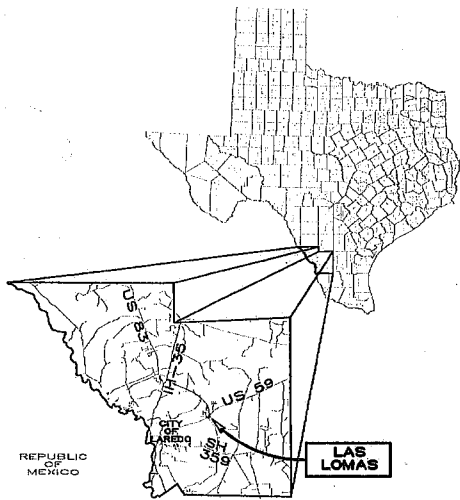


CONSTRUCTION PLANS FOR **LAS LOMAS CULVERT & ROADWAY IMPROVEMENTS**

DRAINAGE & EMERGENCY ACCESS IMPROVEMENTS



WEBB COUNTY, TEXAS

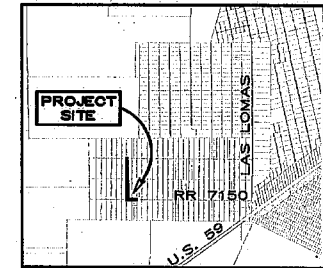
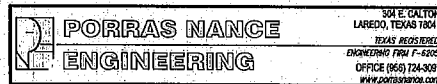


WEBB COUNTY, TEXAS

HONORABLE TANO E. TIJERINA, COUNTY JUDGE

WEBB COUNTY COMMISSIONERS

JESSE GONZALES.....PRECINCT 1
 ROSAURA "WAWI" TIJERINA.....PRECINCT 2
 JOHN GALOPRECINCT 3
 CINDY LIENDO PRECINCT 4



LAS LOMAS COLONIA

INDEX OF SHEETS

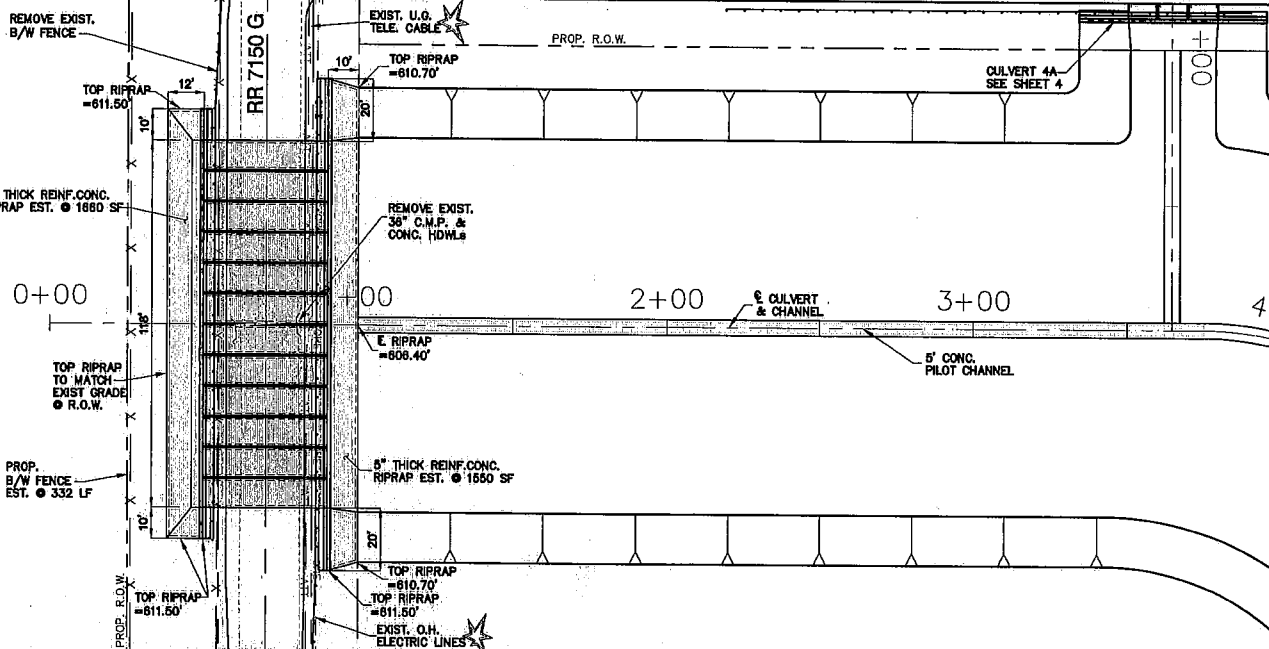
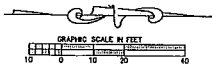
SHEET	DESCRIPTION
1	TITLE SHEET
2	BASIS OF ESTIMATE & GENERAL NOTES
3	CULVERT 4 PLAN & PROFILE
4	CULVERT 4A PLAN & PROFILE
5	CHANNEL PLAN & PROFILE
6	RR 7150 G PLAN & PROFILE
7-8	SALIDA RD PLAN & PROFILE
9	MISCELLANEOUS DETAILS
10	CONSTRUCTION SEQUENCE, DETOUR PLAN & SW3P
11	CHANNEL GRADE PLAN
12	CHANNEL CROSS SECTIONS
13-15	CULVERT & WINGWALL STANDARD DETAILS
16-23	GUARDRAIL STANDARD DETAIL
24	WIRE FENCE STANDARD DETAILS
25	ROCK FILTER DAM EROSION CONTROL DETAILS
26-28	BARRICADE & CONSTRUCTION STANDARD DETAILS



