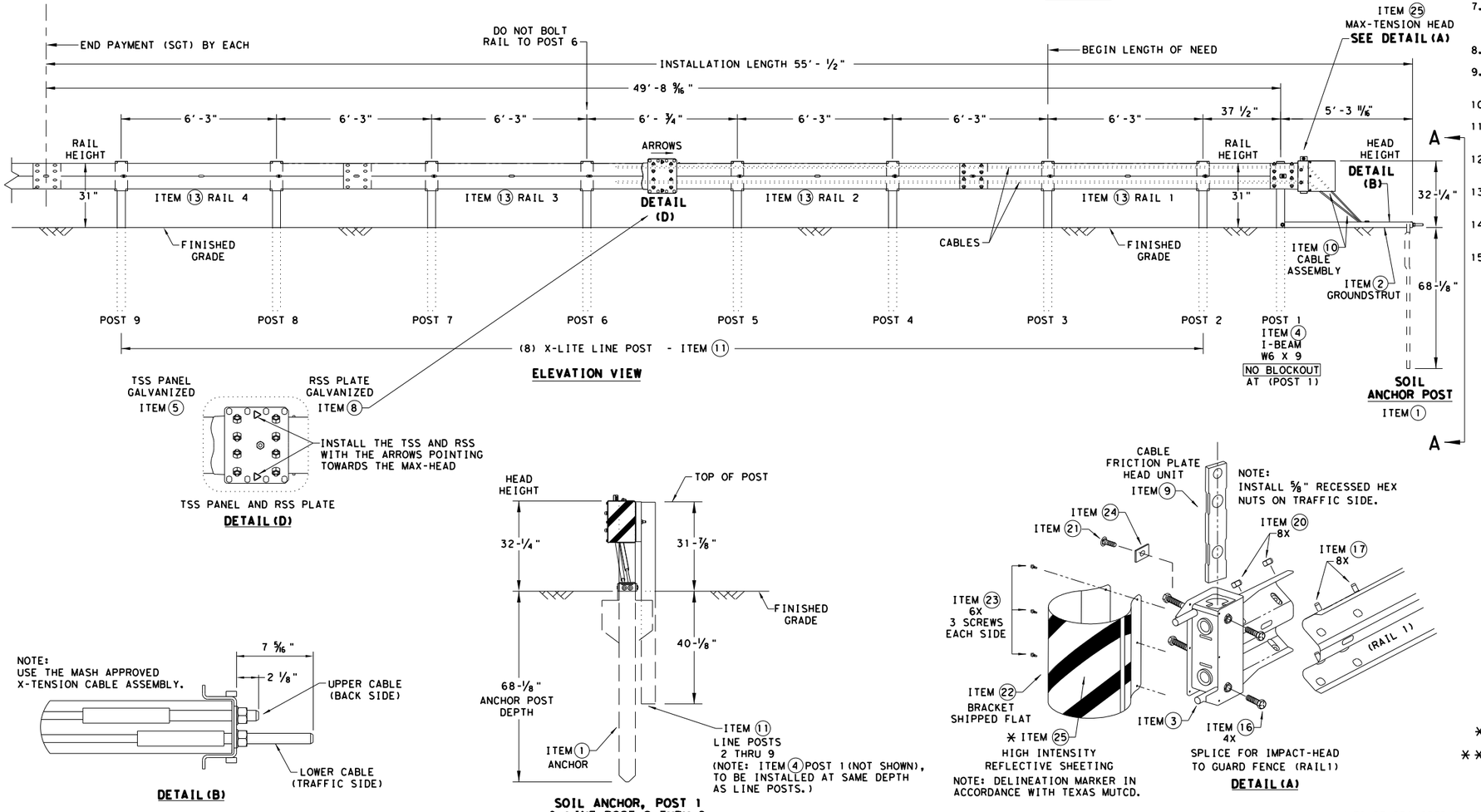
Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		74

DATE: 1/12/2022
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401603\SH155_RDW_SGT(11S)31-18_sht.dgn





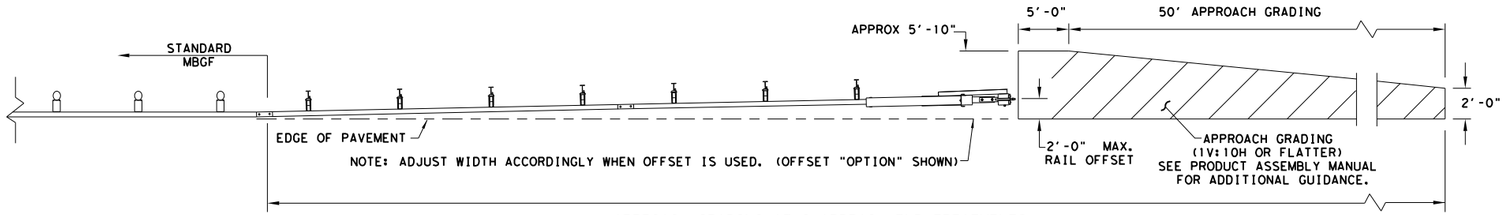
GENERAL NOTES

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

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

* TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

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



TRAFFIC FLOW

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

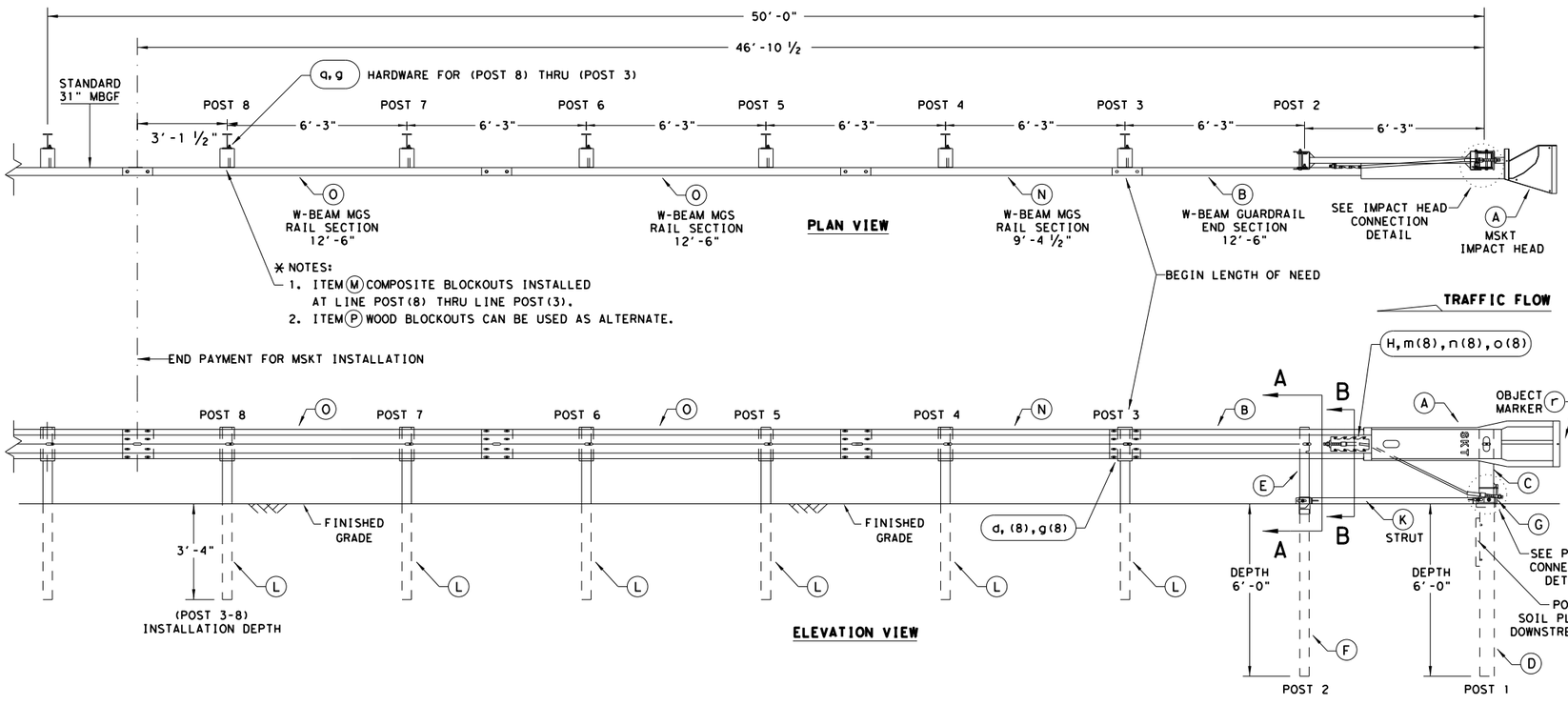
Texas Department of Transportation

Design Division Standard

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

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		75

DATE: 1/12/2022
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401603\SH155_RDW_SGT(12S)31-18.dgn



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

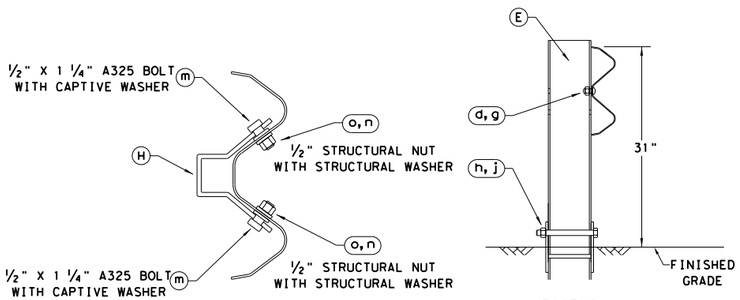
GENERAL NOTES

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

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

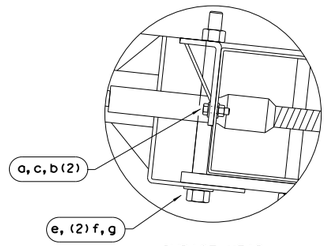
SEE NOTES: *

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

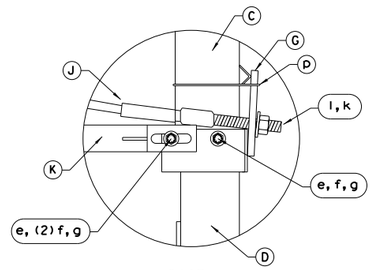


SECTION B-B
ANCHOR BRACKET

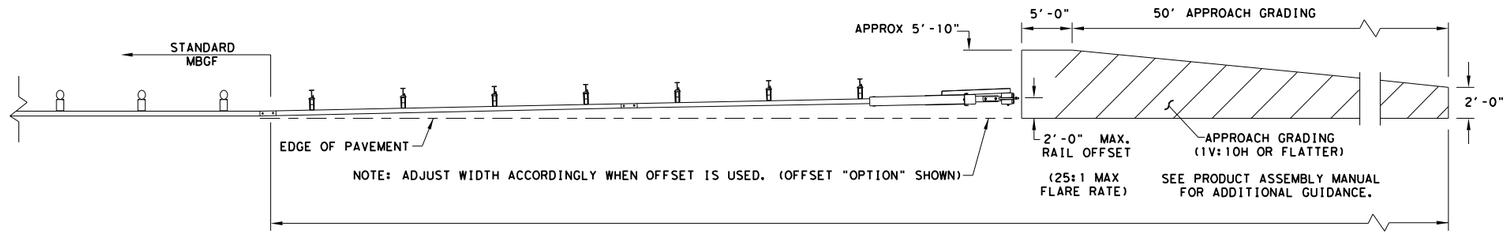
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

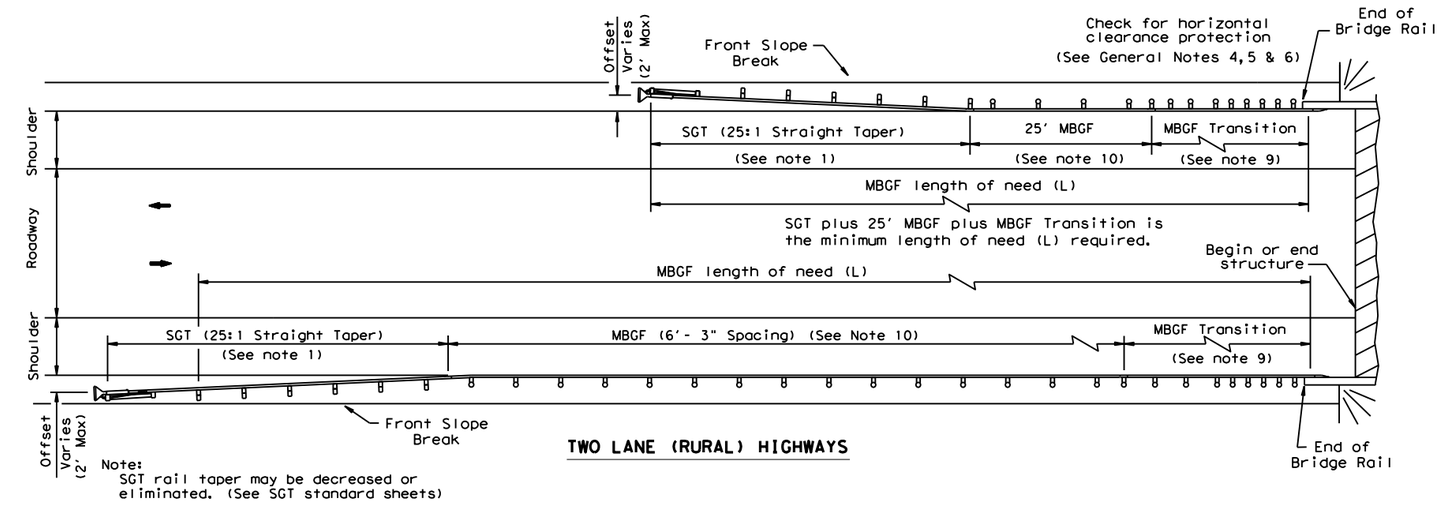
Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3
SGT(12S)31-18

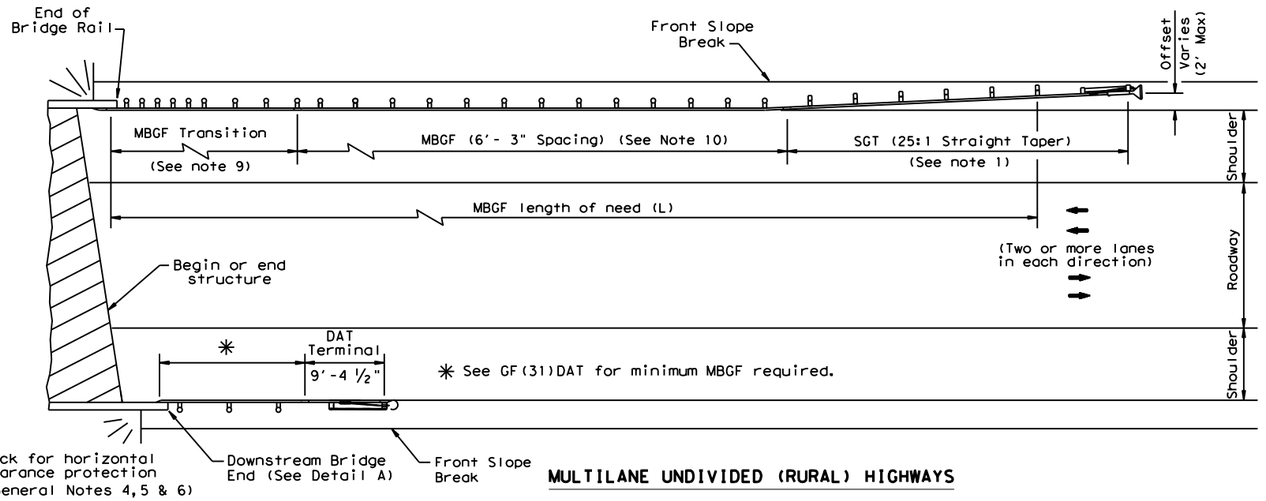
FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0520	08	071	SH 155	
	DIST	COUNTY		SHEET NO.	
	TYL	ANDERSON		76	

DATE: 1/12/2022 2:09:07 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401603\SH155_RDW_BED-14.dgn

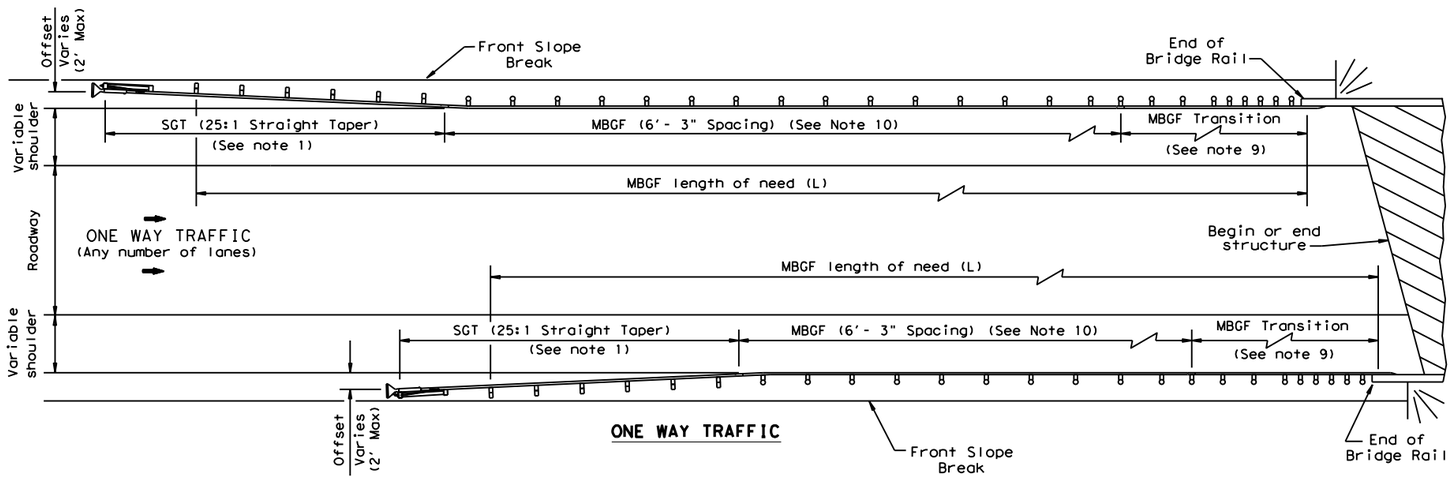


TWO LANE (RURAL) HIGHWAYS

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



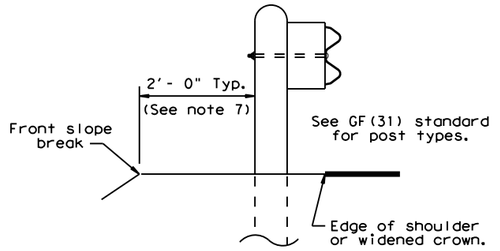
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



ONE WAY TRAFFIC

GENERAL NOTES

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



TYPICAL CROSS SECTION AT MBGF

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

DETAIL A

Showing Downstream Rail Attachment

Texas Department of Transportation

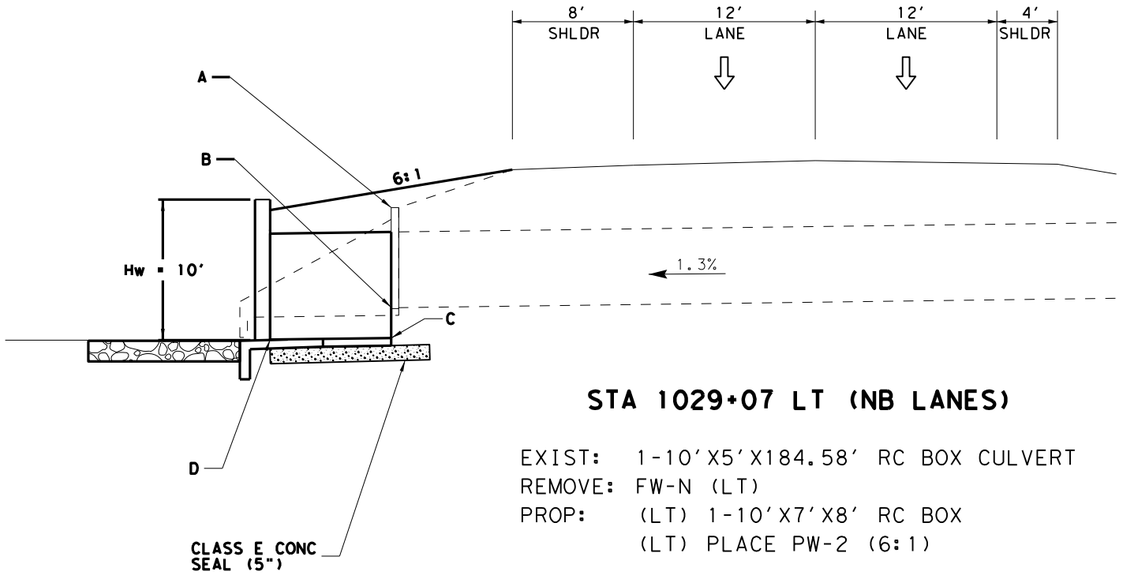
Design Division Standard

BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		77



STA 1029+07 LT (NB LANES)

EXIST: 1-10'X5'X184.58' RC BOX CULVERT
REMOVE: FW-N (LT)
PROP: (LT) 1-10'X7'X8' RC BOX
(LT) PLACE PW-2 (6:1)

0 5' 10'
SCALE: 1" = 10'

EDGELINE
EL = 100.0'

A	TOP OF EXIST HDWL EL = 97.58'
B	FLOWLINE EXIST HDWL EL = 90.90'
C	FLOWLINE PROP RC BOX EXT EL = 88.90'
D	FLOWLINE PROP HDWL EL = 88.83'