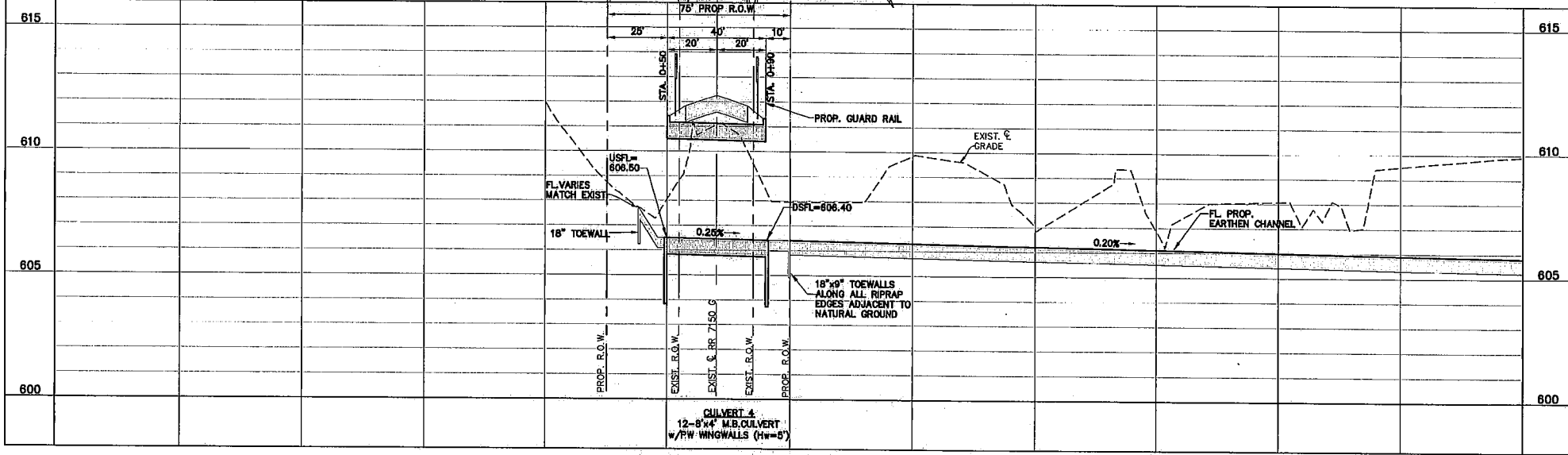
**WEBB COUNTY
APPROVAL:**

Luis Perez Garcia
 LUIS PEREZ GARCIA, P.E., CFM
 COUNTY ENGINEER

4-18-19
 DATE



CULVERT #4
12-8'x4' M.B. CULVERT
w/PW MNOWALLS (Hw=5')



CULVERT #4
12-8'x4' M.B. CULVERT
w/PW MNOWALLS (Hw=5')

DATE:	
REVISIONS:	

VERTICAL SCALE: 1"=10'
HORIZONTAL SCALE: 1"=40'

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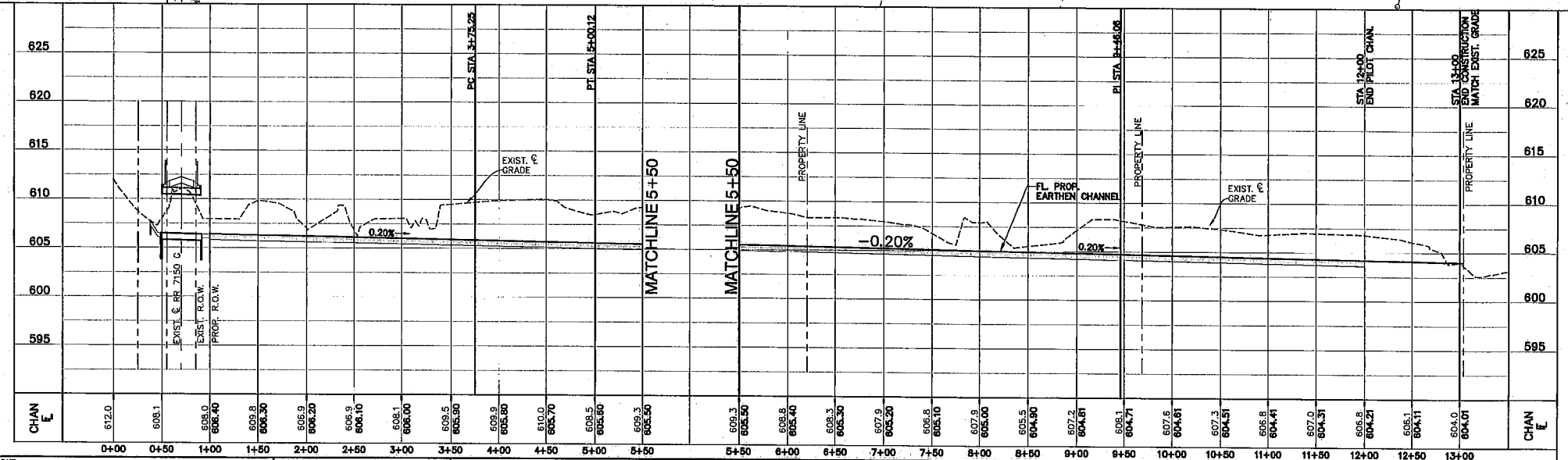
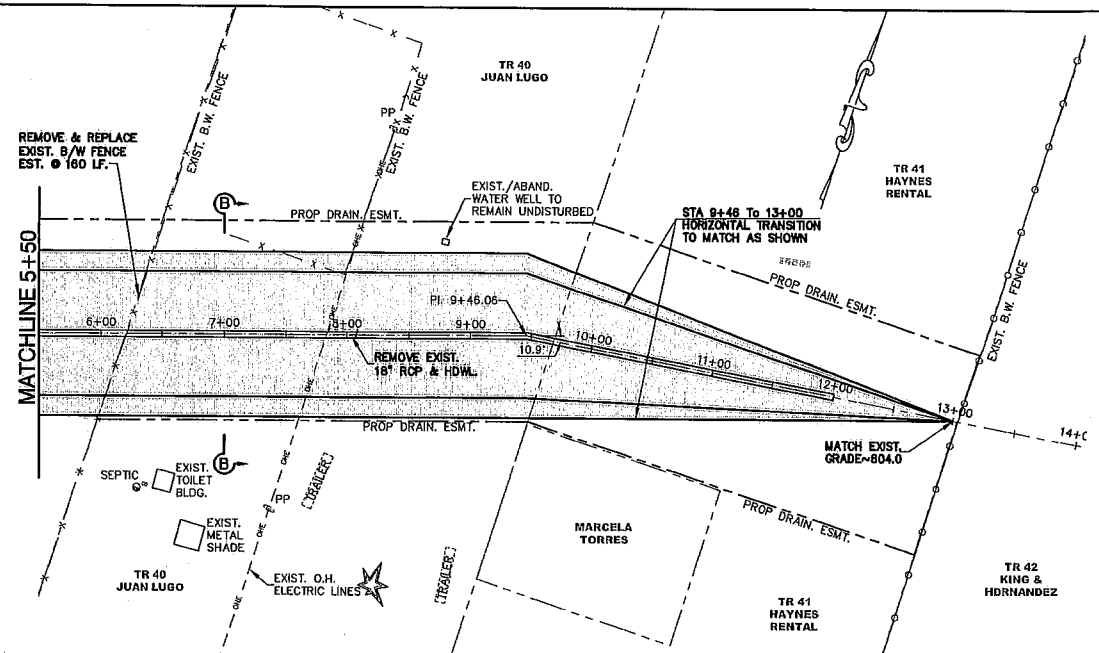
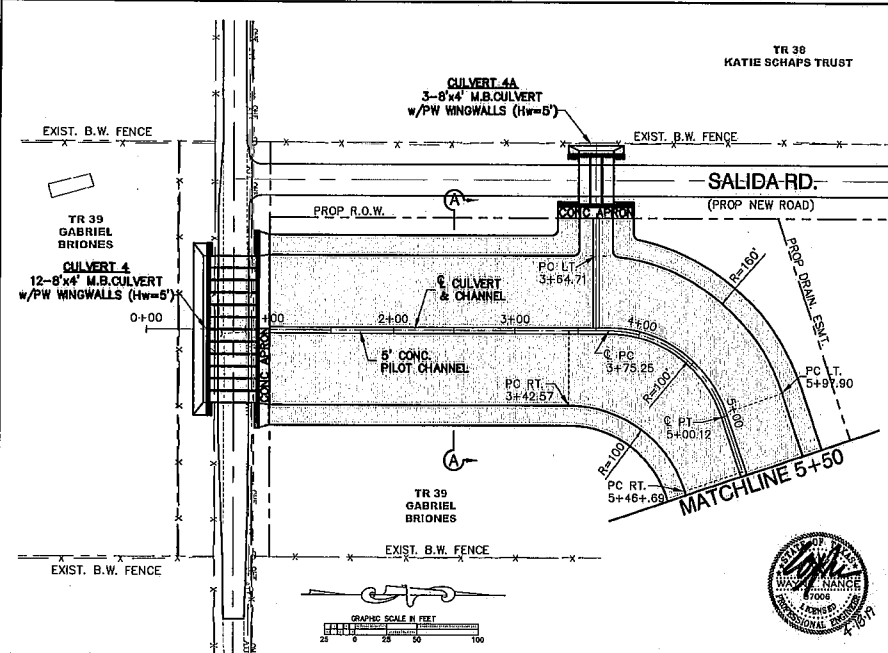
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WEBB COUNTY, TEXAS
LAS LOMAS
CULVERT IMPROVEMENTS