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER

J. Ryan Griffin

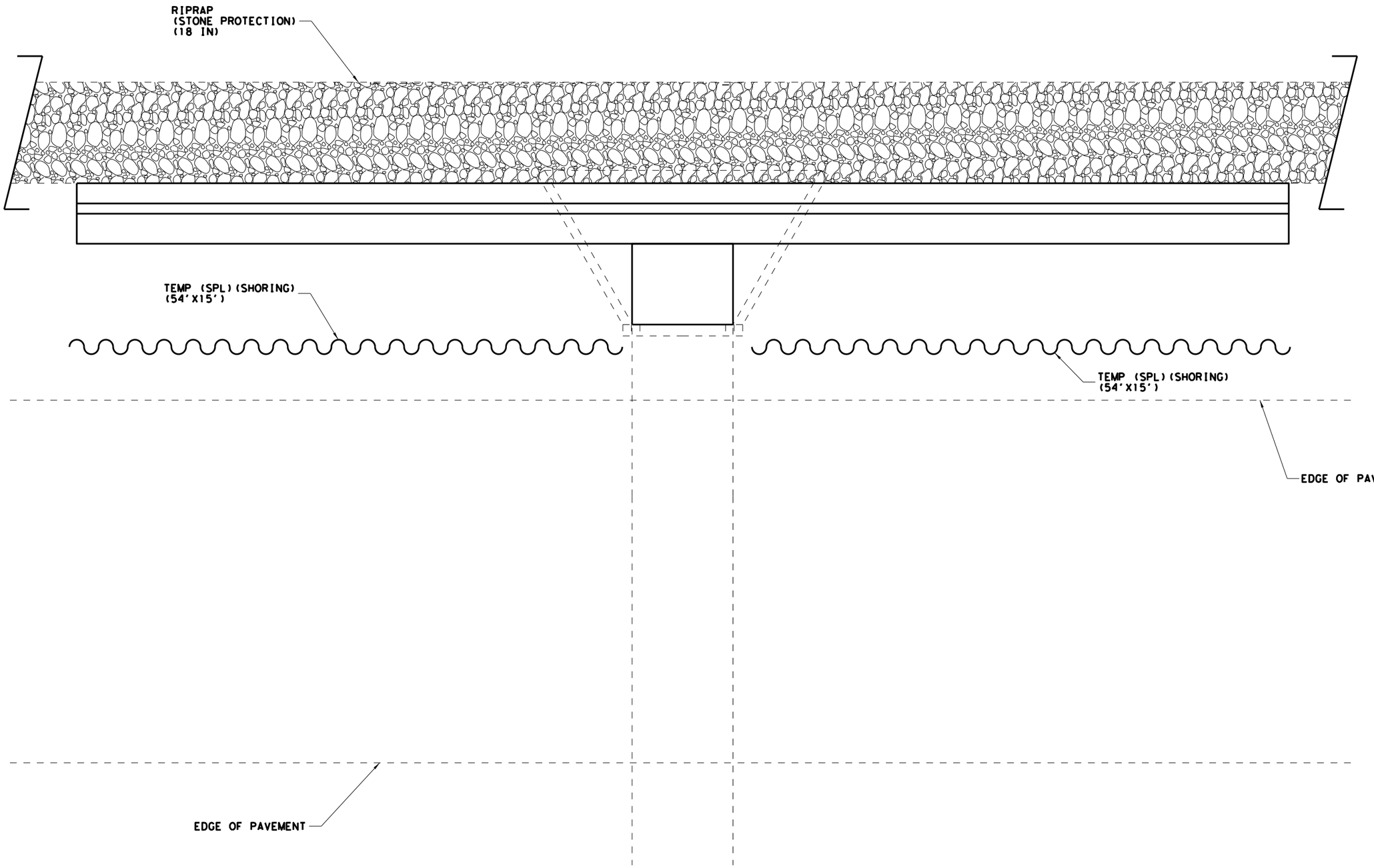
01/13/2022

SH 155
STA 1029+07 LT
CULVERT LAYOUT

Texas Department of Transportation
SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		78

DATE: 1/12/2022 2:09:21 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390364\SH155_DRG_CULV.dgn



0 5' 10'

SCALE: 1" = 10'

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

SH 155
STA 1029+07 LT
CULVERT LAYOUT

Texas Department of Transportation

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		79

DATE: 1/12/2022 2:09:22 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390364\SH155_DRG_CULV.dgn

Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw (1) Height of Wingwall (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" (2) Conc (Curb) (CY)	Class "C" (3) Conc (Wingwall) (CY)	Total Wingwall Area (SF)
STA 1029+07 (Lt)	1 ~10'x 7'	8'	SCC-10(MOD)	PW-2	0°	6:1	9"	7"	2.250'	10.000'	N/A	N/A	54.000'	11.167'	N/A	0.0	0.9	67.7	1074

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

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

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

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

C = Curb height

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

Hw = Height of wingwall

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

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

Lw = Length of longest wingwall.

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

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

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

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

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

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

SPECIAL NOTE:

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

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

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER

J. Ryan Griffin

01/14/2022

Texas Department of Transportation

Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

BCS

FILE:	bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS		0520	08	071	SH 155
		DIST	COUNTY		SHEET NO.
		TYL	ANDERSON		80

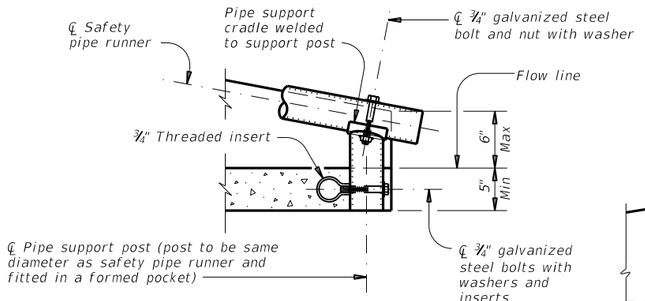
DATE: 1/12/2022 2:09:26 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390364\SH155_DRG_BCS.dgn

DATE: 1/12/2022 2:09:39 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0444194\PSET-SC.dgn

CK:
DW:
CK:
DN:

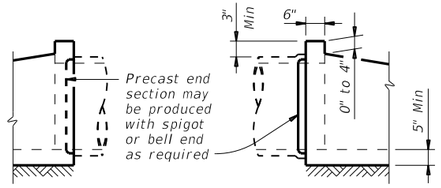
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe Skew	Single Pipe Runners Required	Multiple Pipes Skew	Multiple Pipes Runners Required
12"	2"	1.15"	17.00"	3:1	2' - 11"	≤ 45°	No	≤ 45°	No
				4:1	3' - 6"				
				6:1	4' - 9"				
15"	2 ¼"	1.30"	20.50"	3:1	3' - 8"	≤ 45°	No	≤ 45°	No
				4:1	4' - 7"				
				6:1	6' - 5"				
18"	2 ½"	1.60"	24.00"	3:1	4' - 6"	≤ 45°	No	≤ 45°	No
				4:1	5' - 8"				
				6:1	8' - 0"				
24"	3"	1.95"	31.00"	3:1	6' - 2"	≤ 45°	No	= 30°	No
				4:1	7' - 10"			> 30°	Yes
				6:1	11' - 3"				
30"	3 ½"	2.65"	38.50"	3:1	7' - 10"	= 15°	No	= 15°	No
				4:1	10' - 1"	> 15°	Yes	> 15°	Yes
				6:1	14' - 8"				
36"	4"	2.75"	45.50"	3:1	9' - 5"	= 0°	No	≥ 0°	Yes
				4:1	12' - 3"	> 0°	Yes		
				6:1	17' - 11"				
42"	4 ½"	N/A	52.50"	3:1	11' - 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' - 5"				
				6:1	21' - 2"				



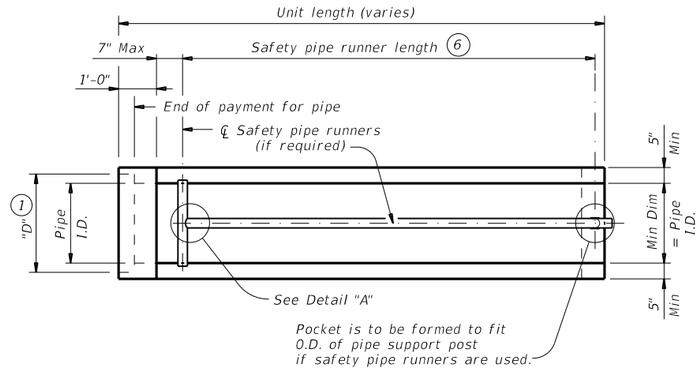
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



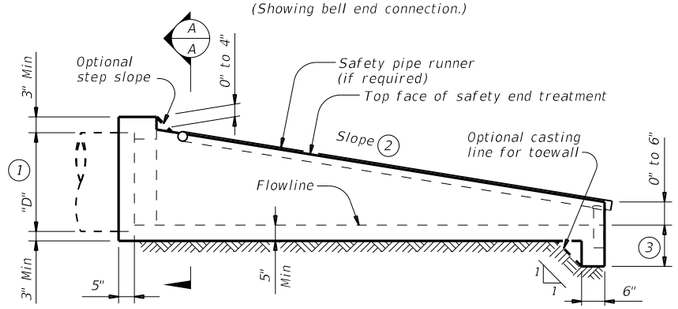
OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)



PLAN

(Showing bell end connection.)



LONGITUDINAL ELEVATION

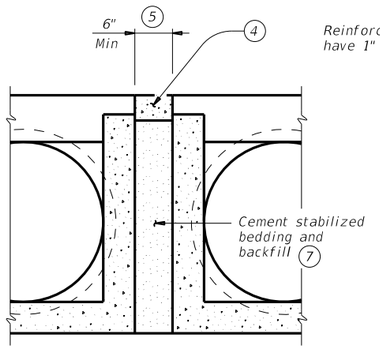
(Showing bell end connection.)

OPTION A

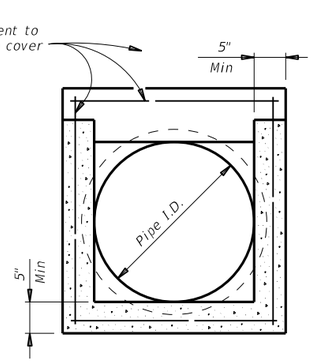
DETAIL A

(If required)

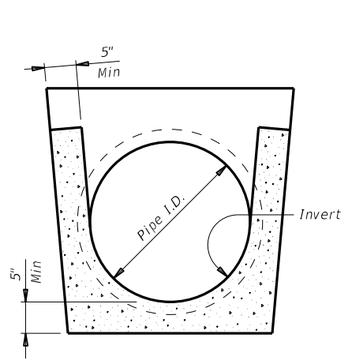
OPTION B



MULTIPLE PIPE INSTALLATION

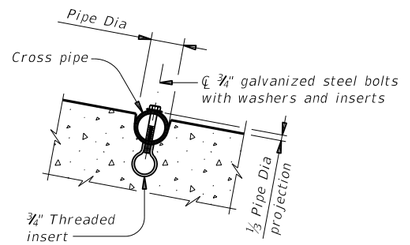


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

SAFETY PIPE RUNNER DIMENSIONS

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' - 2"	3" STD	3.500"	3.068"
15' - 6"	3 ½" STD	4.000"	3.548"
20' - 10"	4" STD	4.500"	4.026"
35' - 4"	5" STD	5.563"	5.047"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in plans. Slope of 3:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Measured along slope.

(7) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(8) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" - D12 x D12 or 5"x5" - D10 x D10 welded wire reinforcement (WWR).
B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor, the next larger size of safety end treatment may be furnished as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464 "Reinforced Concrete Pipe". Connect TP by grouting. See PBGC standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation

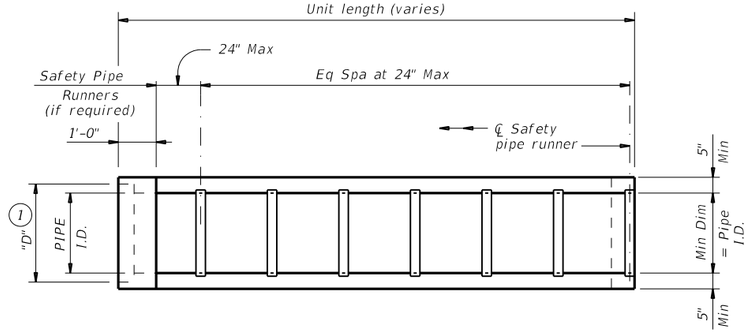
Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

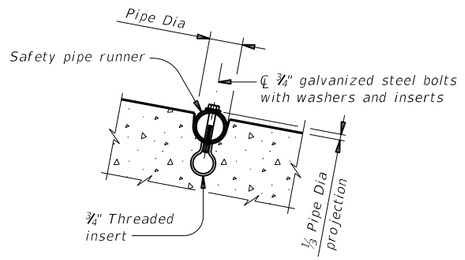
PSET-SC

FILE: psetscss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		81



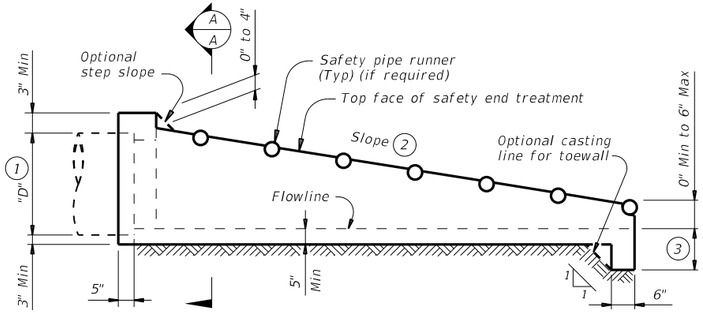
PLAN

(Showing bell end connection.)



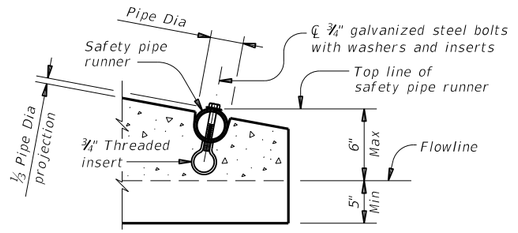
INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

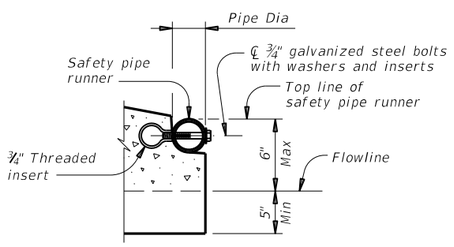


LONGITUDINAL ELEVATION

(Showing bell end connection.)



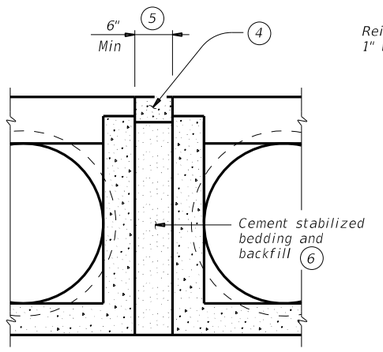
OPTION A



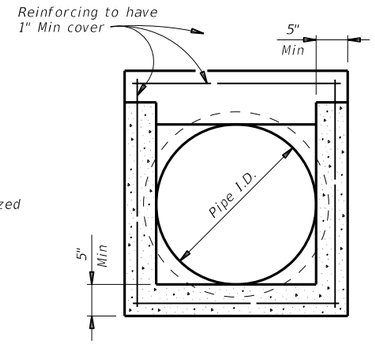
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

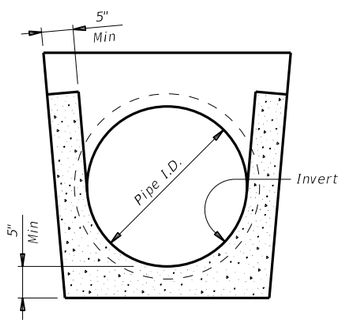
(If required)



MULTIPLE PIPE INSTALLATION

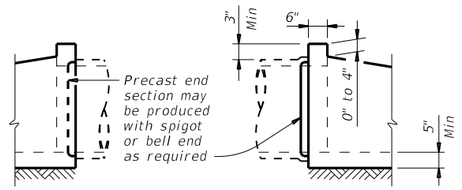


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment.)

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' – 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' – 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' – 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' – 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' – 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' – 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	N/A	52.50"	6:1	21' – 2"	Yes	Yes	4" STD	4.500"	4.026"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(7) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" – D12 x D12 or 5"x5" – D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor the next larger size of safety end treatment may be furnished; as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe". Connect TP by grouting. See PBGC standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

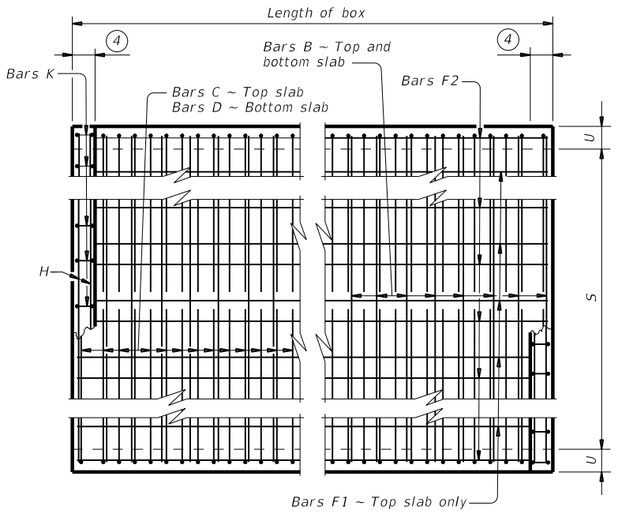
PSET-SP

FILE: psetspss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		82

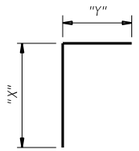
DATE: 1/12/2022 2:09:43 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0444194\PSET-SP.dgn

DN: CK: DW: CK:

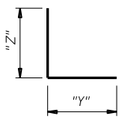
DATE: 1/12/2022 2:09:49 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0444194\BC101601_MOD.dgn



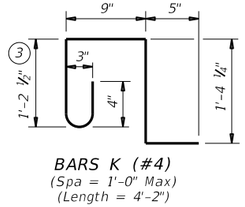
PLAN OF REINF STEEL



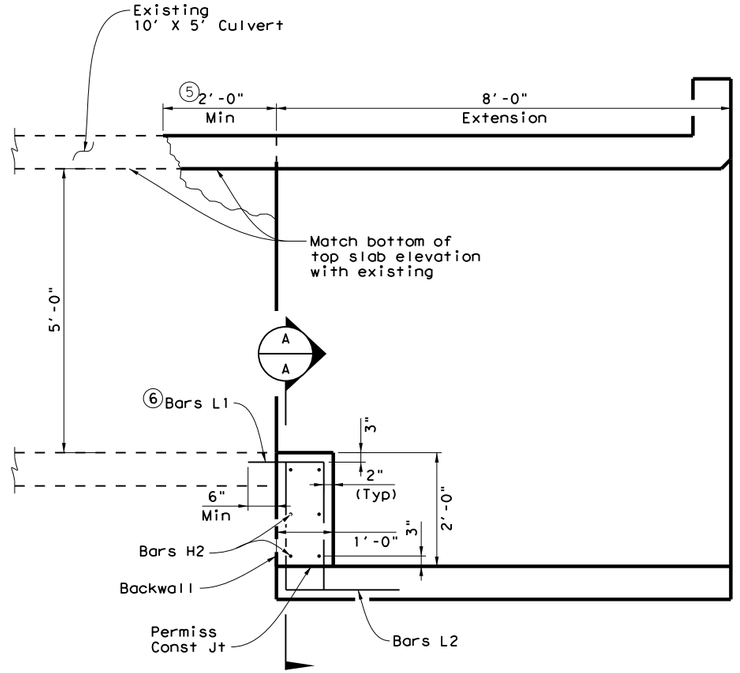
BARS C



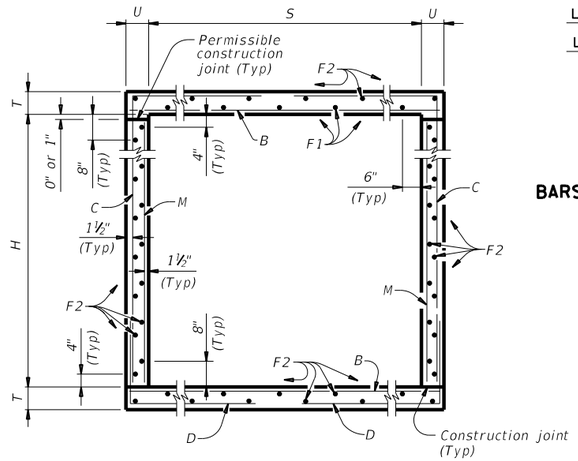
BARS D



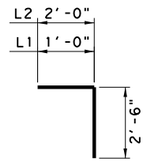
BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")



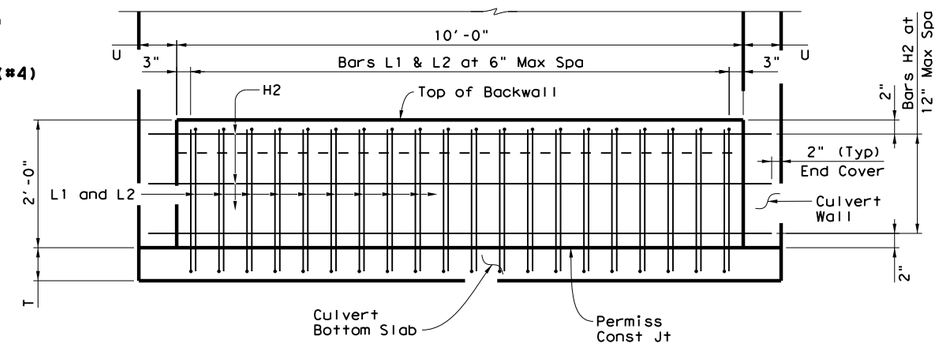
LENGTHENING ELEVATION DETAIL⑤



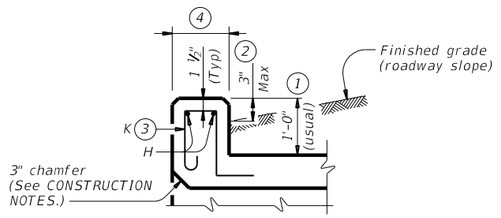
TYPICAL SECTION



BARS L1 & L2 (#4)



SECTION A-A



SECTION THRU CURB

CULVERT LENGTHENING BACKWALL ⑦				
Bar	No.	Size	Length	Weight
H2	6	#4	10'-10"	72
L1	20	#4	3'-6"	74
L2	20	#4	4'-6"	86
Reinforced Steel			Lb	232
Concrete			CY	1.5

⑤ Break back top slab to provide a minimum of 2'-0" lap of existing longitudinal bars with the longitudinal bars in the extension. Break back wings and apron as necessary to install the extension. Exposed Wingwall and apron reinforcing may be removed or cleaned and included in the extension. Existing and new reinforcing shall be field bent into transition maintaining specified cover requirements.

⑥ Embed Bars L1(#4) 6" min. into exisiting culvert using epoxy in accordance with Item 420.4.7.10, "Installing of Dowels and Anchor Bolts".

⑦ For Contractor's information only. Backwall is subsidiary to the 10' X 7' culvert extension.

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

② For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

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

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

④ 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR.
Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

CONSTRUCTION NOTES:
Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed.

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min
- Uncoated or galvanized ~ #7 = 3'-3" Min

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.
See the Single Box Culverts Cast-In-Place Miscellaneous Detail (SCC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

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

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

SCC-10(MOD)

FILE: scc10ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		83

SECTION DIMENSIONS				(8) FILL HEIGHT	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																												QUANTITIES					
					Bars B					Bars C							Bars D							Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
S	H	T	U		No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Wt	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
10' – 0"	7' – 0"	15"	12"	30'	162	#7	6"	11' – 9"	3,891	162	#6	6"	14' – 3"	3,467	8' – 1"	6' – 2"	162	#6	6"	9' – 10"	2,393	6' – 2"	3' – 8"	108	9"	7' – 0"	505	7	39' – 9"	186	45	39' – 9"	1,195	11' – 9"	31	26	72	1.630	290.9	0.9	103	66.1	11,740

(8) For direct traffic culverts (fill height ≤ 2 ft.), identify the required box size and select the option with the minimum fill height.

Deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064 may be used to replace conventional reinforcement shown at the Contractor's option. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes.

Example Conversion: Replacement of No. 6 Gr 60 at 6" Spacing with WWR.
WWR required = (0.44 sq in/ 0.5') x (60 ksi/70 ksi) = 0.754 sq in/ft.
If D30.6 wire is used to meet the 0.754 sq in/ft requirement in this example, the required spacing = (0.306 sq in/ 0.754 sq in/ft) x 12 in/ft = 4.87" Max spacing.
Required lap length for the provided D30.6 wire is 2'-2" (Lap required for uncoated No. 5 bars, as shown in Item 440).

DATE: 1/12/2022 2:09:50 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0444194\BC101601_MOD.dgn

HL93 LOADING SHEET 2 OF 2

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED PROFESSIONAL ENGINEER

J. Ryan Griffin

01/13/2022

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

SCC-10(MOD)

FILE: scc10ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		84

DATE: 1/12/2022 2:09:55 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0444194\pwstde01-20.dgn

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

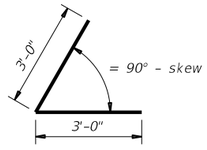
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2~wings) (4)		Estimated Quantities per ft of Toewall (1~toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	48.64	0.406	6.85	0.071
2'-9"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.31	0.424	6.85	0.071
3'-0"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	49.98	0.444	6.85	0.071
3'-3"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.32	0.462	6.85	0.071
3'-6"	2'-10"	10"	1'-0"	7"	#4	1'-0"	#4	1'-0"	53.98	0.480	6.85	0.071
4'-0"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	55.77	0.532	6.85	0.071
4'-6"	3'-2"	1'-2"	1'-0"	7"	#4	1'-0"	#4	1'-0"	59.77	0.568	6.85	0.071
5'-0"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	63.45	0.632	6.96	0.075
5'-6"	3'-9"	1'-7"	1'-2"	7"	#4	1'-0"	#4	1'-0"	67.46	0.668	6.96	0.075
6'-0"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	80.67	0.730	7.07	0.078
6'-6"	4'-4"	2'-0"	1'-4"	7"	#5	1'-0"	#5	1'-0"	85.05	0.768	7.07	0.078
7'-0"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	92.15	0.864	8.07	0.093
7'-6"	5'-0"	2'-3"	1'-9"	8"	#5	1'-0"	#5	1'-0"	96.54	0.902	8.07	0.093
8'-0"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'-6"	5'-6"	2'-8"	1'-10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'-6"	6'-0"	2'-10"	2'-2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'-6"	6'-5"	3'-0"	2'-5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'-6"	7'-2"	3'-6"	2'-8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'-6"	7'-8"	3'-9"	2'-11"	1'-0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'-6"	8'-2"	4'-0"	3'-2"	1'-2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'-6"	8'-10"	4'-5"	3'-5"	1'-4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'-6"	9'-6"	4'-10"	3'-8"	1'-6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'-0"	9'-11"	5'-0"	3'-11"	1'-7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING
(2~wings)

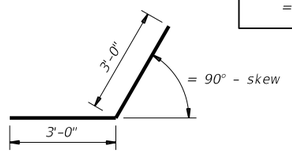
Bar	Size	No.	Spa
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

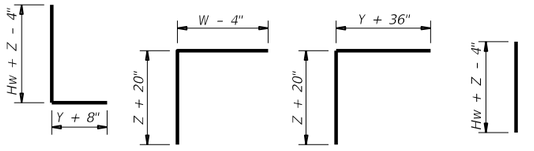
Bar	Size	No.	Spa
J3	#4	~	1'-0"
M2	#4	2	~
E2	#4	~	1'-0"



BARS D1



BARS D2



BARS J1 BARS J2 BARS J3 BARS V

WING DIMENSION FORMULAS:
(All values are in feet.)

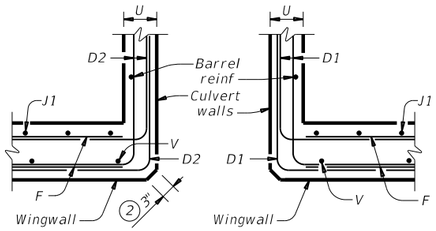
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW-1
= (Hw - 1') (SL) ÷ cosine (θ) for Type PW-2 and Hw ≥ 4'
= (Hw - 0.5') (SL) ÷ cosine (θ) for Type PW-2 and Hw < 4'

For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

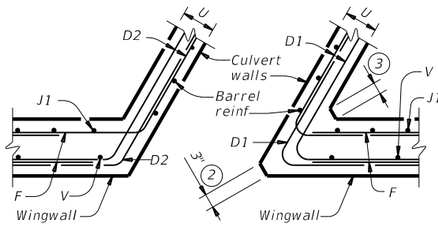
For precast culverts:
Ltw = [(N) (2 U + S) + (N - 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW-1
= (2)(Hw)(Lw) - 6 SF for Type PW-2 and Hw ≥ 4'
= (2)(Hw)(Lw) - 1.5 SF for Type PW-2 and Hw < 4'

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

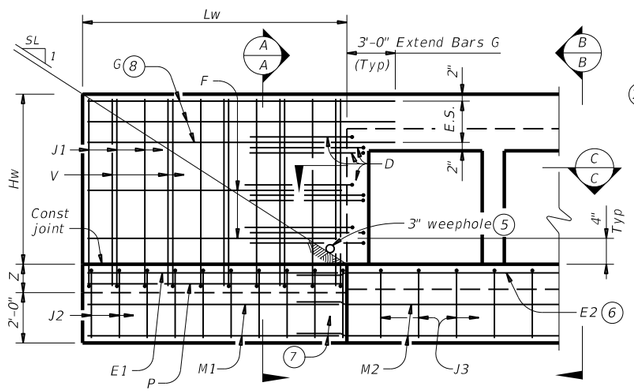
See applicable box culvert standard sheet for S, H, T, and U values.



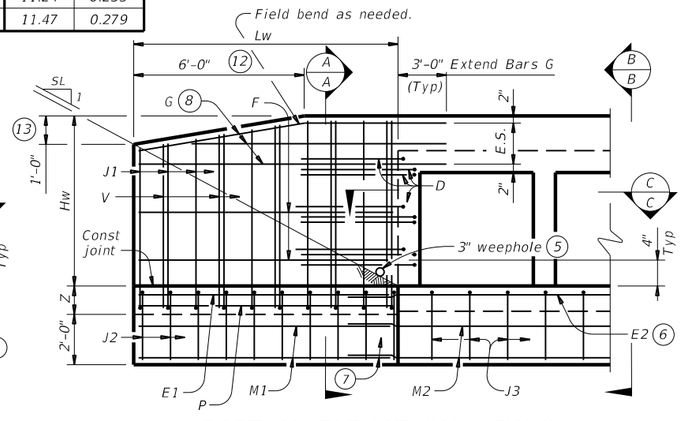
SECTION C-C - PW-1



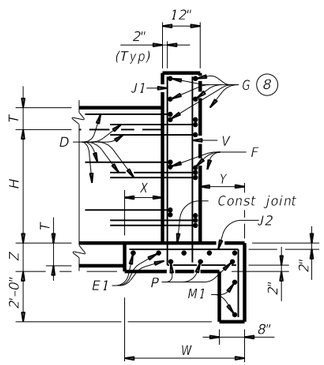
SECTION C-C - PW-2



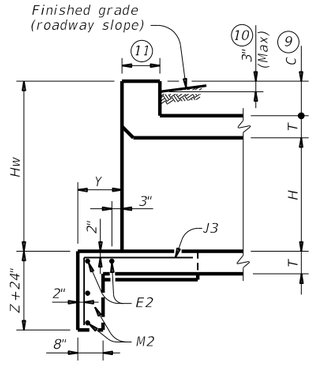
PARTIAL ELEVATION - PW-1



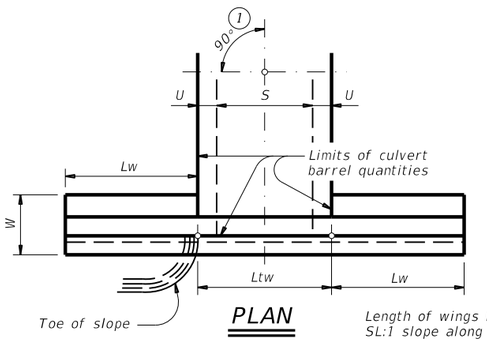
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)

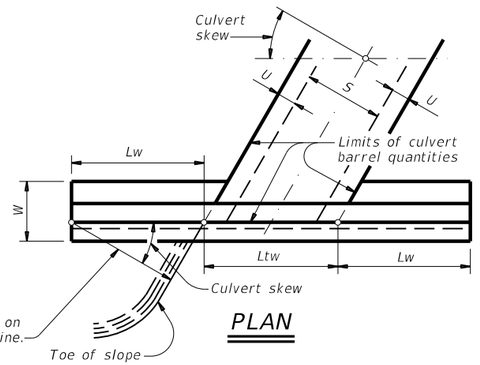


SECTION B-B
(Showing wing reinforcement.)



PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

1. Skew = 0°
2. At discharge end, chamfer may be ¾" minimum.
3. For 15° skew ~ 1"
   For 30° skew ~ 2"
   For 45° skew ~ 3"
4. Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'-6" minimum into the wingwall footing.
7. Lap Bars M1 1'-6" minimum with Bars M2.
8. Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.
9. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
10. For vehicle safety, the following requirements must be met:
    - For structures without bridge rail, construct curbs no more than 3" above finished grade.
    - For structures with bridge rail, construct curbs flush with finished grade.

    Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.
12. 3'-0" for Hw < 4'.
13. 6" for Hw < 4'.

DESIGNER NOTES:
Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW-2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforing steel if required elsewhere in the plans.

GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

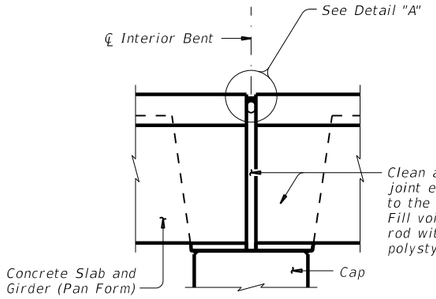
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out-to-out of bars.

Texas Department of Transportation
Bridge Division Standard

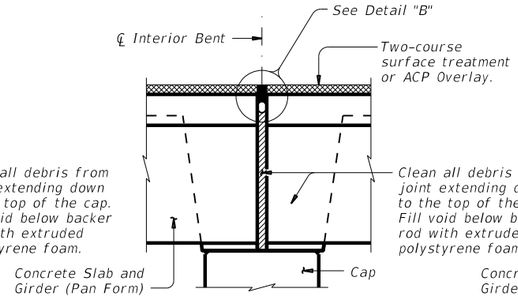
CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR BOX CULVERTS
TYPES PW-1 AND PW-2

PW

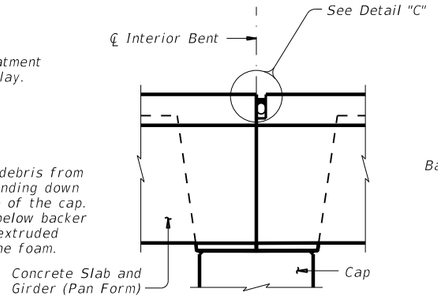
FILE: pwstde01-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		85



JOINT WITH SILICONE SEAL
(used without ACP Overlay)

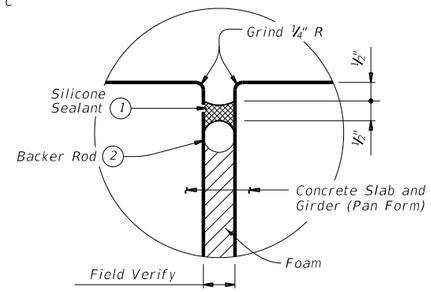


JOINT WITH HOT POURED RUBBER SEAL
(used with ACP Overlay)

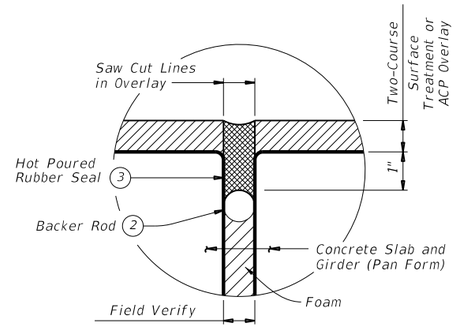


FIXED JOINT

EXISTING CONCRETE SLAB & GIRDER JOINT REPAIR

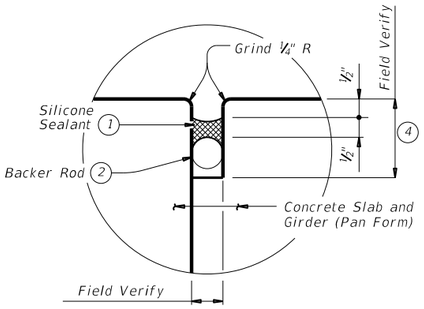


DETAIL "A"



DETAIL "B"

1. Use Class 7 silicone sealant. Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints."
2. Backer rod must be 25% larger than joint opening and must be compatible with the sealant.
3. Use Class 3 hot poured rubber seal. Prepare joint and seal in accordance with Item 438 "Cleaning and Sealing Joints."
4. Backer rod may be omitted if existing joint depth is less than 1½".



DETAIL "C"

PROCEDURE FOR CLEANING AND SEALING EXISTING CONCRETE GIRDER JOINT WITH SILICONE SEAL:

1) Clean joint opening of all old expansion materials/devices, dirt, and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints." Clean joint out full depth of the joint.
2) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.
3) Place backer rod into joint opening 1" below the top of concrete. The backer rod must be 25% larger than the joint opening. Fill void below backer rod with extruded polystyrene foam.
4) Seal the joint opening with a Class 7 Silicone. Recess seal ½" below top of concrete in travel lanes and ⅛" below top of concrete in shoulders.

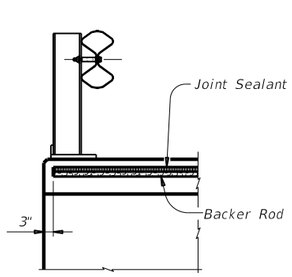
PROCEDURE FOR CLEANING AND SEALING EXISTING CONCRETE GIRDER JOINT WITH HOT POURED RUBBER SEAL:

1) Saw cut through the asphalt at the centerline of joint. Make multiple saw cuts to create a ½" minimum joint opening or match the existing joint opening. Clean joint opening of all old expansion materials/devices, bituminous materials, dirt, grease and all other deleterious materials in accordance with Item 438, "Cleaning and Sealing Joints."
2) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.
3) Place backer rod into joint opening 1" below the top of concrete. Backer rod must be compatible with the hot poured rubber sealant and rated for a minimum of 400°F. The backer rod must be 25% larger than the joint opening. Fill void below backer rod with extruded polystyrene foam.
4) Seal the joint opening with a Class 3, "Hot Poured Rubber." Seal flush to the top of the asphaltic concrete pavement.

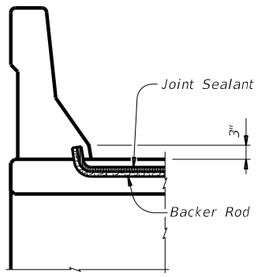
PROCEDURE FOR CLEANING AND SEALING EXISTING FIXED JOINTS:

1) Remove existing seal and debris from recess.
2) Abrasive blast clean existing surfaces where silicone seal is to be placed.
3) Obtain approval of cleaned joint prior to proceeding with joint sealing operation.
4) Place backer rod into joint opening 1" below the top of concrete. The backer rod must be 25% larger than the joint opening.
5) Seal the joint opening with a Class 7 Silicone. Recess seal ½" below top of concrete in travel lanes and ⅛" below top of concrete in shoulders.

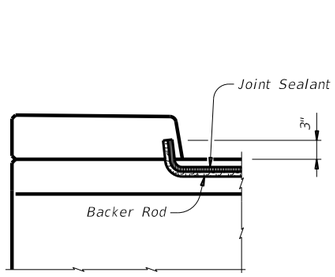
NOTE:
DURING LANE CLOSURES AND PRIOR TO MILLING OPERATIONS, THE CONTRACTOR SHALL MARK BRIDGE JOINT LOCATIONS.



SHOWN AT STEEL RAIL



SHOWN AT BARRIER RAIL



SHOWN AT CURB

JOINT SEALANT TERMINATION DETAILS

GENERAL NOTES

Cleaning existing joint opening (full depth) of all debris, providing and placing backer rod, saw-cutting asphalt overlay, and sealing joint is paid for by Item 438, "Cleaning and Sealing Joints" and measured by the linear foot.

Obtain approval for all tools, equipment, materials and techniques proposed for use to prepare the joint.

For Class 3 Hot Poured Rubber Seal, provide backer rod compatible with the hot poured rubber sealant and rated for a minimum of 400°F.

Provide Class 3 sealant in accordance with DMS-6310, "Joint Sealants and Fillers" for joints in asphalt overlay.

Provide Class 7 silicone sealant in accordance with DMS-6310, "Joint Sealants and Fillers" for joints in concrete.

Extend sealant up into rail or curb 3 inches on low side or sides of deck. If the Class 7 Sealant cannot be effectively placed in the vertical position, a Class 4 Sealant compatible with the Class 7 sealant is allowed for the extension of the seal into the curb or rail. Prepare surfaces where sealant is to be placed in accordance with manufacturer's specifications.

Texas Department of Transportation

Bridge Division

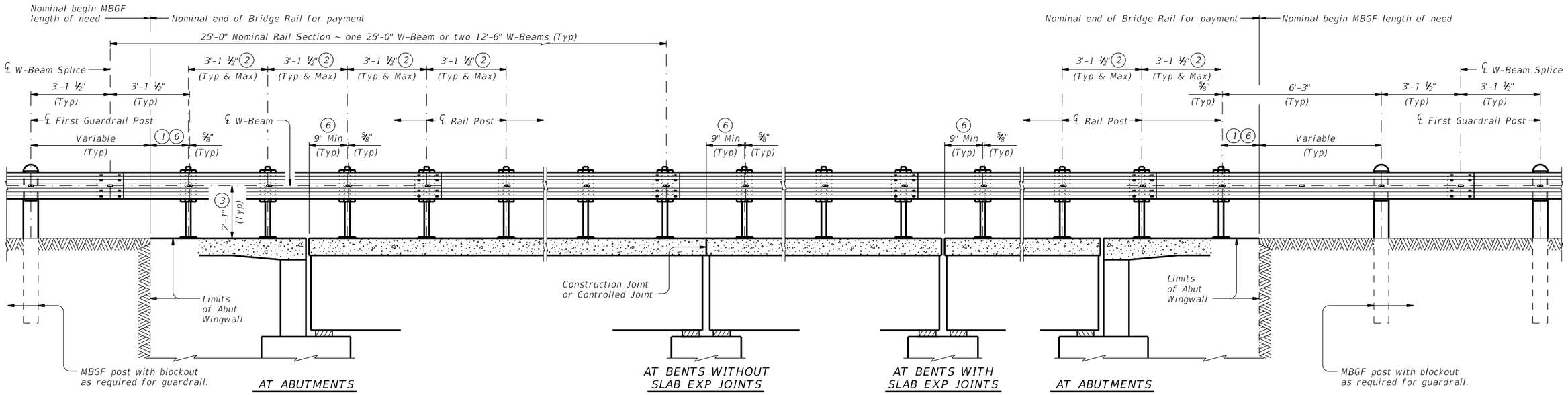
CLEANING AND SEALING EXISTING BRIDGE JOINTS

(PAN GIRDER BRIDGES)

FILE: cleansealjts pangirder.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT OCTOBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		86

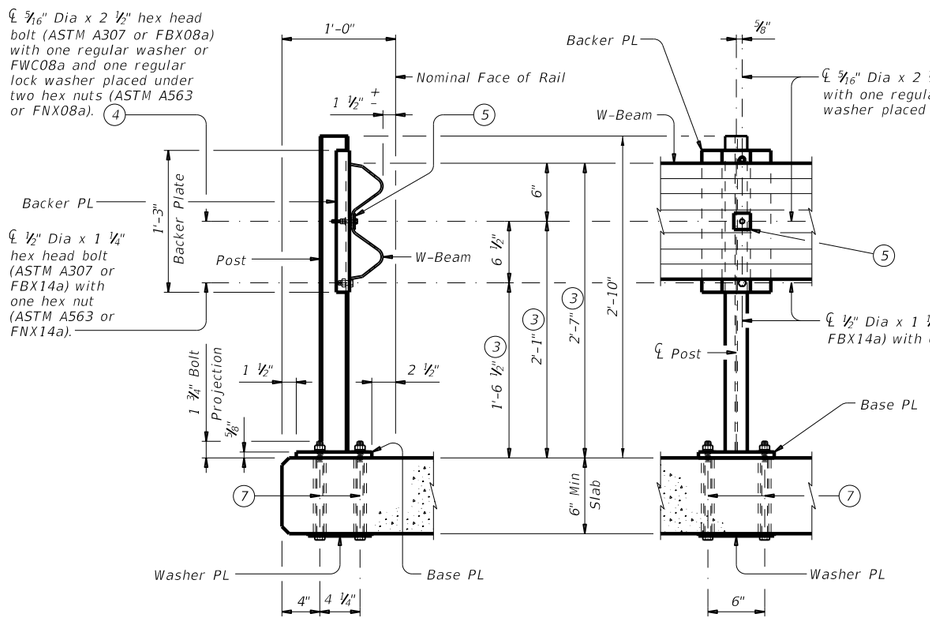
DATE:
FILE:

DATE: 1/12/2022 2:10:21 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0492582\SH155_BRG_TRAFFICRAIL_T631.dgn



ROADWAY ELEVATION OF RAIL

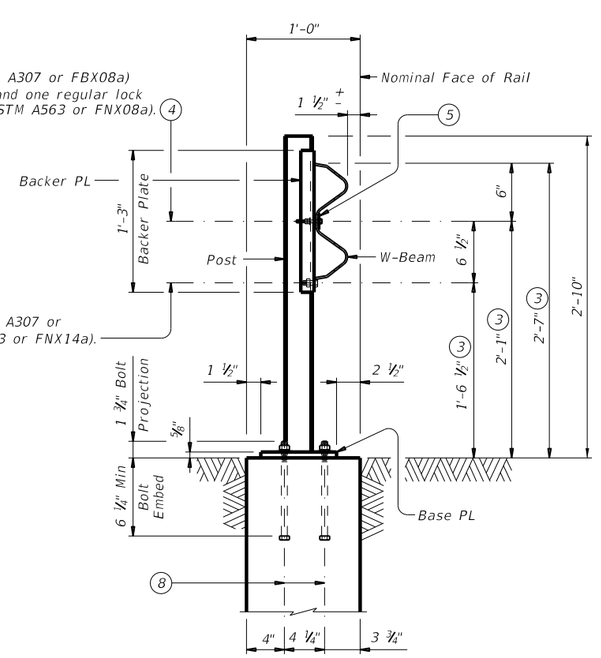
Showing without overlay.