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PLAN OF: **CULVERT #4**
PLAN & PROFILE
RR 7150 G

SHEET:
3



DATE: _____

REVISIONS:

VERTICAL SCALE: 1" = _____

HORIZONTAL SCALE: 1" = _____

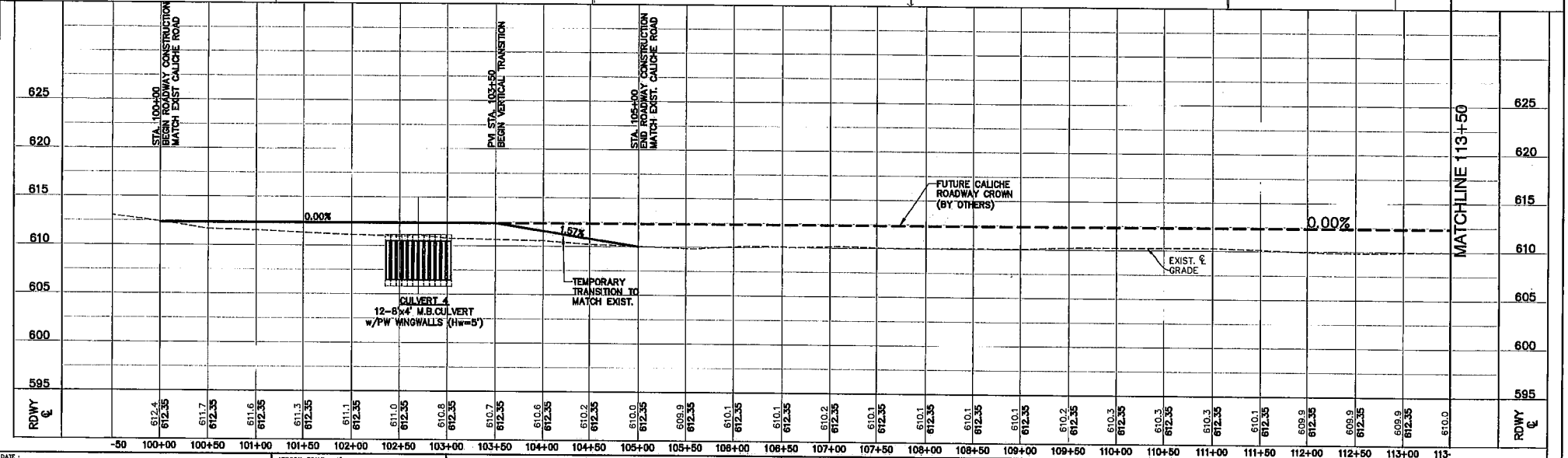