RAIL SECTION — TRAFFIC SIDE RAIL VIEW

RAIL DETAILS ON BRIDGE SLAB

Showing without overlay.



RAIL SECTION ON ABUTMENT WINGWALL

Showing without overlay.

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

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

(3) Increase 2" for structures with overlay.

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

(5) PL ⅛ x 1 ¾ x 1¾ with ⅜ Dia Hole centered in PL (ASTM A36). Square Guardrail Washer (FWR01).

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

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

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

Texas Department of Transportation

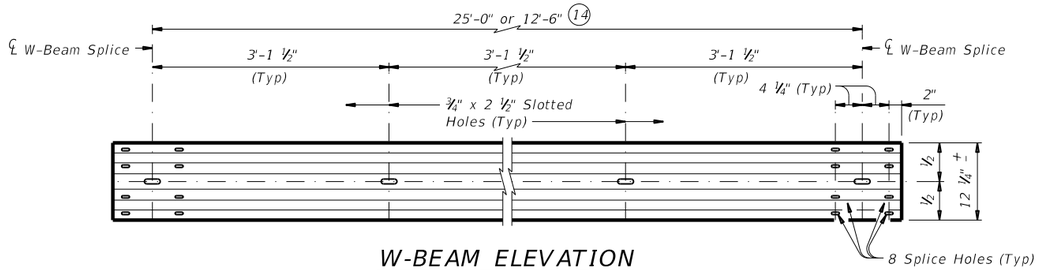
Bridge Division Standard

TRAFFIC RAIL

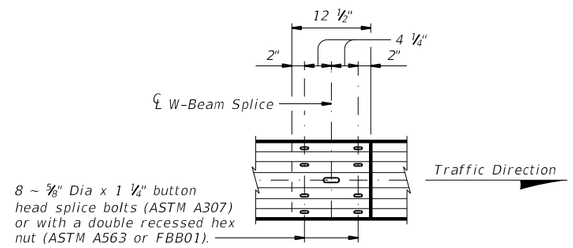
TYPE T631

FILE:	rlstd038-20.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT	September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS		0520	08	071	SH 155
07-20: Allowing 9'-4 ½" or 6'-3" W-Beam sections.		DIST	COUNTY		SHEET NO.
		TYL	ANDERSON		87

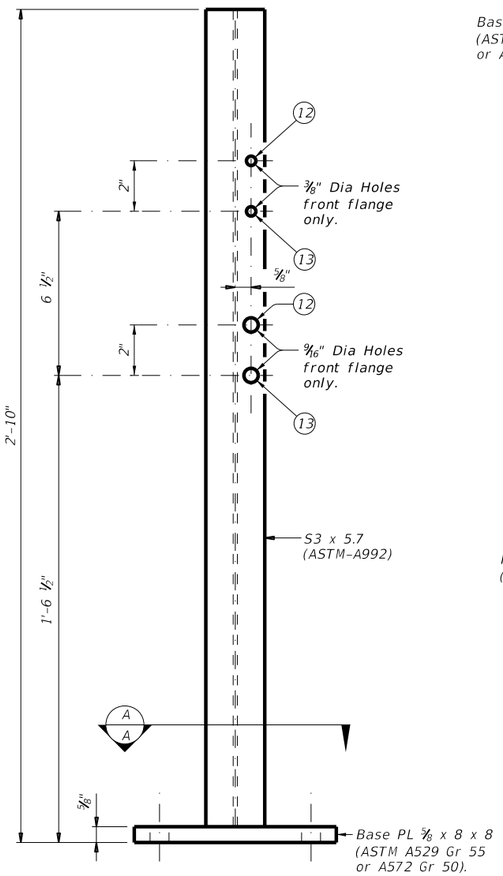
DATE: 1/12/2022 2:10:22 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0492582\SH155_BRG_TRAFFICRAIL_T631_rlstd038-20.dgn



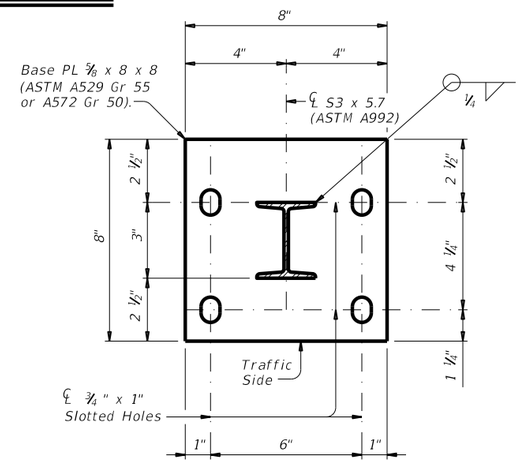
W-BEAM ELEVATION



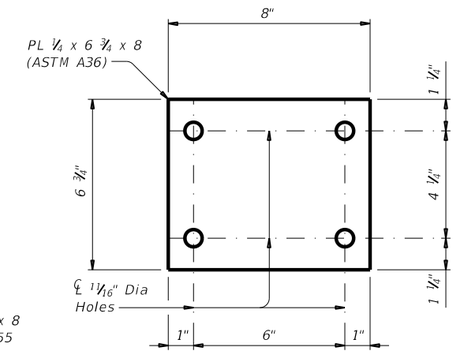
W-BEAM SPLICE ELEVATION



POST ELEVATION

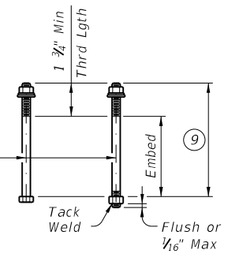


SECTION A-A



WASHER PLATE DETAIL

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



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

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

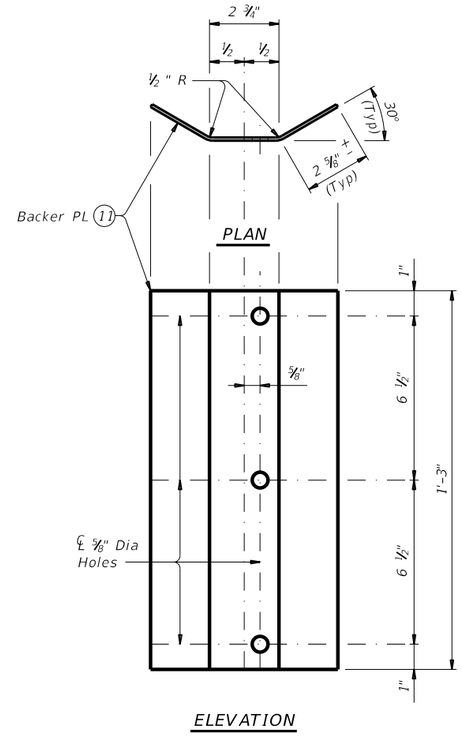
(10) See "Material Notes" for anchor bolt information.

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

(12) Used for structures with overlay.

(13) Used for structures without overlay.

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



BACKER PLATE

MBGF AND END TREATMENT NOTES:

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

CONSTRUCTION NOTES:

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

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

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

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

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

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

Shop drawings are not required for this rail.

MATERIAL NOTES:

Galvanize all steel components.

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

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

W-beam must meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified in the plans. The Contractor may furnish rail elements of 25'-0" or 12'-6" (Nominal) lengths and a single rail element of 9'-4 ½" or 6'-3" (Nominal) length.

W-Beam must have slotted holes at 3'-1 ½".

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

GENERAL NOTES:

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

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

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

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

Texas Department of Transportation

Bridge Division Standard

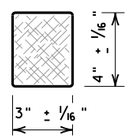
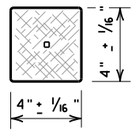
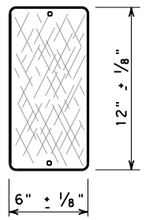
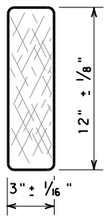
TRAFFIC RAIL

TYPE T631

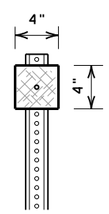
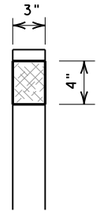
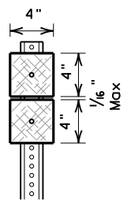
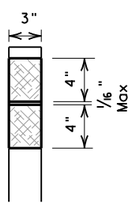
FILE: rlstd038-20.dgn	DN: TxDOT	CK: AES	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
07-20: Allowing 9'-4 ½" or 6'-3" W-Beam sections.	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		88

DATE: 1/12/2022 2:10:40 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401585\SH155_TRF_D&OM(1)S_20.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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

DELINEATORS

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

D & OM DESCRIPTIVE CODES

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

NUMBER OF REFLECTORS
S = Single
D = Double

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

REFLECTOR UNIT SIZE
1 or 2

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

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

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

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

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

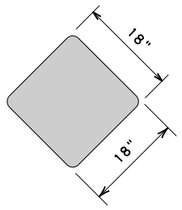
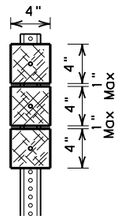
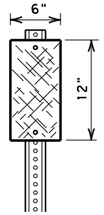
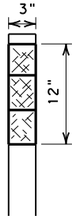
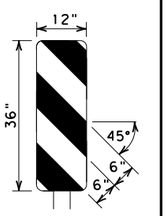
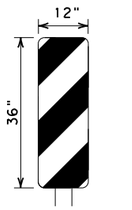
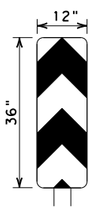
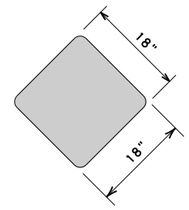
NUMBER OF REFLECTORS OR DIRECTION
X = 3-Size 2 reflector units (Type 2 only)
Y = 1-Size 3 reflector unit (Type 2 only)
Z = 3-Size 1 or 1-Size 4 reflector unit(s)(Type 2 only)
L = Left Side (Type 3 Object Marker only)
R = Right Side (Type 3 Object Marker only)
C = Center (Type 3 Object Marker only)

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

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

DIRECTION
If Required
BI = Bi-Directional

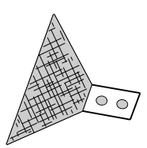
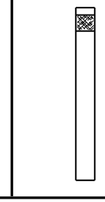
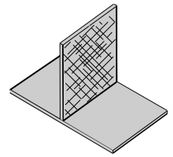
OBJECT MARKERS

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

DEPARTMENTAL MATERIAL SPECIFICATIONS

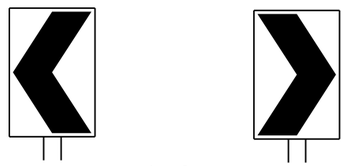
FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

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

CHEVRONS

DEVICE

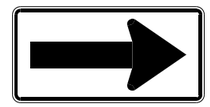


SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

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

ONE DIRECTION LARGE ARROW

DEVICE



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

NOTE:

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

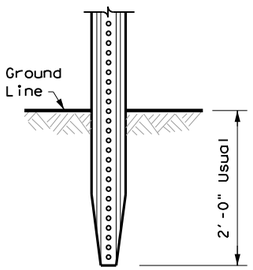
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	TYL	ANDERSON		89

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

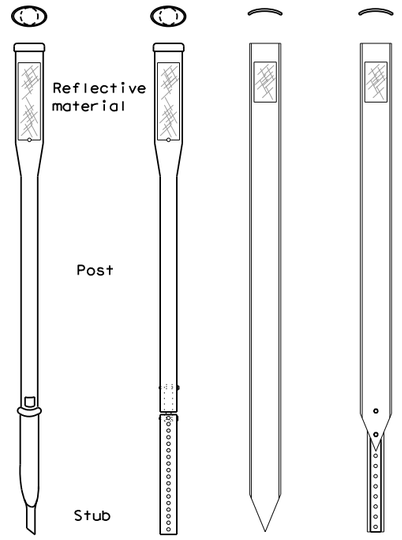


NOTES

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

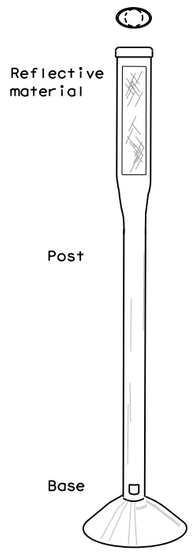
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



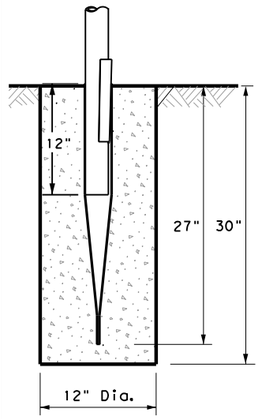
SURFACE MOUNT

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.

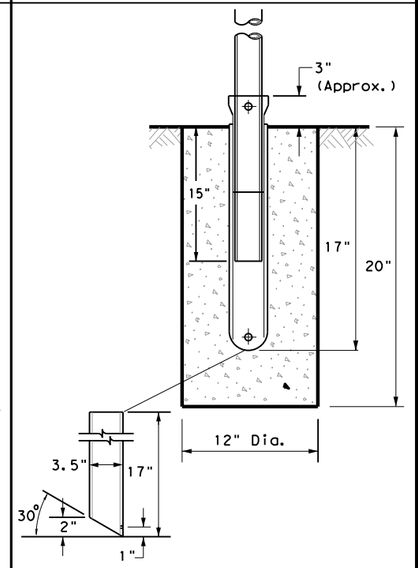
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

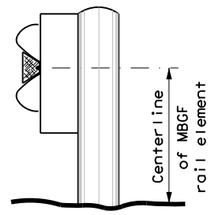
NOTE

1. Install per manufacturer's recommendations.

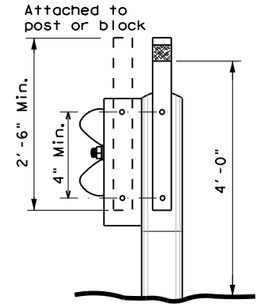
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

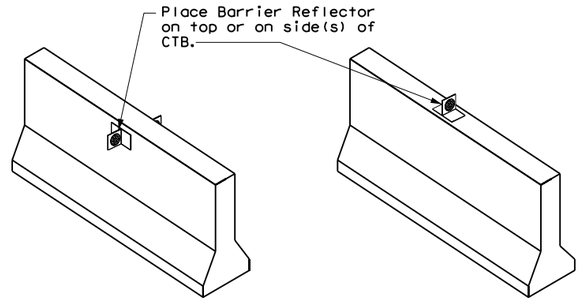
GF1



GF2



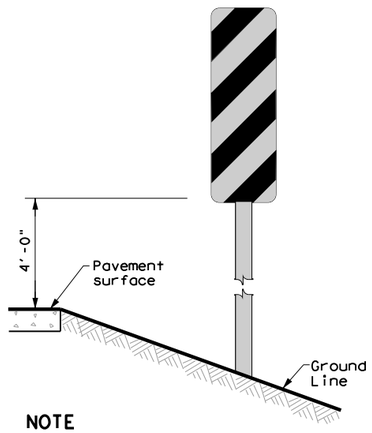
CONCRETE TRAFFIC BARRIER (CTB)



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.

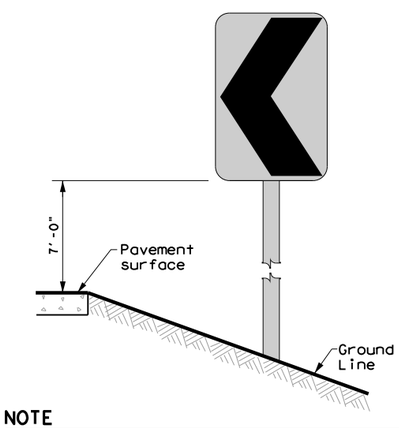
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

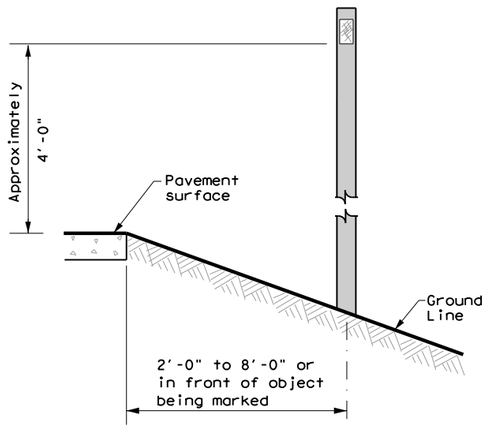
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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	0520	08	071	SH 155
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	TYL	ANDERSON		90

20B

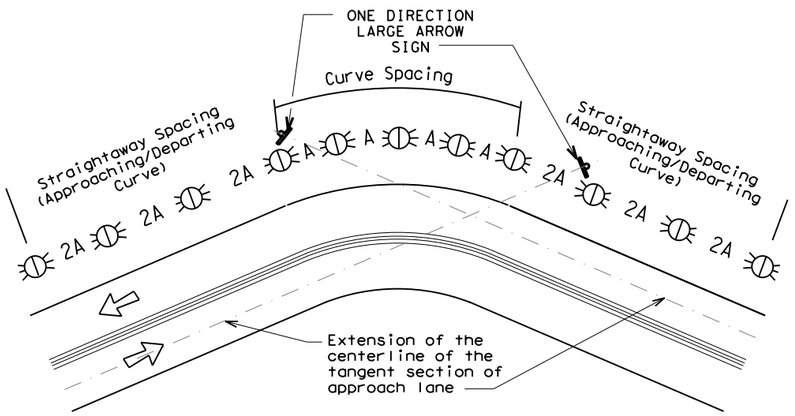
DATE: 1/12/2022 2:10:45 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401585\SH155_TRF_D&OM(2)_20.dgn

DATE: 1/12/2022 2:10:50 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401585\SH155_TRF_D&OM(3)-20.dgn

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

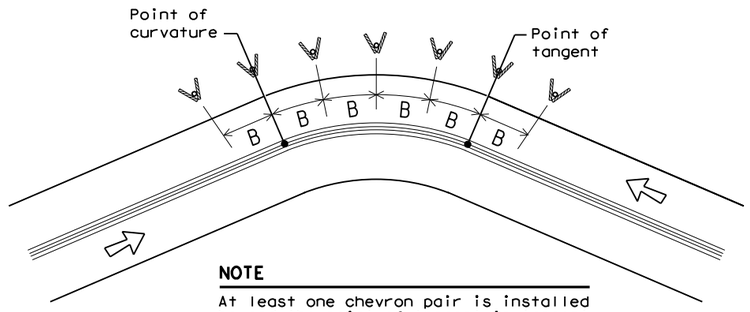
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

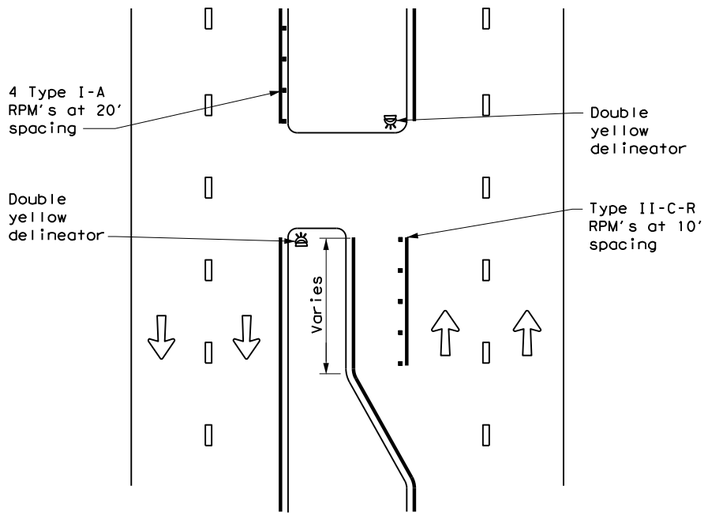
D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	TYL	ANDERSON		91

20C

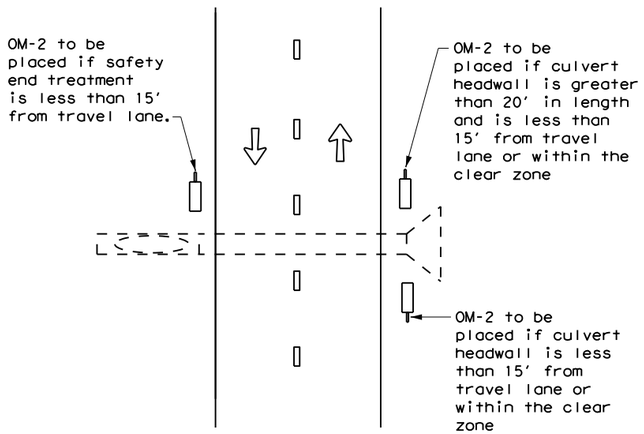
DATE: 1/12/2022 2:10:55 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401585\SH155_TRF_D&OM(4)-20.dgn

CROSSOVERS



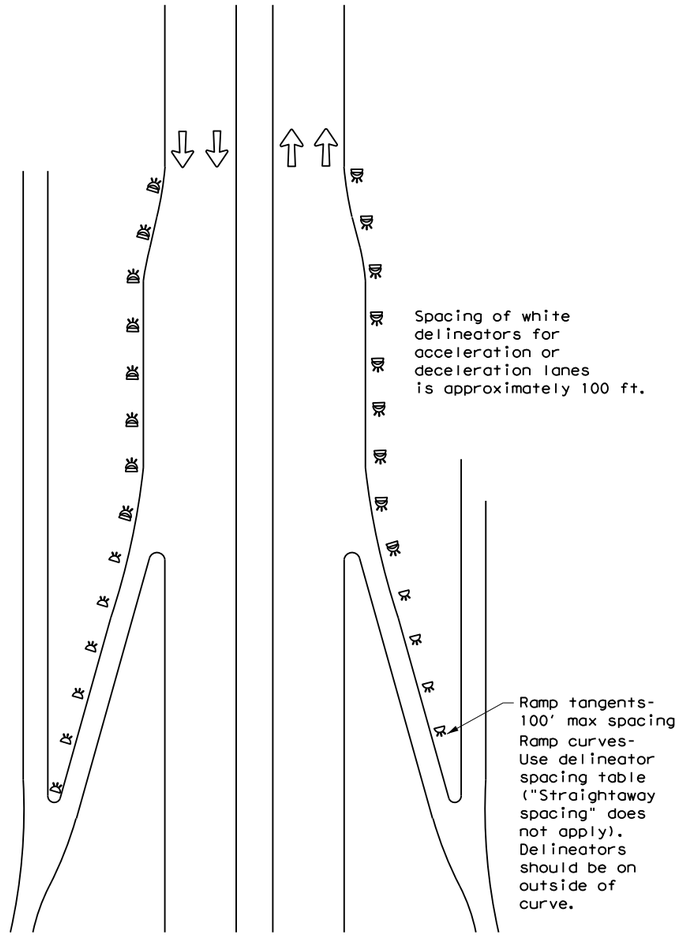
DETAIL 1

FOR CULVERTS WITHOUT MBGF



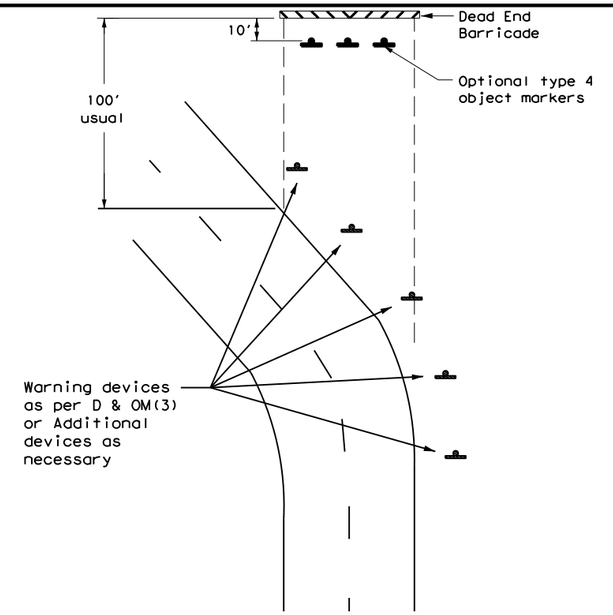
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