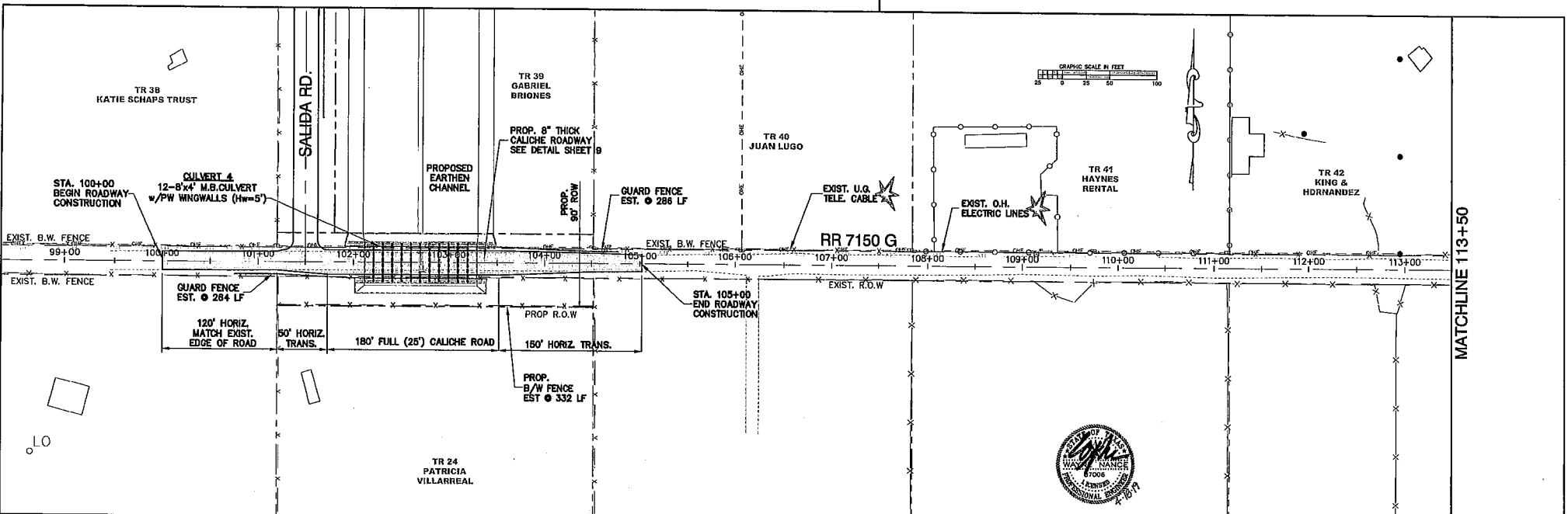
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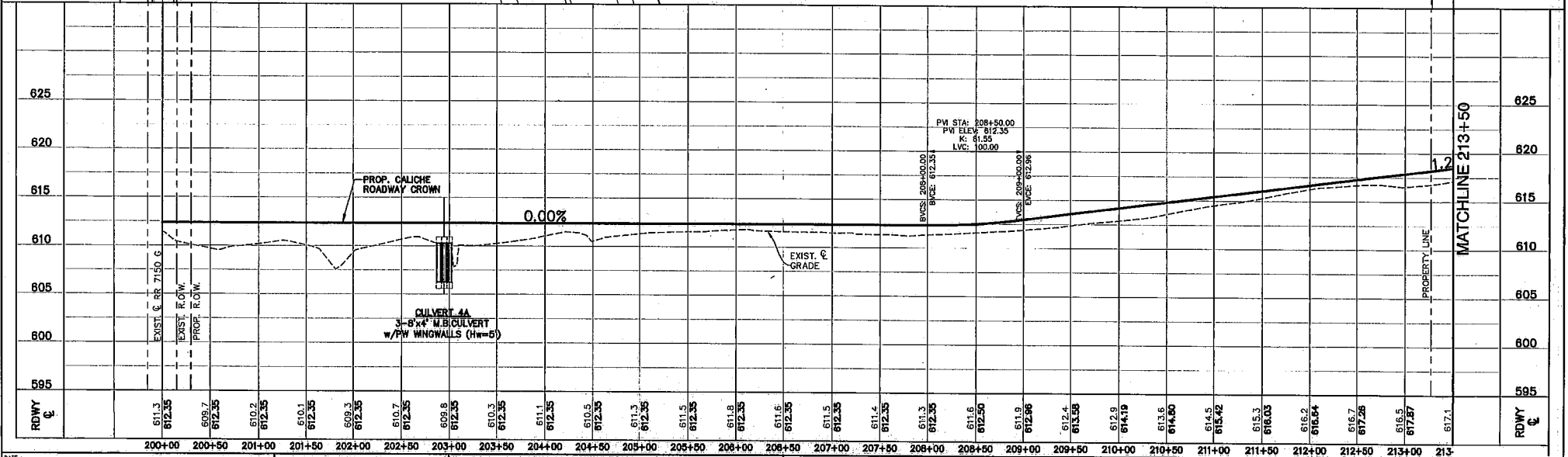
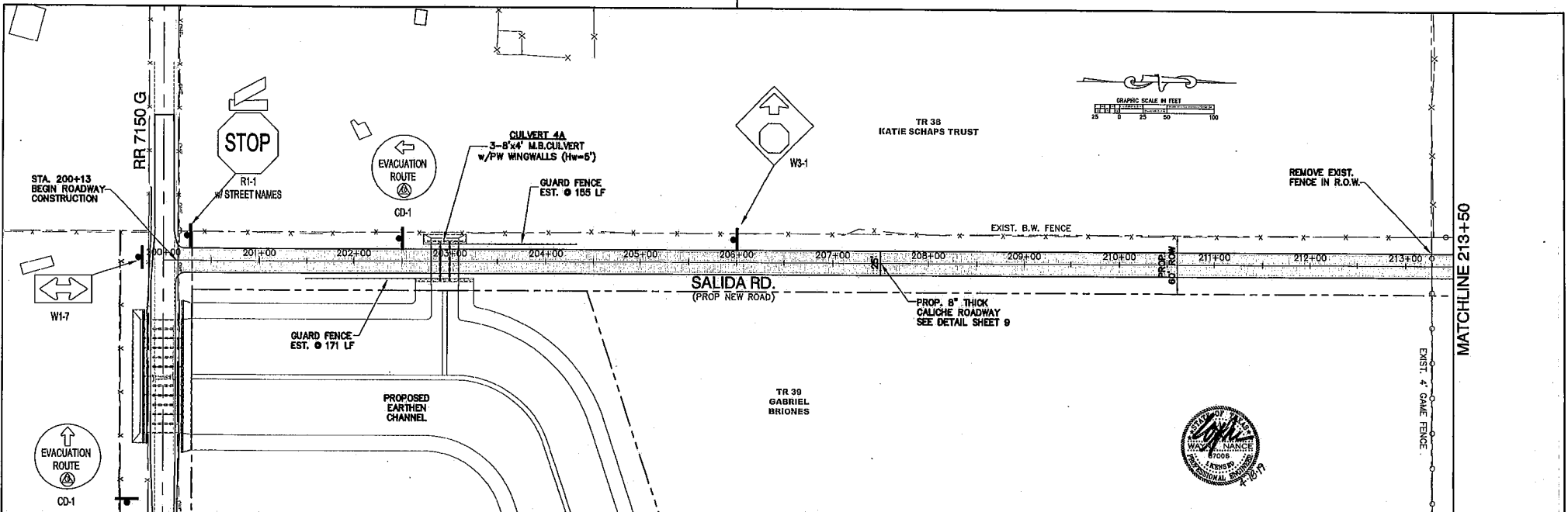
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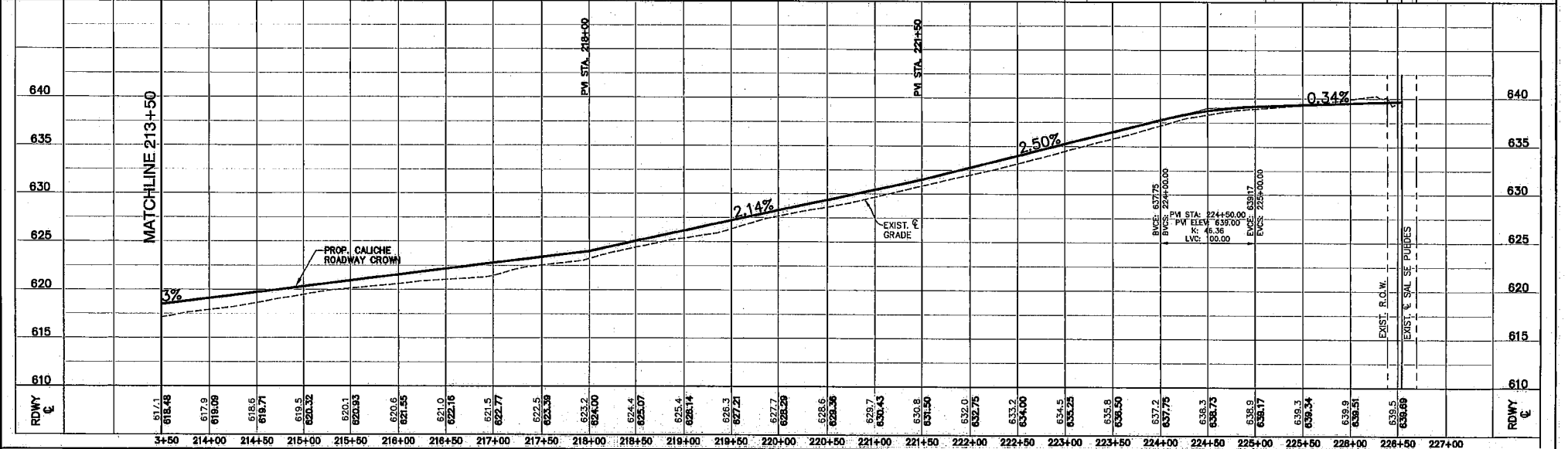