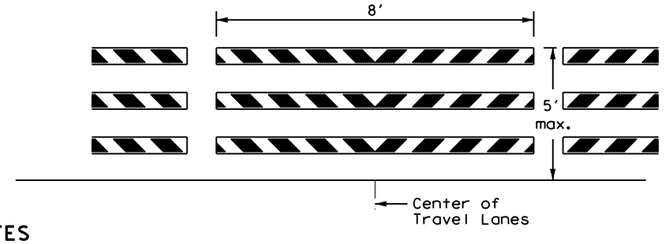
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

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

DETAIL 5

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

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

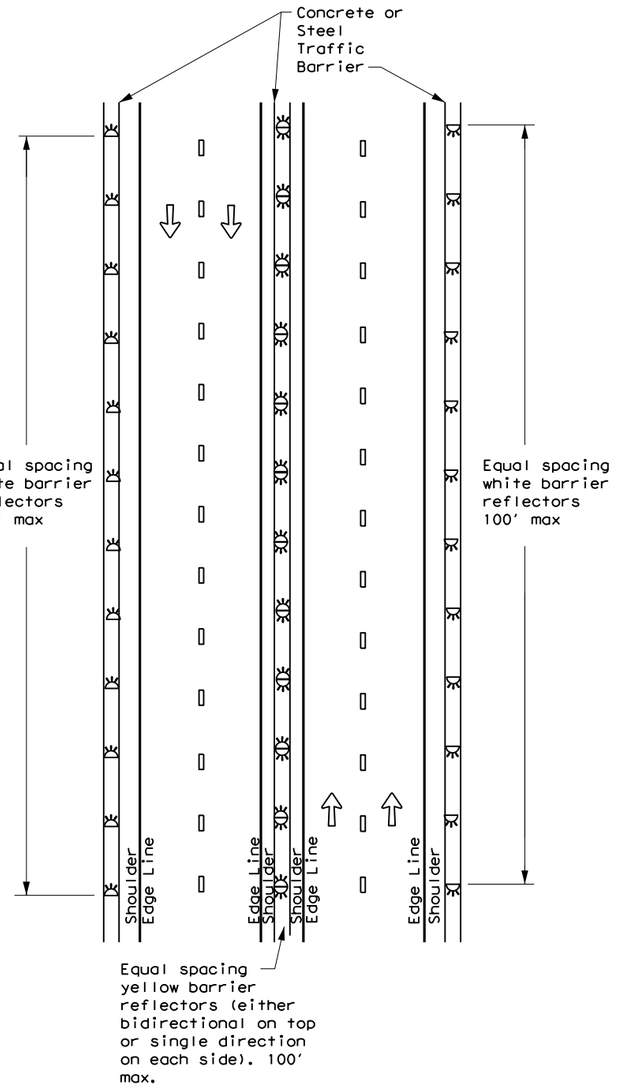
D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
3-15	DIST	COUNTY		SHEET NO.
7-20	TYL	ANDERSON		92

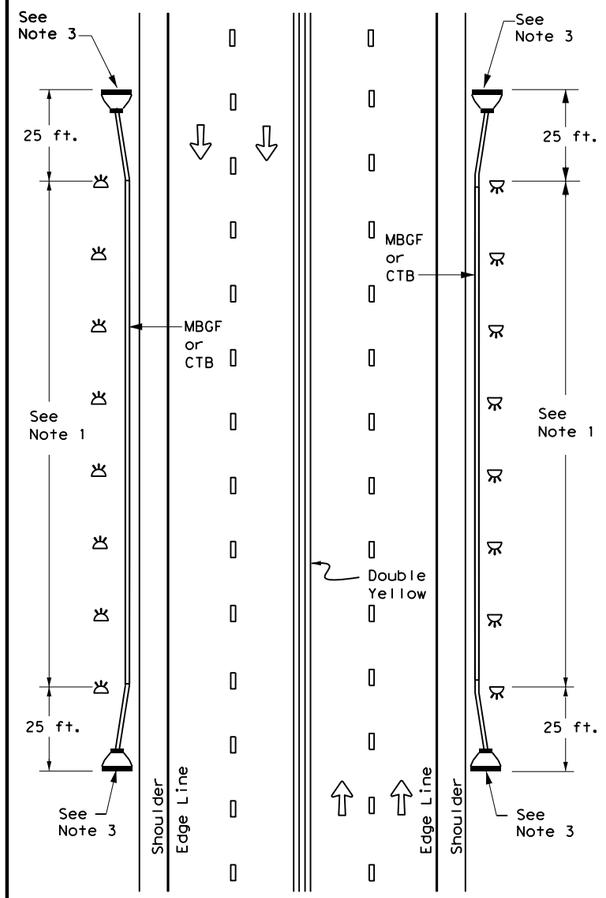
20D

DATE: 1/12/2022 2:10:59 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401585\SH155_TRF_D&OM(6).dgn

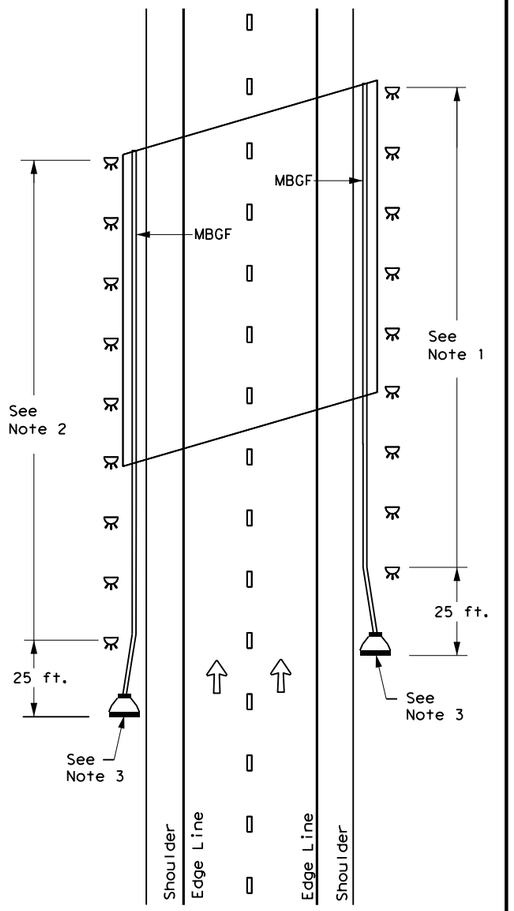
CONTINUOUS CONCRETE OR STEEL BARRIER



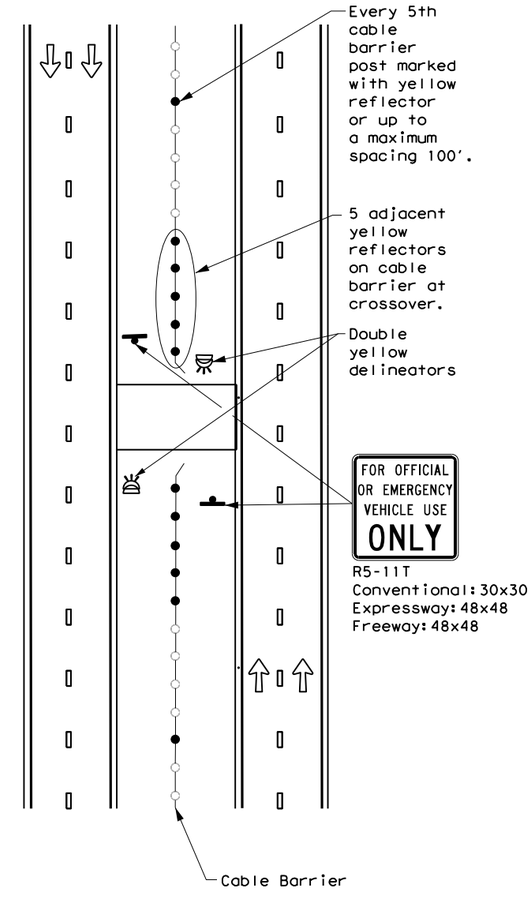
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

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

LEGEND

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

Texas Department of Transportation

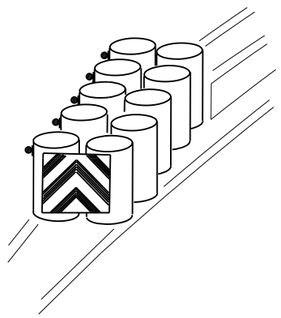
Traffic Safety Division Standard

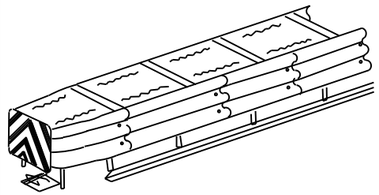
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

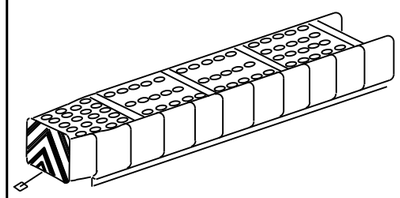
D & OM(6)-20

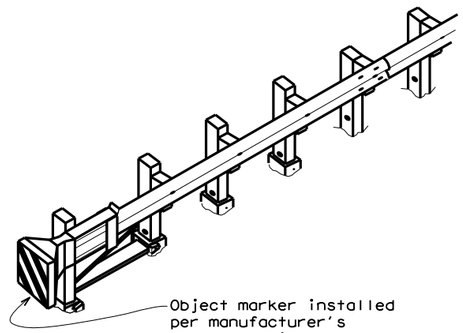
FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
7-20	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		93

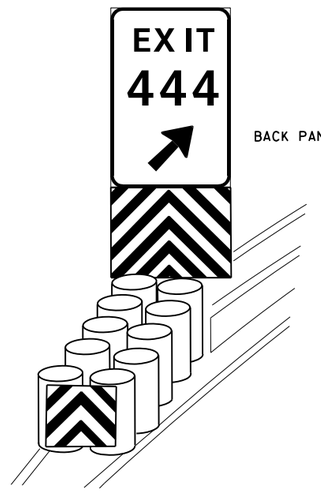
DATE: 1/12/2022 2:11:04 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401585\SH155_TRF_DOMVIA_s-20.dgn

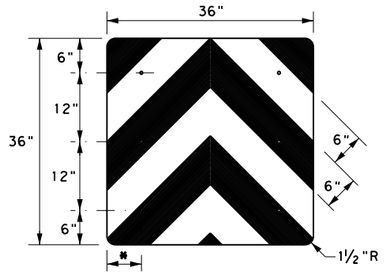


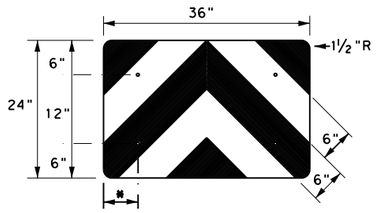




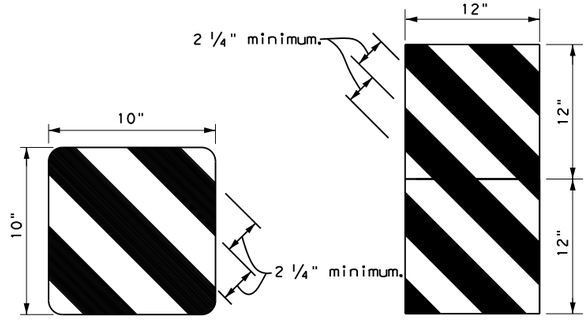




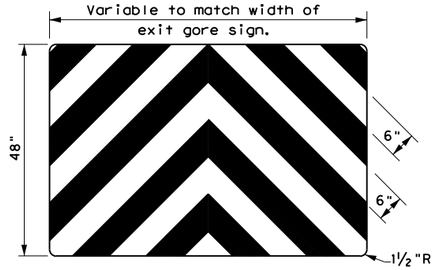


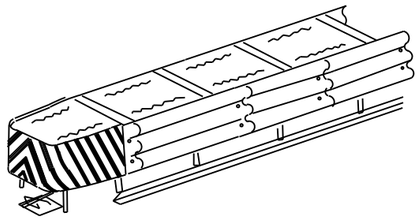


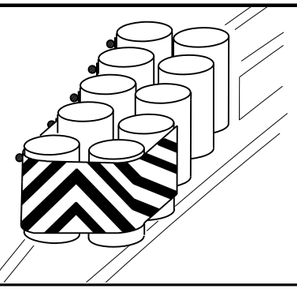
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

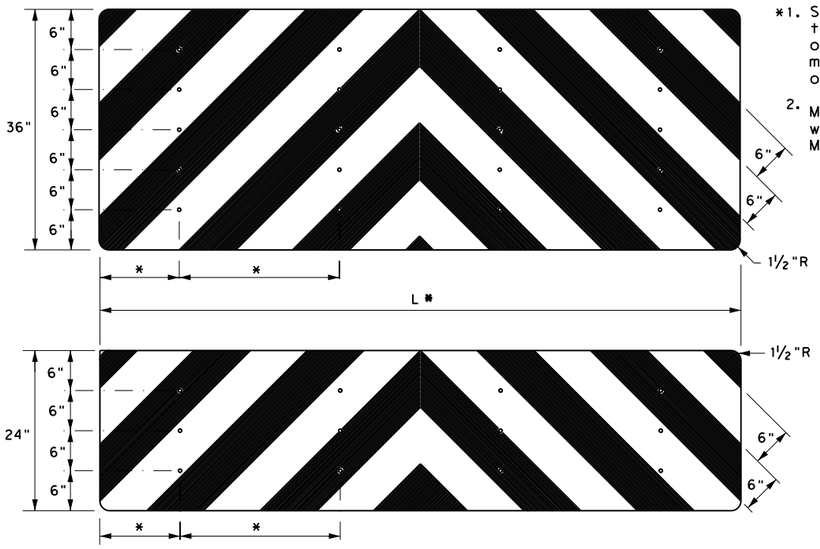


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

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

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

NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

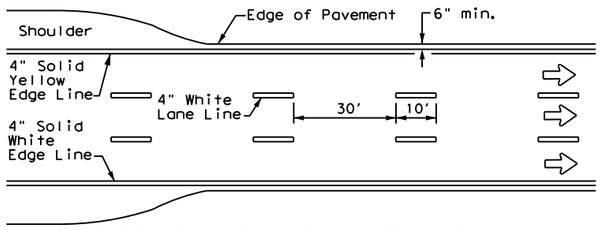
DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

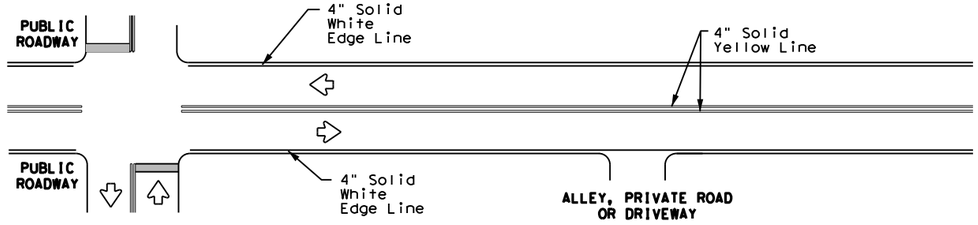
FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	TYL	ANDERSON		94
4-98 7-20				

20G

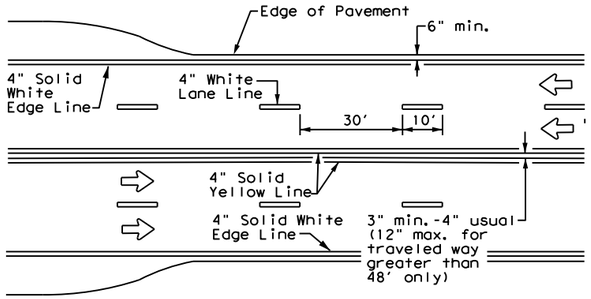
DATE: 1/12/2022 2:11:08 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401585\SH155_TRF_PM1fig20.dgn



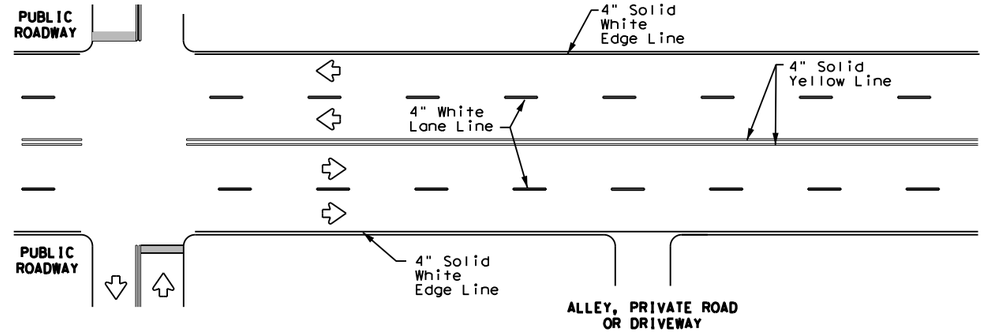
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



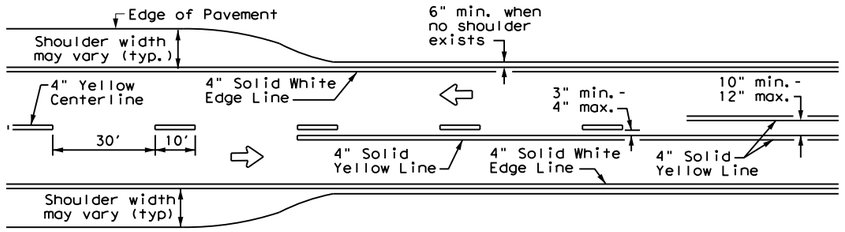
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



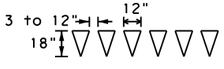
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



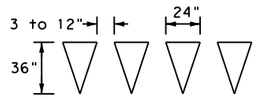
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

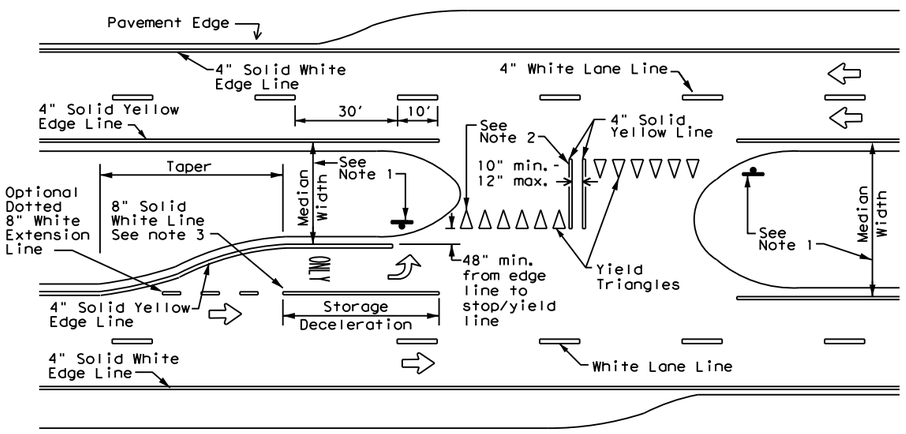


For posted speed on road being marked equal to or less than 40 MPH.