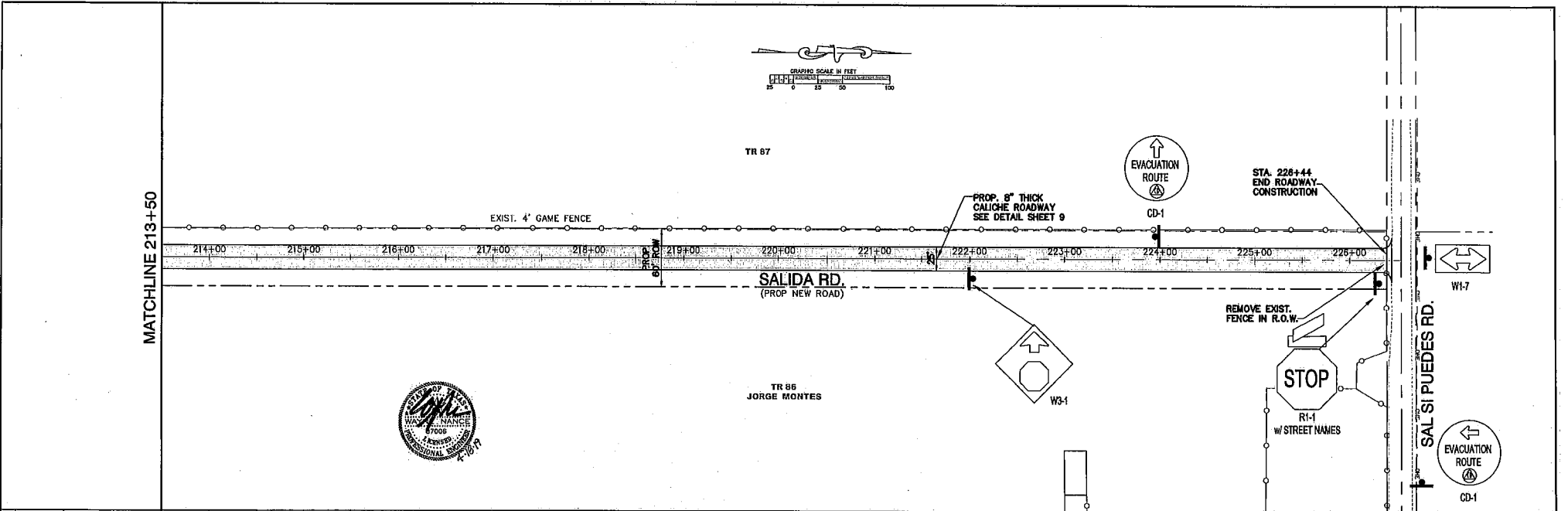
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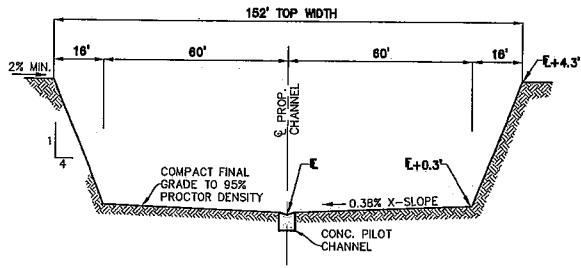
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PLAN OF: **PLAN & PROFILE
 SALIDA ROAD
 RR 7150 G TO SAL SI PUEDES RD.**