For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

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

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

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

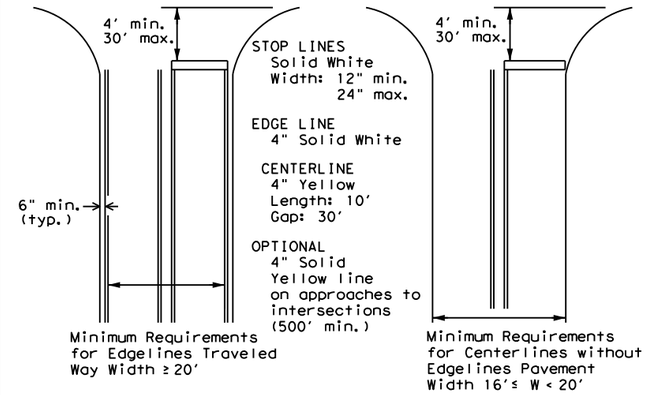
GENERAL NOTES

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

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

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

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



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

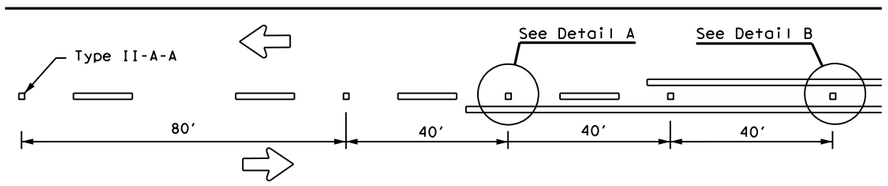
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

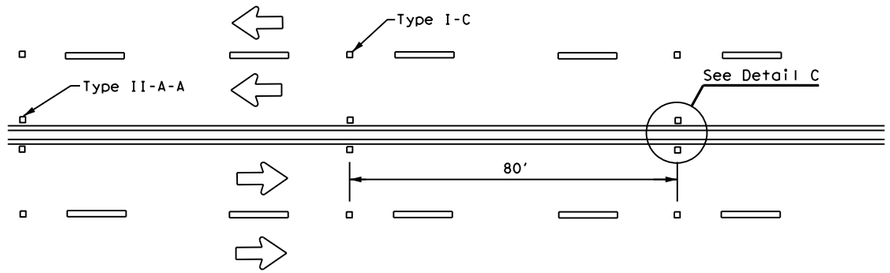
FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0520	08	071	SH 155
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	TYL	ANDERSON		95

22B

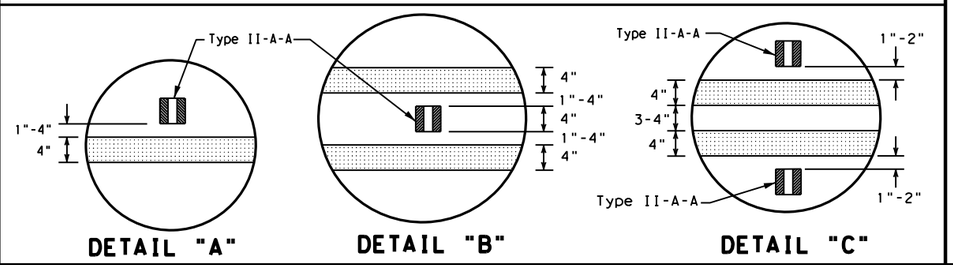
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



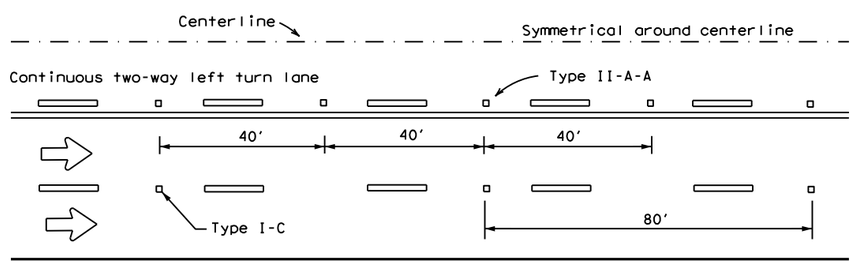
CENTERLINE FOR ALL TWO LANE ROADWAYS



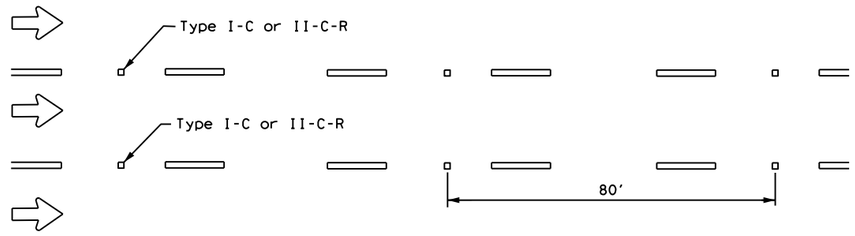
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" **DETAIL "B"** **DETAIL "C"**

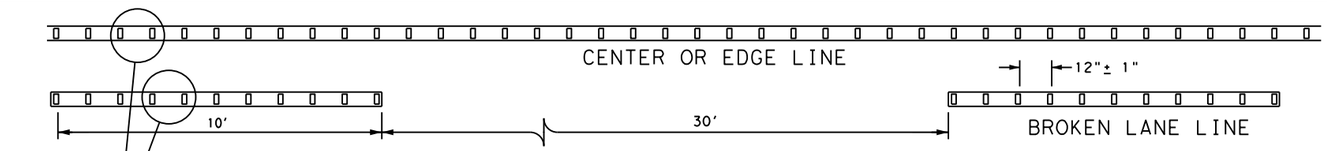


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



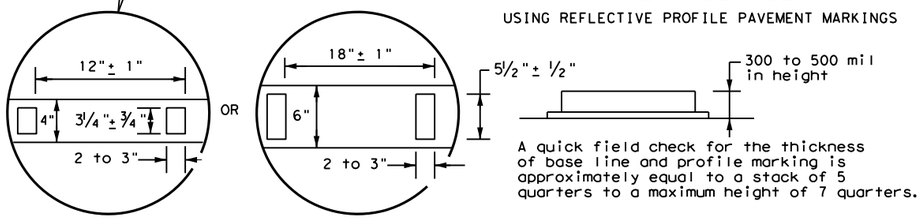
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTE

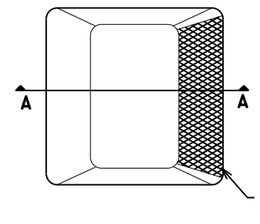
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

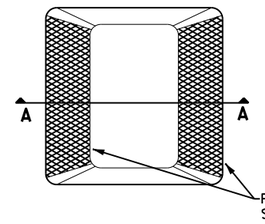
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

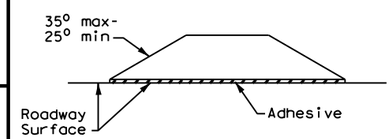
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

Traffic Safety Division Standard

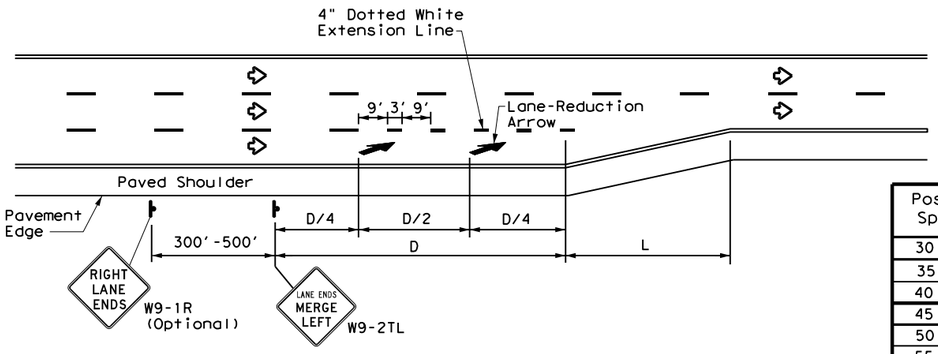
POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10	0520	08	071	SH 155
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	TYL	ANDERSON		96

22B

DATE: 1/12/2022 2:11:12 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401585\SH155_TRF_PM#2#1#20.dgn

DATE: 1/12/2022 2:11:16 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401585\SH155_TRF_PM#3#20.dgn

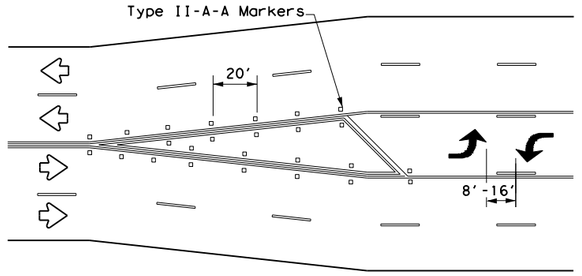


LANE REDUCTION

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

NOTES

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



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

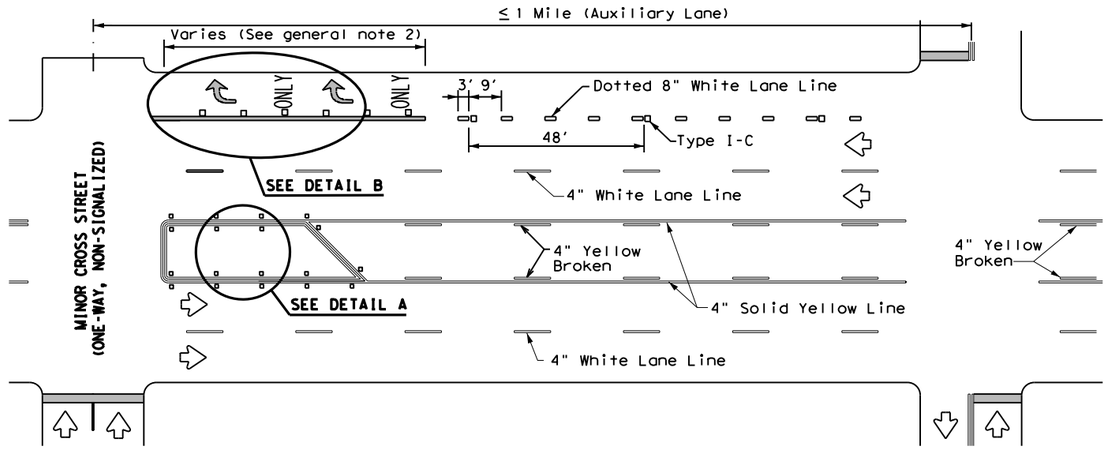
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

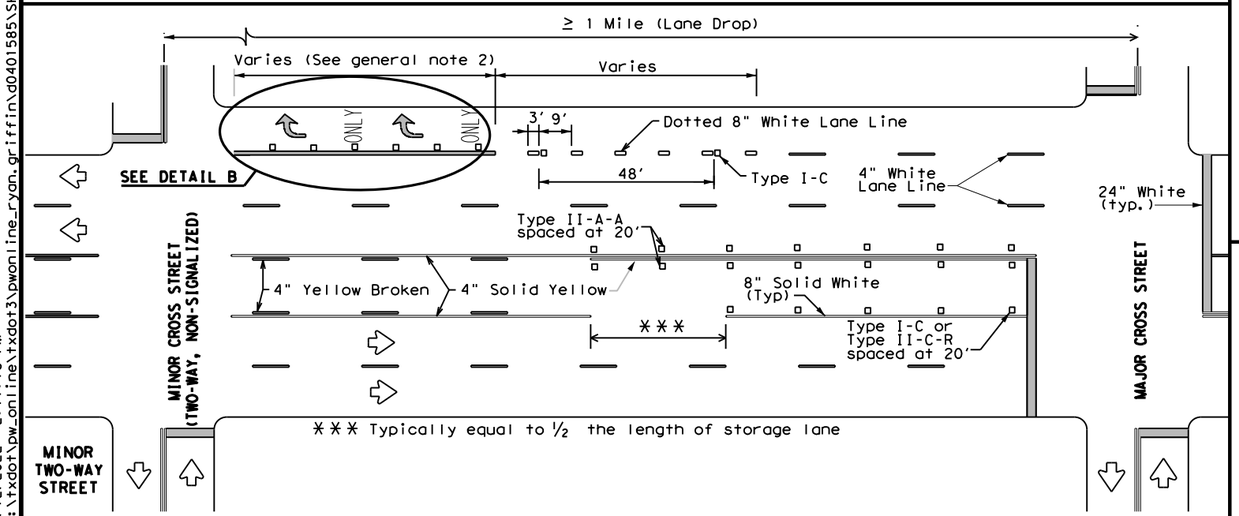
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn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

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

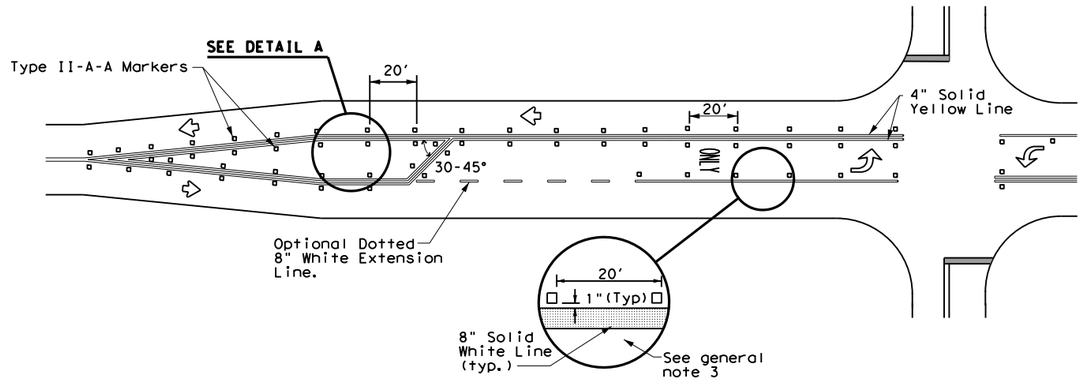
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



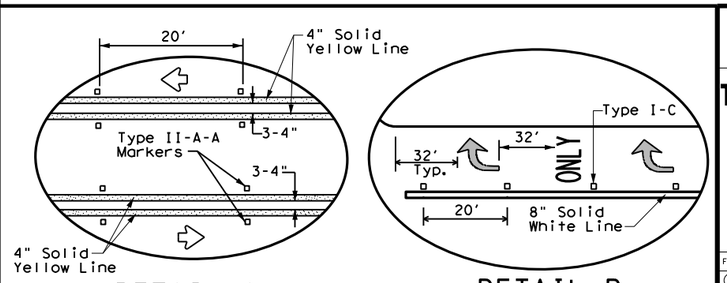
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



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



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



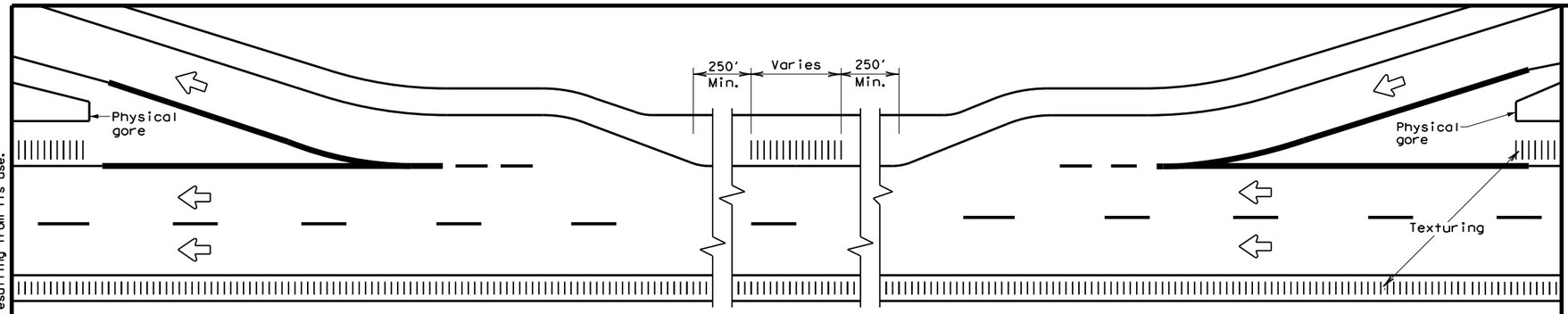
Texas Department of Transportation

Traffic Safety Division Standard

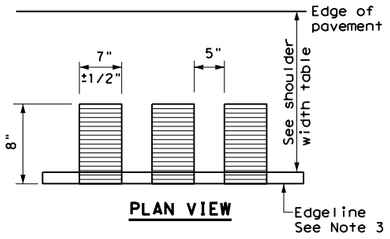
TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
5-00 2-10	DIST	COUNTY		SHEET NO.
8-00 2-12	TYL	ANDERSON		97
3-03 6-20				

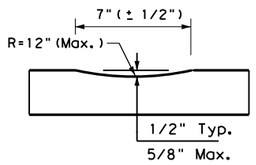
220



TYPICAL RUMBLE STRIP PLACEMENT AT EXIT AND ENTRANCE RAMPS

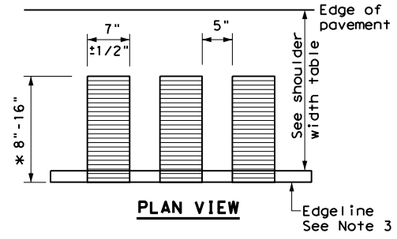


PLAN VIEW



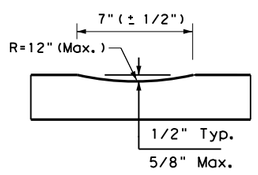
PROFILE VIEW
OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



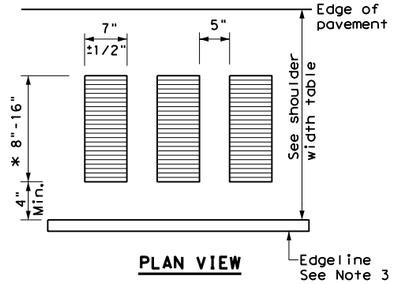
PLAN VIEW

* This distance may vary based on width of shoulder



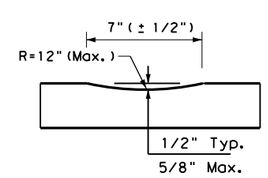
PROFILE VIEW
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



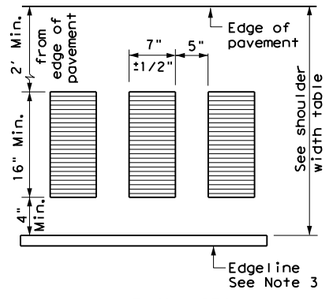
PLAN VIEW

* This distance may vary based on width of shoulder

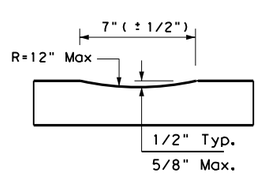


PROFILE VIEW
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW



PROFILE VIEW
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)

GENERAL NOTES

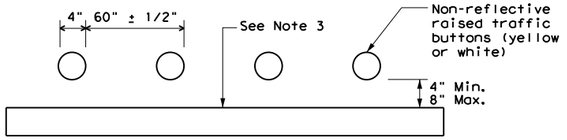
1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the table below for determining what options may be used for edgeline rumble strips.

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

5. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
6. Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble stripe.
7. Breaks in edgeline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks when installed on conventional highways.
8. Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
9. Consideration should be given to noise levels when edgeline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inches depth of milled rumble strip may be considered in these areas.
10. On roadways with high bicycle activity, consideration should be given before the installation of edgeline rumble strips. Things to consider include size of rumble strips, rumble strip material and location of rumble strips on the shoulder. If the designer determines that gaps are needed in the rumble strips due to bicycle use of the road, then follow the requirement shown in FHWA Technical Advisory T5040.39, or latest version. A detail of the spacing shall be included in the plans.

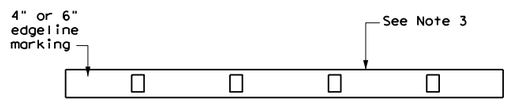
WHEN INSTALLING RAISED OR PROFILE EDGELINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edgeline when used as a rumble strip. The color of the button should match the color of the adjacent edgeline marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. Breaks in edgeline rumble strips using raised traffic buttons shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks when installed on conventional highways.
15. The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
16. Raised profile thermoplastic markings used as edgelines may substitute for buttons.



PLAN VIEW
OPTION 5

RAISED EDGELINE RUMBLE STRIPS



PLAN VIEW
OPTION 6

PROFILE EDGELINE MARKINGS

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

Texas Department of Transportation

Traffic Operations Division Standard

EDGELINE RUMBLE STRIPS ON FREEWAYS AND DIVIDED HIGHWAYS
RS(1)-13

FILE: rs(1)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-10 10-13	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		98

DATE: 1/12/2022 2:11:23 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401585\SH155_TRF_RSfig1s.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

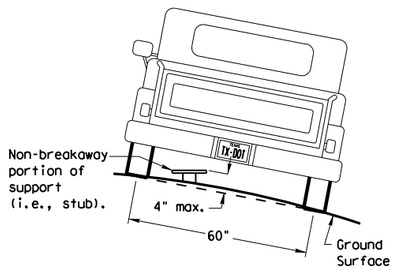
Anchor Type

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

Sign Mounting Designation

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

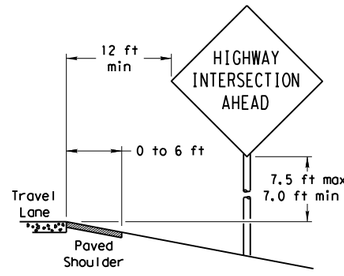
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

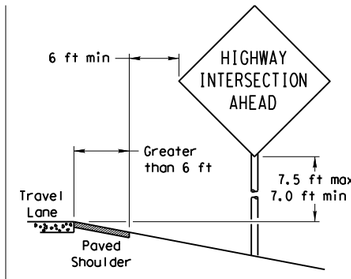
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

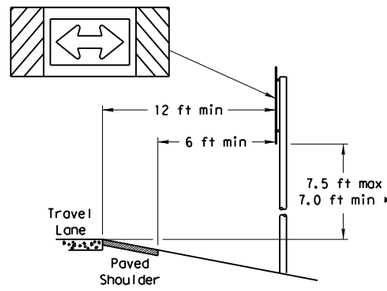
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



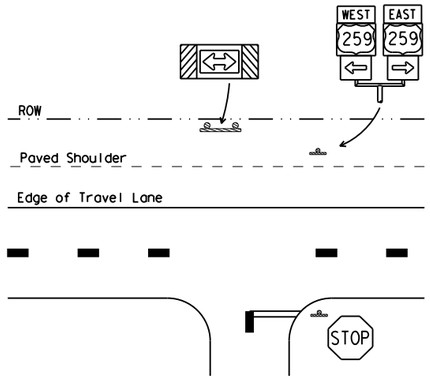
GREATER THAN 6 FT. WIDE

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

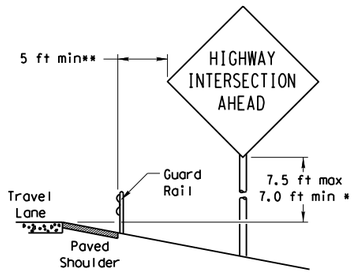
T-INTERSECTION



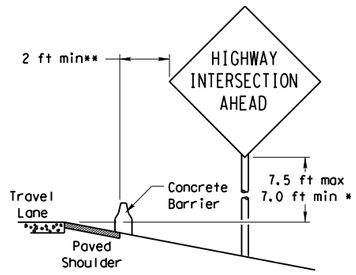
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



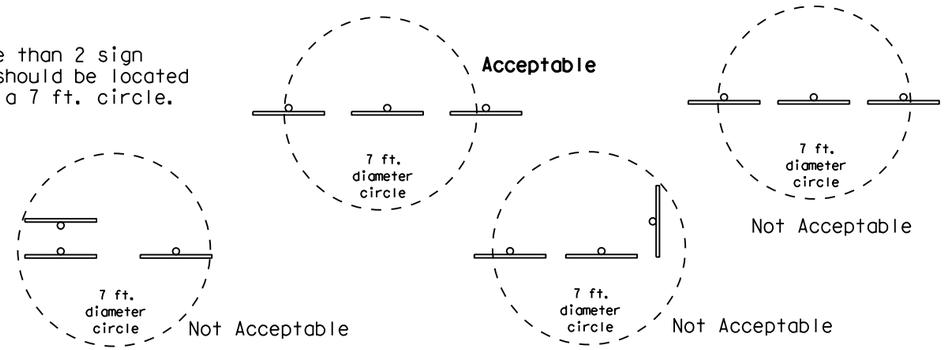
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

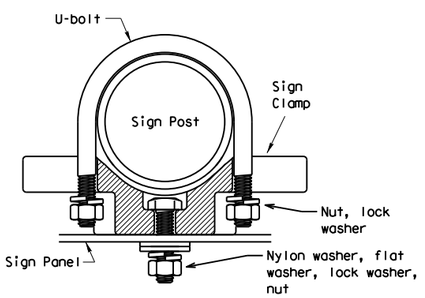
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

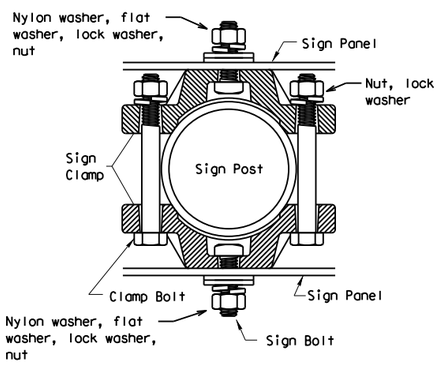


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

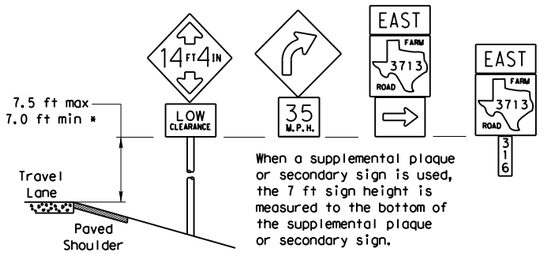
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