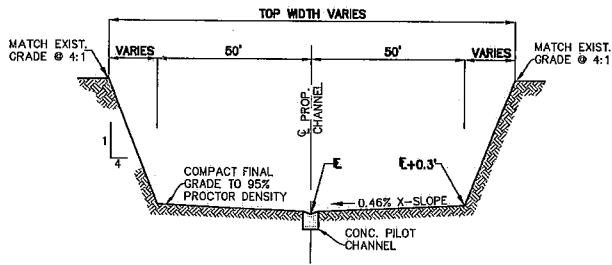
SHEET **7**



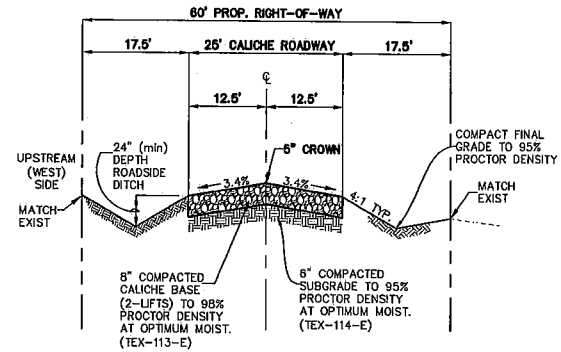
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REVISIONS:	HORIZONTAL SCALE: 1" = 100'					8		



CHANNEL SECTION A-A
SCALE: 1"=20' HORIZ.
1"=2' VERT.

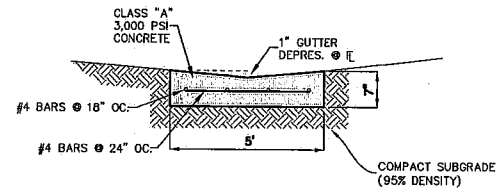


CHANNEL SECTION B-B
SCALE: 1"=20' HORIZ.
1"=2' VERT.