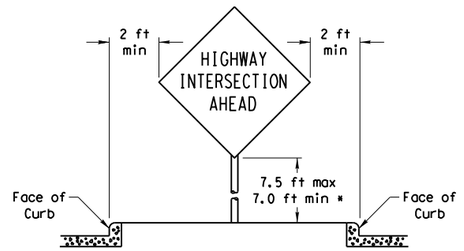
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



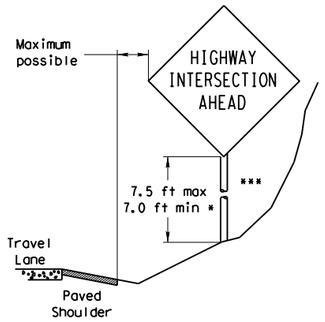
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

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

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

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

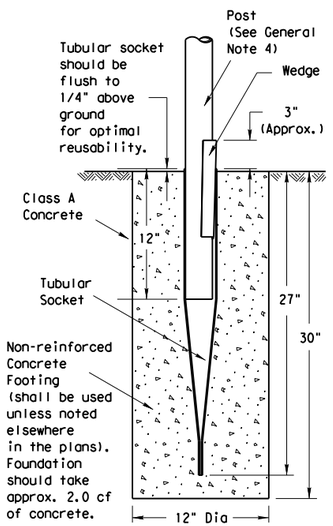
9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155

DIST	COUNTY	SHEET NO.
TYL	ANDERSON	99

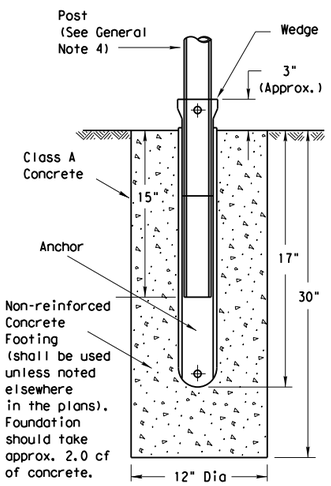
DATE: 1/12/2022 2:11:28 PM
FILE: c:\txdot\pwonline\txdot3\pwonline*ryan.griffin\d0401585\SMD(GEN)-08.dgn

Wedge Anchor Steel System



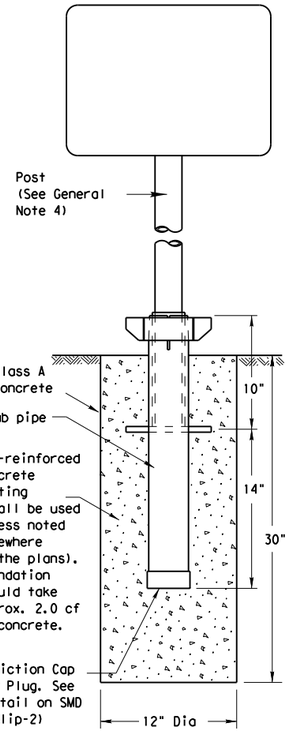
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

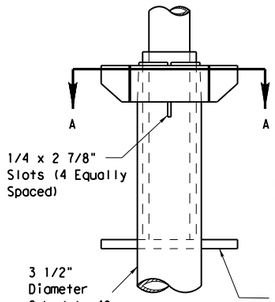


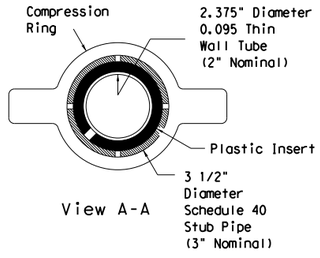
SMD RD SGN ASSM TY TWT(X)WP(X)

Universal Anchor System with Thin-Walled Tubing Post



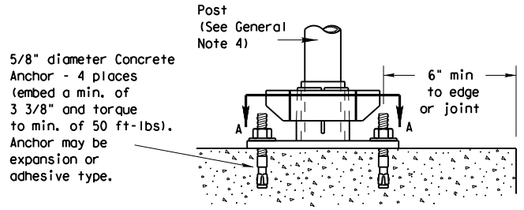
SM RD SGN ASSM TY TWT(X)UA(P)



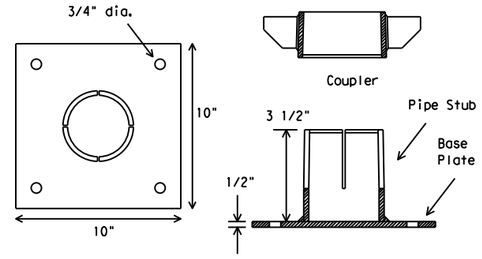


View A-A

Plastic insert must be used when using the TWT with either the Universal Anchor System or the Bolt Down Universal Anchor System. The insert should be approx. 10" long and cover the tubing from just above the top of the stub pipe to the bottom of the sign post when using the Universal Anchor System. The insert should be cut to approx. 4 1/2" when used with the Bolt Down Universal Anchor System.

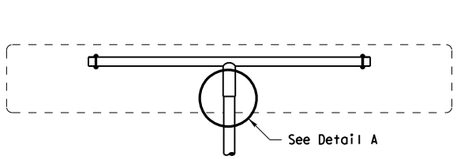


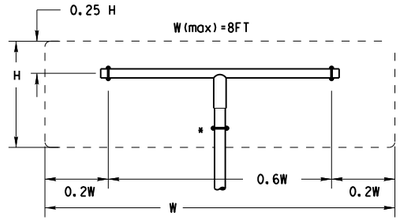
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Top of bolt shall extend at least flush with top of nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 3 3/8" minimum embedment, shall have a minimum allowable tension and shear of 2450 and 1525 psi, respectively. 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.



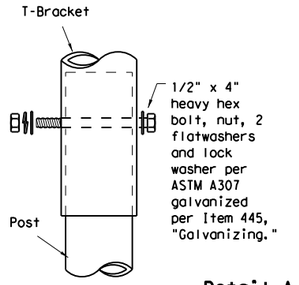
SM RD SGN ASSM TY TWT(X)UB(P)

Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)
(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

The devices shall be installed per manufacturer's recommendations.
Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

1. The Wedge Anchor System and the Universal Anchor System with thin wall tubing post may be used to support up to 10 square feet of sign area.
2. The tubular socket, wedge and prefabricated T-bracket shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to the approval of the TxDOT Traffic Standards Engineer.
3. Except for posts (13 BWG Tubing), clamps, nuts and bolts, all components shall be prequalified. A list of prequalified vendors may be obtained from the Material Producer List web page. The website address is: http://www.txdot.gov/business/producer list.htm
4. Material used as post with this system shall conform to the following specifications:
   13 BWG Tubing (2.375" outside diameter) (TWT)
   0.095" nominal wall thickness
   Seamless or electric-resistance welded steel tubing
   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
   18% minimum elongation in 2"
   Wall thickness (uncoated) shall be within the range of .083" to .099"
   Outside diameter (uncoated) shall be within the range of 2.369" to 2.381"
   Galvanization per ASTM 123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
5. Sign blanks shall be the sizes and shapes shown on the plans.
6. Additional sign clamp required on the "T-bracket" post for 24" high signs. Place clamp at least 3" above bottom of sign when possible.
7. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
8. See the Traffic Operations Division website for detailed drawings of sign clamps and Wedge Anchor System components. The website address is: http://www.txdot.gov/publications/traffic.htm

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
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. Place concrete into hole until it is approximately flush with the ground. Concrete shall be Class A.
3. Insert tubular socket into concrete until top of socket is approximaely 1/4 " above the concrete footing.
4. Plumb the socket. Allow a minimum 4 days for concrete to set, unless otherwise directed by Engineer..
5. Attach the sign to the sign post.
6. Insert the sign post into socket and align sign face with roadway.
7. Drive the wedge into the socket to secure post. This will leave approximately 3 inches of the wedge exposed.

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

1. Dig foundation hole. Where solid rock is encountered at ground level, the foundation shall be a minimum depth of 18". When solid rock is encountered below ground level, the foundation shall extend in the solid rock a minimum depth of 18" or provide a minimum foundation depth of 30". If solid rock is encountered, the socket/stub may be reduced in length as required to a minimum length of 18". Any material removed from the socket/stub shall be from the bottom and the clearance requirements given on SMD(GEN) must be followed. The inner surfaces of the socket/stub must remain free of concrete or other debris.
2. Insert base post in hole to depths shown and backfill hole with concrete.
3. Level and plumb the base post using a torpedo level and allow concrete adequate time to set. The bottom of the slots provided in the stub pipe shall remain above the top of the concrete foundation.
4. Attach the sign to the sign post.
5. Install plastic insert around bottom of post.
6. Insert sign post into base post. Lower until the post comes to rest on steel rod.
7. Seat compression ring using a hammer. Typically, the top of compression ring will be approximately level with top of stub post when optimally installed.
8. Check sign post by hand to ensure it is unable to turn. If loose, increase the tightening of the compression ring.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

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

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155

DIST	COUNTY	SHEET NO.
TYL	ANDERSON	100

DATE: 1/12/2022 2:11:33 PM
FILE: c:\txdot\pw\online\txdot3\pwonlineeryan.griffin\d0401585\SMD(TWT)-08.dgn

DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

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

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

1.

2.

☐ No Action Required ☒ Required Action

Action No. FOLLOW SW3P PER PLANS

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# 3(i)

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

1.

2.

3.

4.

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

Best Management Practices:

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

III. CULTURAL RESOURCES

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

☒ No Action Required ☐ Required Action

Action No.

1. No Action necessary above those required by the 2004 Texas Standard for Specifications Construction and Maintenance of Highways. Streets & Bridges.
2.
3.
4.

IV. VEGETATION RESOURCES

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

☐ No Action Required ☒ Required Action

Action No.

1. ADHERE TO THE SPECS AS LISTED ABOVE
2.
3.
4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

☐ No Action Required ☒ Required Action

Action No.

1. ADHERE TO DIRECTION CONCERNING MIGRATORY BIRDS LISTED BELOW
2.
3.
4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

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

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

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

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

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

Contact the Engineer if any of the following are detected:

* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

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

☐ Yes ☒ No

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

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

☐ Yes ☐ No

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

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

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

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation

Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0520	08	071	SH 155	
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.	
05-07-14 ADDED NOTE SECTION IV.	TYL	ANDERSON		101	
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.					

CK:
DW:
CK:
DN:

A. GENERAL SITE DATA

1. PROJECT LIMITS:
FROM .13 MI N OF CR 3112 (DEPRESSED MEDIAN), S
TO FM 315
PROJECT LENGTH = 98,215.00 FT. = 18.601 MILES

PROJECT LOCATION:
BEGIN PROJECT : R.M. 350+0.552
END PROJECT : R.M. 368+1.105

PROJECT COORDINATES:
BEG LATITUDE: +32.03949 BEG LONGITUDE: -95.51221
END LATITUDE: +31.79127 END LONGITUDE: -95.61846

2. PROJECT SITE MAPS:
* PROJECT LOCATION MAP: **TITLE SHEET**
* DRAINAGE PATTERNS: **MBGF LAYOUTS**
* SLOPES ANTICIPATED AFTER MAJOR GRADINGS OR AREAS OF SOIL DISTURBANCE: **EXISTING AND PROPOSED TYPICAL SECTIONS**
* LOCATION OF EROSION AND SEDIMENT CONTROLS: **MBGF LAYOUTS**
* SURFACE WATERS AND DISCHARGE LOCATIONS: **MBGF LAYOUTS**
* PROJECT SPECIFIC LOCATIONS: TO BE SPECIFIED BY THE PROJECT FIELD OFFICE DURING CONSTRUCTION AND LOCATED IN THE PROJECT SW3P FILE. REFERENCE ITEM #10 BELOW

3. PROJECT DESCRIPTION: **REPAIR AND RESURFACE ROADWAY, IMPROVE DRAINAGE, UPGRADE MBGF**

4. MAJOR SOIL DISTURBING ACTIVITIES: **UPGRADE AND ADD MBGF**

5. EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:

ACCORDING TO DATA FROM THE WEB SOIL SURVEY, THE PROJECT SOILS ARE PRIMARILY SANDY LOAM. THE PROJECT SITE IS WELL VEGETATED.

6. TOTAL PROJECT AREA: **563.7 ACRES**

7. TOTAL AREA TO BE DISTURBED: **4.9 ACRES**

8. WEIGHTED RUNOFF COEFFICIENT
BEFORE CONSTRUCTION: **N/A**
AFTER CONSTRUCTION: **N/A**

9. NAME OF RECEIVING WATERS: (SEGMENT NUMBER OF RECEIVING WATERS)
RECEIVING WATERS WILL BE DISCHARGED INTO THE NECHES RIVER, SEGMENT 0604.

10. PROJECT SW3P FILE: FOR PROJECTS DISTURBING ONE ACRE OR MORE, TXDOT WILL MAINTAIN AN SW3P FILE WITH ALL PERTINENT ENVIRONMENTAL DOCUMENTS, CORRESPONDENCE, ETC. AT THE PROJECT FIELD OFFICE. IF NO FIELD OFFICE IS AVAILABLE THEN THE SW3P FILE SHALL BE KEPT IN THE INSPECTOR'S TRUCK.

B. EROSION AND SEDIMENT CONTROLS

1. SOIL STABILIZATION PRACTICES:

- [X] TEMPORARY SEEDING
- [X] PERMANENT PLANTING, SODDING, OR SEEDING
- [ ] MULCHING
- [X] SOIL RETENTION BLANKET
- [ ] BUFFER ZONES
- [ ] PRESERVATION OF NATURAL RESOURCES

OTHER:

2. STRUCTURAL PRACTICES:

- [X] SILT FENCES
- [X] ROCK FILTER DAMS
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- [ ] DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- [ ] DIVERSION DIKE AND SWALE COMBINATIONS
- [ ] PIPE SLOPE DRAINS
- [ ] PAVED FLUMES
- [ ] ROCK BEDDING AT CONSTRUCTION EXIT
- [ ] TIMBER MATTING AT CONSTRUCTION EXIT
- [ ] CHANNEL LINERS
- [ ] SEDIMENT TRAPS
- [ ] SEDIMENT BASINS
- [ ] STORM INLET SEDIMENT TRAP
- [ ] STONE OUTLET STRUCTURES
- [ ] CURBS AND GUTTERS
- [ ] STORM SEWERS
- [ ] VELOCITY CONTROL DEVICES

OTHER:

3. STORM WATER MANAGEMENT:

STORM WATER DRAINAGE WILL BE PROVIDED BY **EXISTING DITCHES**

THIS SYSTEM WILL CARRY THE DRAINAGE WITHIN THE RIGHT-OF-WAY TO

EXISTING OUTFALL CHANNELS

4. STORM WATER MANAGEMENT ACTIVITIES: (SEQUENCE OF CONSTRUCTION)

1. **INSTALL EROSION CONTROL MEASURES AT LOCATIONS AS DIRECTED.**
2. **UPGRADE MBGF AND CONSTRUCT MOW STRIPS.**
3. **PLACE SEEDING AND FERTILIZER AS DIRECTED.**
4. **WHEN ALL CONSTRUCTION ACTIVITY IS COMPLETE AND THE SITE IS STABILIZED AND APPROVED BY THE ENGINEER, REMOVE ALL TEMPORARY SEDIMENT CONTROLS AND RESEED ANY AREA DISTURBED DURING REMOVAL.**

5. NON-STORM WATER DISCHARGES:
FILTER NON-STORM WATER DISCHARGES, OR HOLD RETENTION BASINS, BEFORE BEING ALLOWED TO MIX WITH STORM WATER. THESE DISCHARGES CONSIST OF NON-POLLUTED GROUND WATER, SPRING WATER, FOUNDATION AND/OR FOOTING DRAIN WATER; AND WATER USED FOR DUST CONTROL, PAVEMENT WASHING AND VEHICLE WASHWATER CONTAINING NO DETERGENTS.

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:
MAINTENANCE WILL BE PERFORMED AS INDICATED ON FIELD INSPECTION AND MAINTENANCE REPORT FORM 2118.

2. INSPECTION:
INSPECTION WILL BE PERFORMED AS INDICATED ON FIELD INSPECTION AND MAINTENANCE REPORT FORM 2118.

3. WASTE MATERIALS:
ALL WASTE MATERIALS WILL BE COLLECTED AND STORED IN A LIDDED CONTAINER AND THEN DISPOSED OF IN A LEGAL AND PROPER MANNER. NO CONSTRUCTION WASTE MATERIAL WILL BE BURIED ON SITE.

4. HAZARDOUS WASTE (INCLUDING SPILL REPORTING):
AT A MINIMUM, ANY PRODUCTS IN THE FOLLOWING CATEGORIES ARE CONSIDERED TO BE HAZARDOUS. PAINTS, ACIDS FOR CLEANING MASONRY SURFACES, CLEANING SOLVENTS, ASPHALT PRODUCTS, CHEMICAL ADDITIVES FOR SOIL STABILIZATION, OR CONCRETE CURING COMPOUNDS AND ADDITIVES. IN THE EVENT OF A SPILL WHICH MAY BE HAZARDOUS, THE SPILL COORDINATOR MUST BE CONTACTED IMMEDIATELY.

5. 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.

OFFSITE VEHICLE TRACKING:

- [ ] HAUL ROADS DAMPENED FOR DUST CONTROL
- [X] LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- [X] EXCESS DIRT ON ROAD REMOVED DAILY
- [ ] STABILIZED CONSTRUCTION ENTRANCE

OTHER:

REMARKS: DISPOSAL AREAS, STOCKPILES AND HAUL ROADS SHALL BE CONSTRUCTED IN A MANNER THAT WILL MINIMIZE AND CONTROL SEDIMENT FROM ENTERING RECEIVING WATERS. DISPOSAL AREAS SHALL NOT BE LOCATED IN ANY WATERBODY OR STREAMBED.

CONSTRUCTION STAGING AREAS AND VEHICLE MAINTENANCE AREAS SHALL BE CONSTRUCTED TO MINIMIZE THE RUNOFF OF POLLUTANTS.

STATE OF TEXAS
J. RYAN GRIFFIN
143112
LICENSED
PROFESSIONAL ENGINEER

J. Ryan Griffin

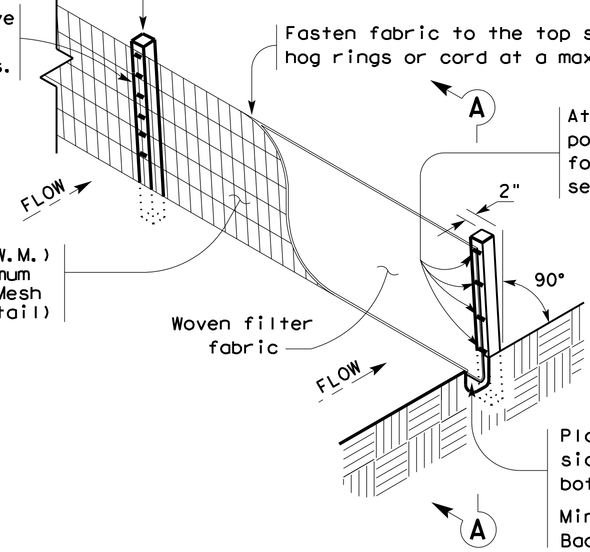
01/13/2022

SH 155
STORM WATER POLLUTION PREVENTION PLAN (SW3P)

Texas Department of Transportation

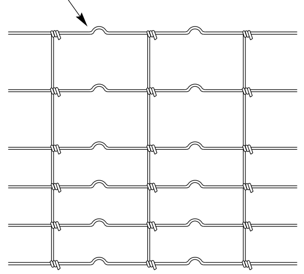
CONT	SECT	JOB	HIGHWAY
0520	08	071	SH 155
DIST	COUNTY		SHEET NO.
TYL	ANDERSON		102

DATE: 1/12/2022 2:11:50 PM
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0390368\SH155_ENV_SW3P.dgn



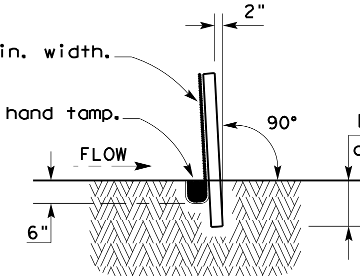
TEMPORARY SEDIMENT CONTROL FENCE

SCF



HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.



SECTION A-A

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

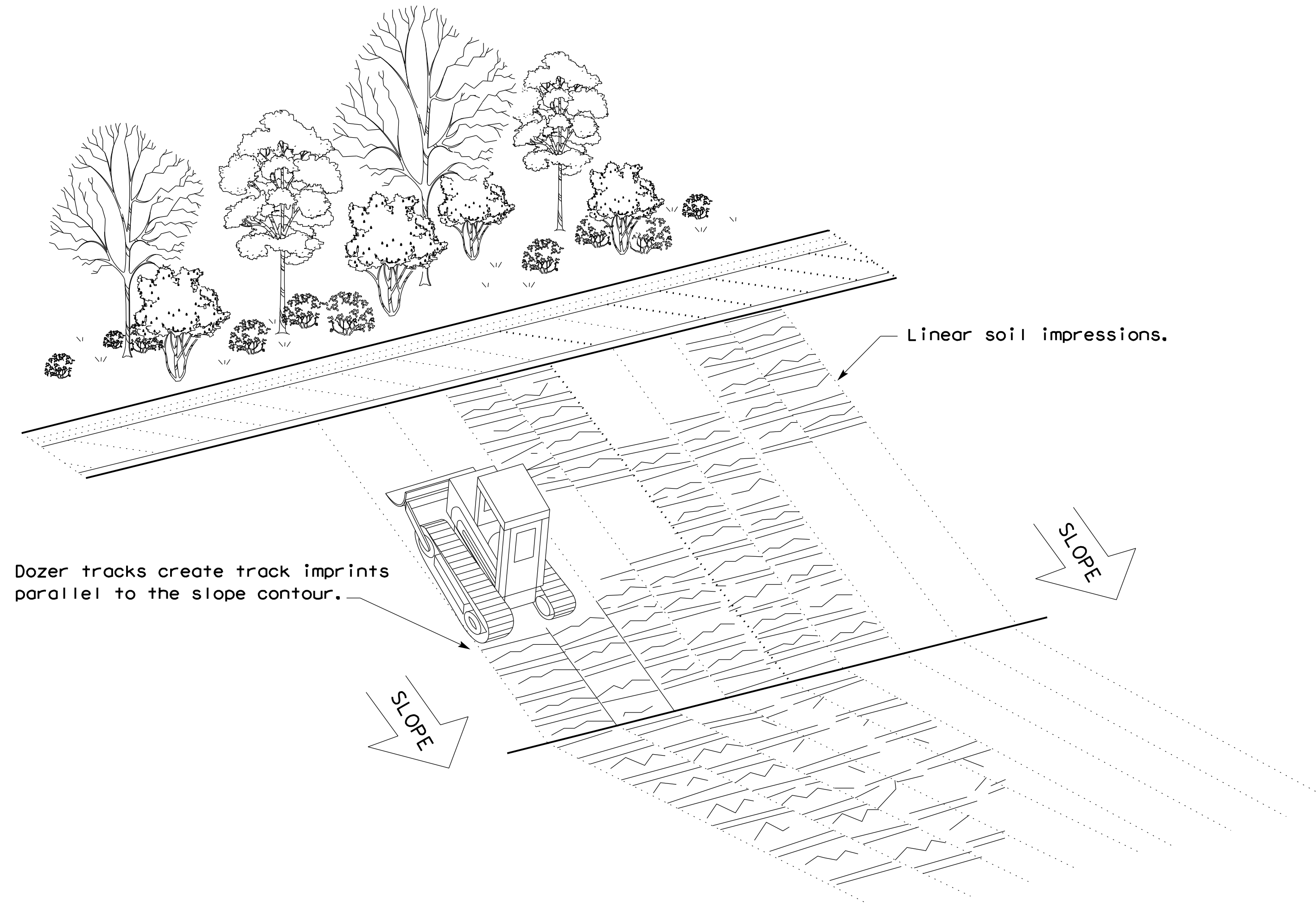
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation | Design Division Standard

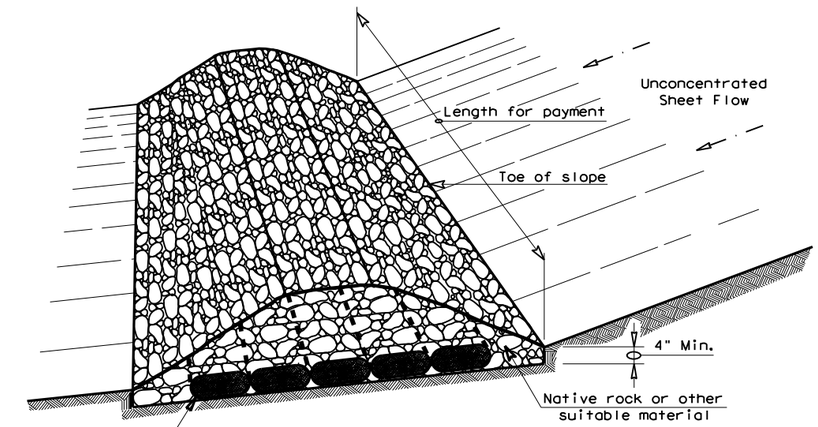
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

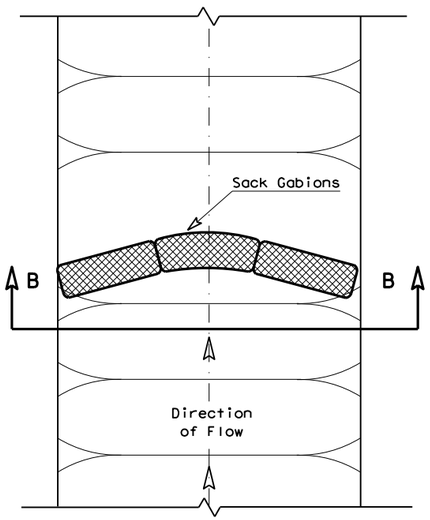
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
	DIST		COUNTY	SHEET NO.
	TYL		ANDERSON	103

DATE: 1/12/2022
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401604\SH155_ENV_EC(2)-16.dgn

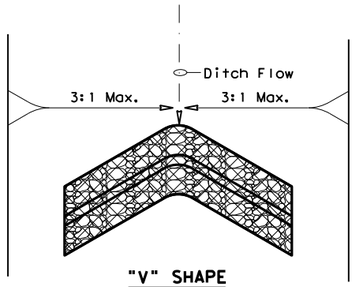


FILTER DAM AT TOE OF SLOPE

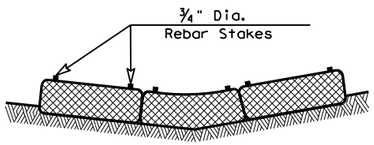
RFD1



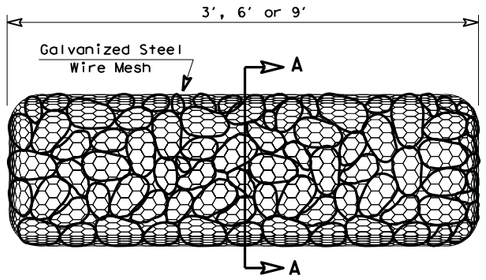
PLAN VIEW



"V" SHAPE
PLAN VIEW

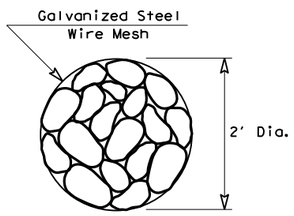


SECTION B-B

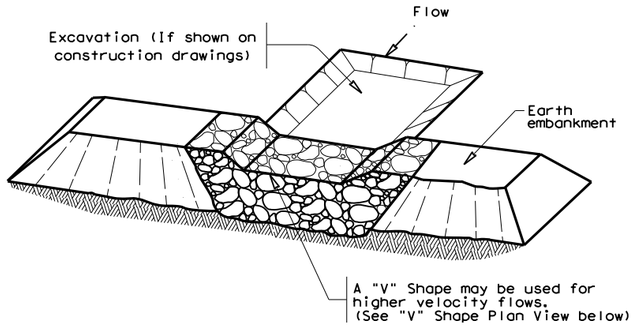


TYPE 4 (SACK GABIONS)

RFD4

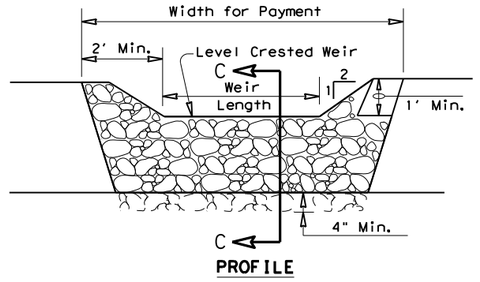


SECTION A-A

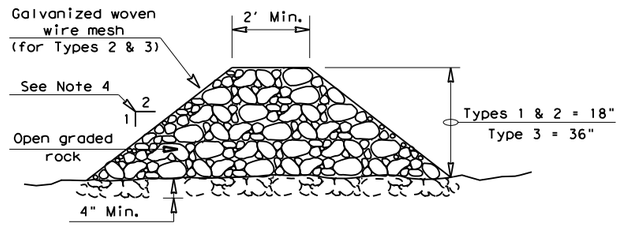


FILTER DAM AT SEDIMENT TRAP

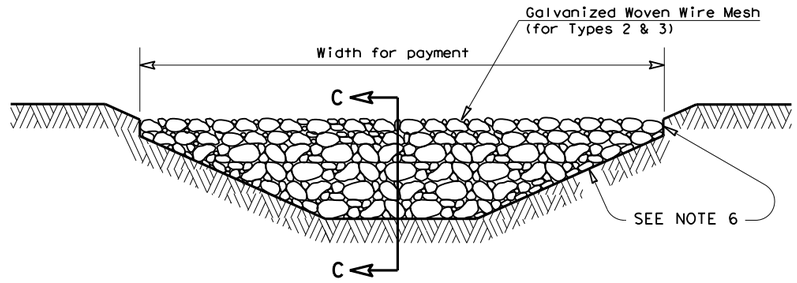
RFD1 — OR — RFD2



PROFILE



SECTION C-C



FILTER DAM AT CHANNEL SECTIONS

RFD1 — OR — RFD2 — OR — RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation

Design Division Standard

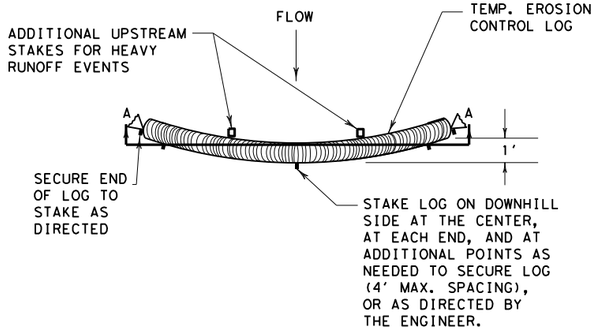
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

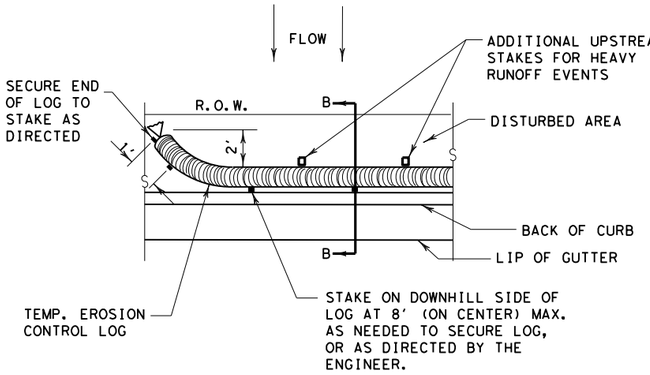
EC(2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		104

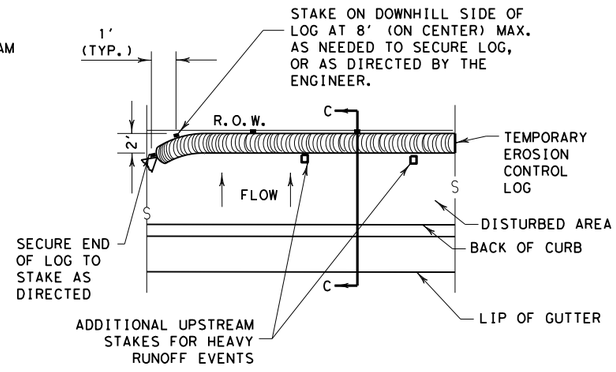
DATE: 1/12/2022
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401604\SH155_ENV_EC(9)-16.dgn



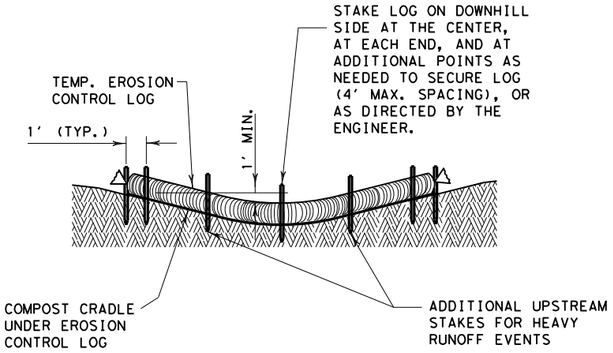
PLAN VIEW



PLAN VIEW



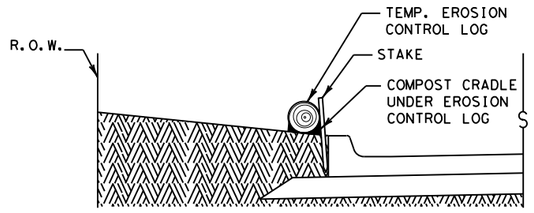
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

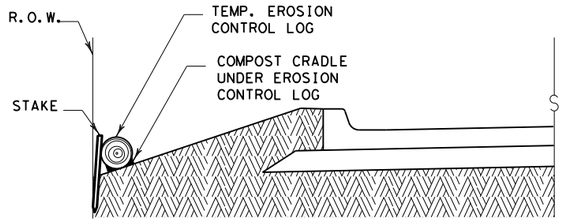
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

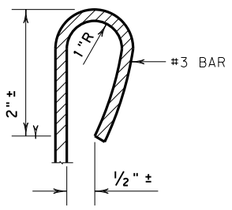
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



REBAR STAKE DETAIL

LEGEND

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

GENERAL NOTES:

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

SEDIMENT BASIN & TRAP USAGE GUIDELINES

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

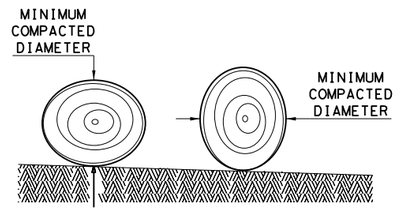
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

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

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

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



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

Texas Department of Transportation

Design Division Standard

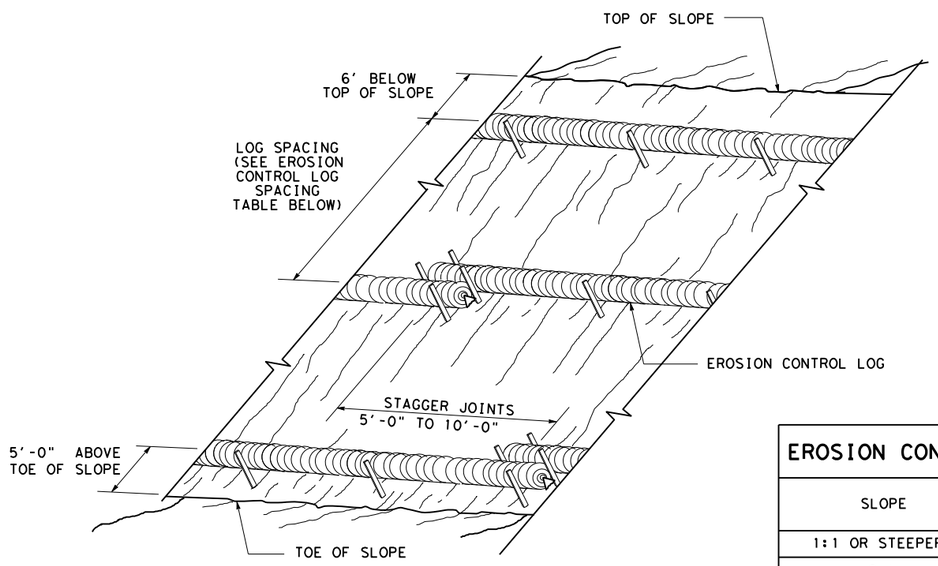
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

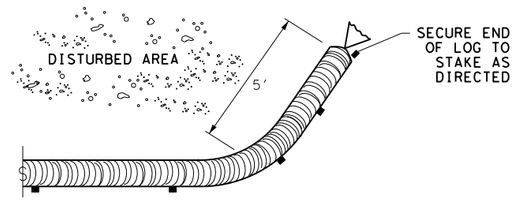
FILE: ec916		DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0520	08	071		SH 155	
		DIST		COUNTY			SHEET NO.
		TYL		ANDERSON			105

DATE: 1/12/2022
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401604\SH155_ENV_EC(9)-16.dgn



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

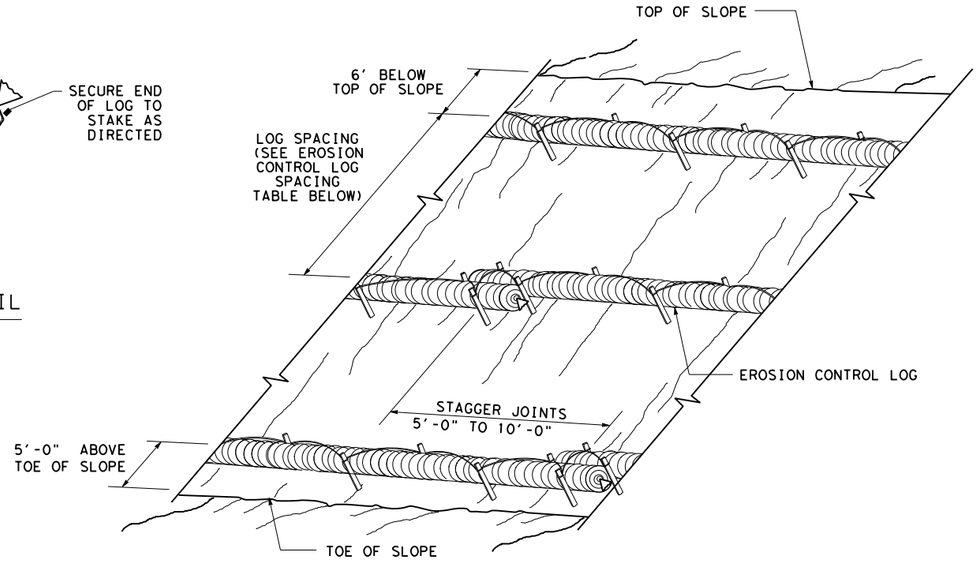
CL-SST



END SECTION RAP DETAIL

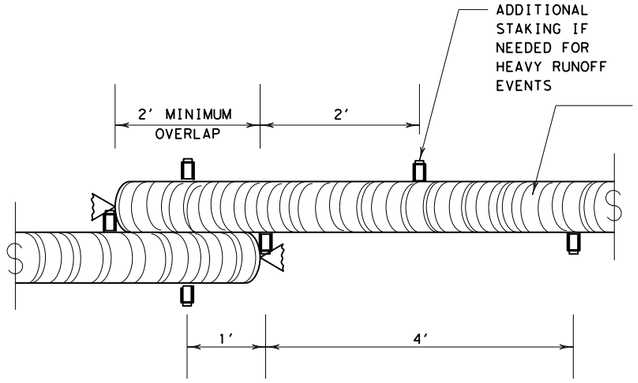
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

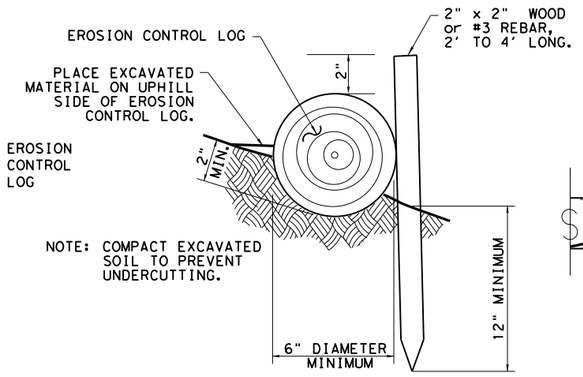
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

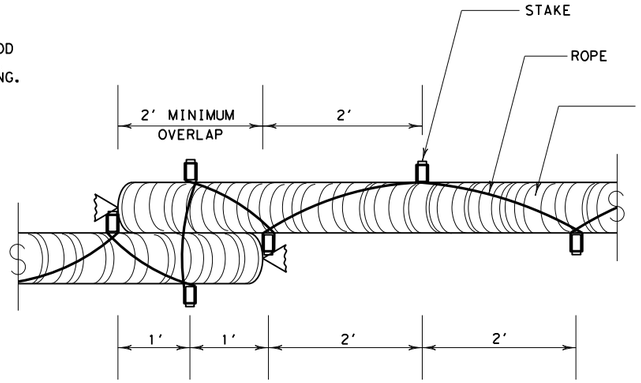


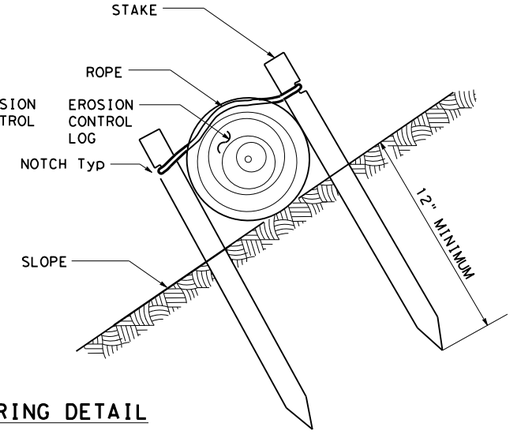


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

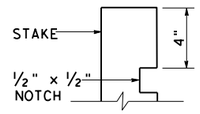
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

SHEET 2 OF 3

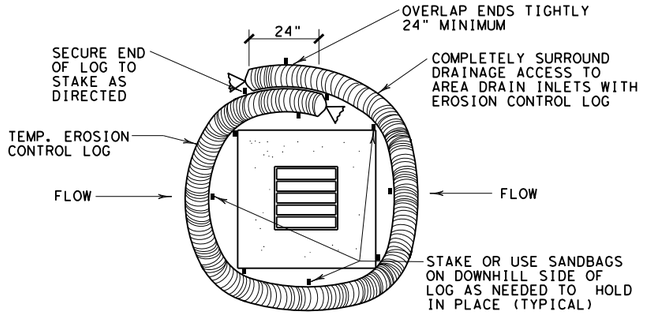
Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

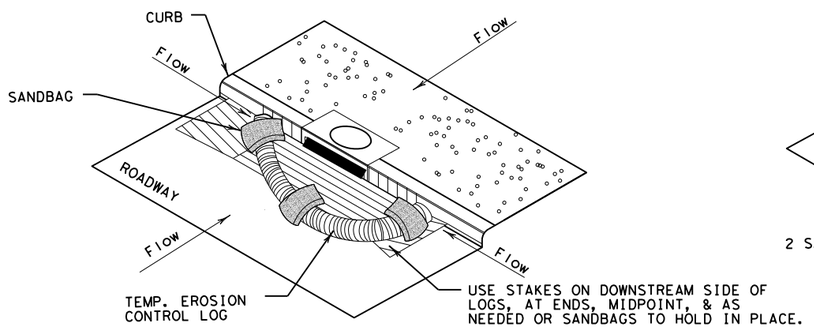
FILE: ec116	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0520	08	071		SH 155	
	DIST	COUNTY			SHEET NO.	
	TYL	ANDERSON			106	

DATE: 1/12/2022
FILE: c:\txdot\pw_online\txdot3\pwonline_ryan.griffin\d0401604\SH155_ENV_EC(9)-16.dgn



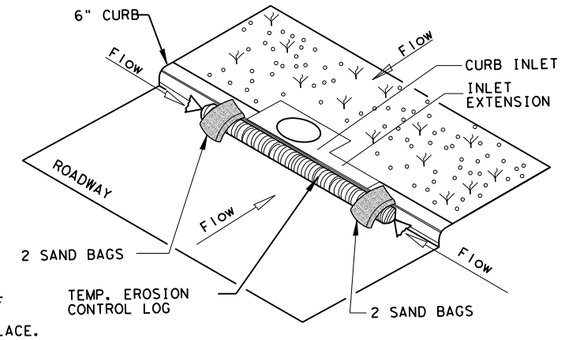
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

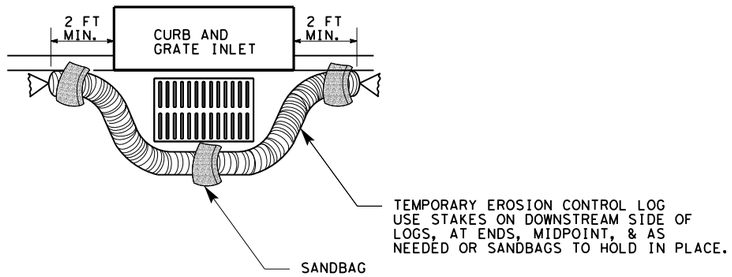
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

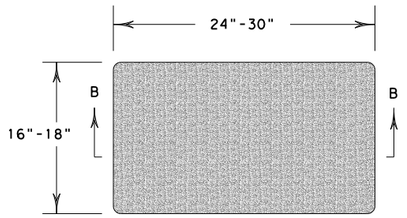
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



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	0520	08	071	SH 155
	DIST	COUNTY		SHEET NO.
	TYL	ANDERSON		107