TYPICAL NEW ROADWAY SECTION

SALIDA ROAD
NOT TO SCALE

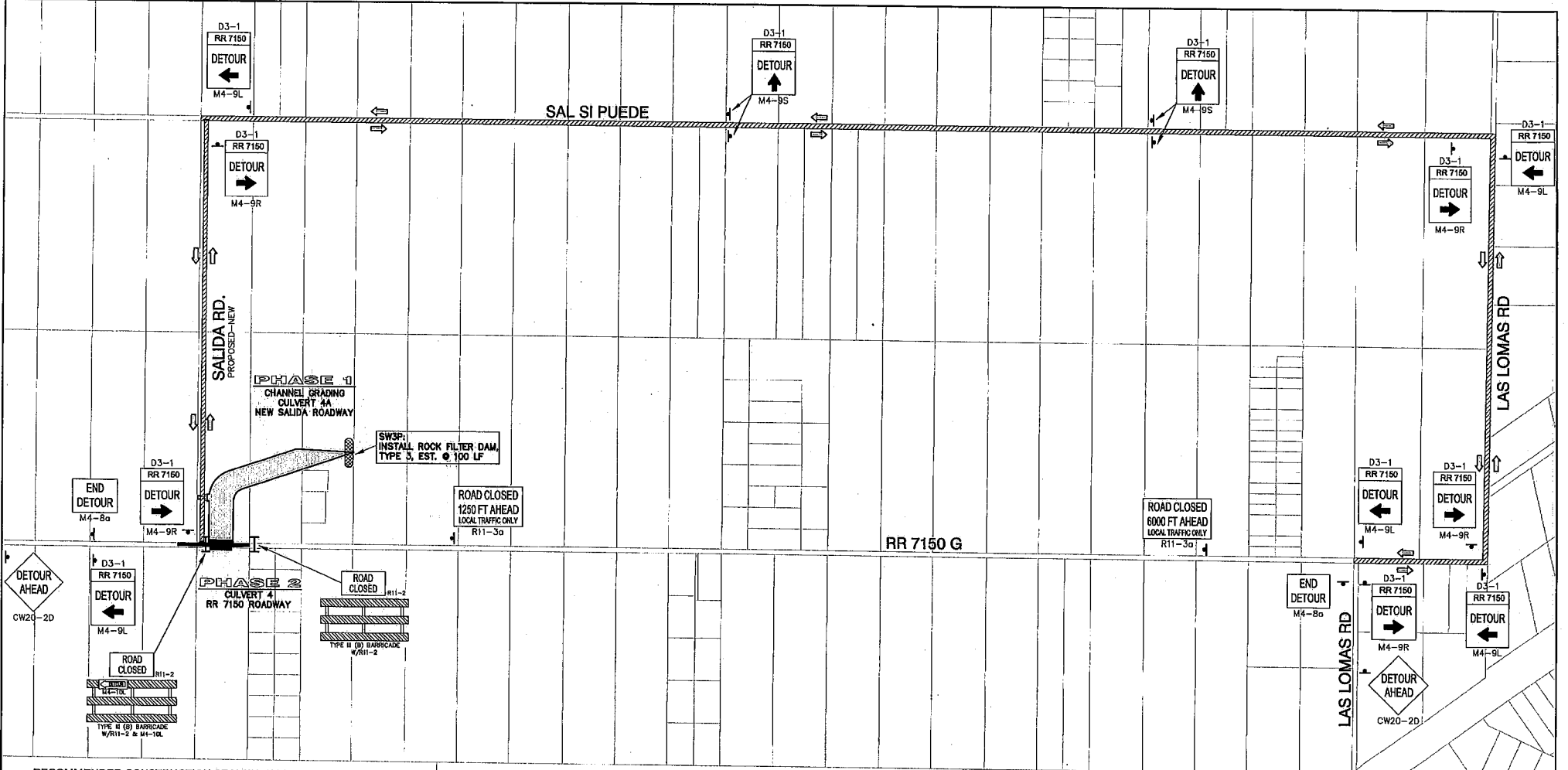


CONCRETE PILOT CHANNEL DETAIL

NOT TO SCALE

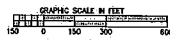


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RECOMMENDED CONSTRUCTION SEQUENCE PLAN

- PHASE 1**
- A. INSTALL EROSION CONTROL BMPs
 - B. GRADE EARTHEN CHANNEL IMPROVEMENTS
 - C. CONSTRUCT CULVERT 4A
 - D. CONSTRUCT SALIDA ROADWAY IMPROVEMENTS
- PHASE 2**
- A. INSTALL ALL DETOURS AND BARRICADES SHOWN ON THIS SHEET
 - B. CONSTRUCT CULVERT 4
 - C. CONSTRUCT RR 7150 G ROADWAY IMPROVEMENTS
 - D. REMOVE BARRICADES AND SIGNS



LEGEND	
	TEMPORARY GROUND MOUNTED SIGN
	CHANNELIZATION DEVICE
	TYPE III BARRICADE
	ROCK FILTER DAMS
	WORK AREA
	DETOUR ROUTE



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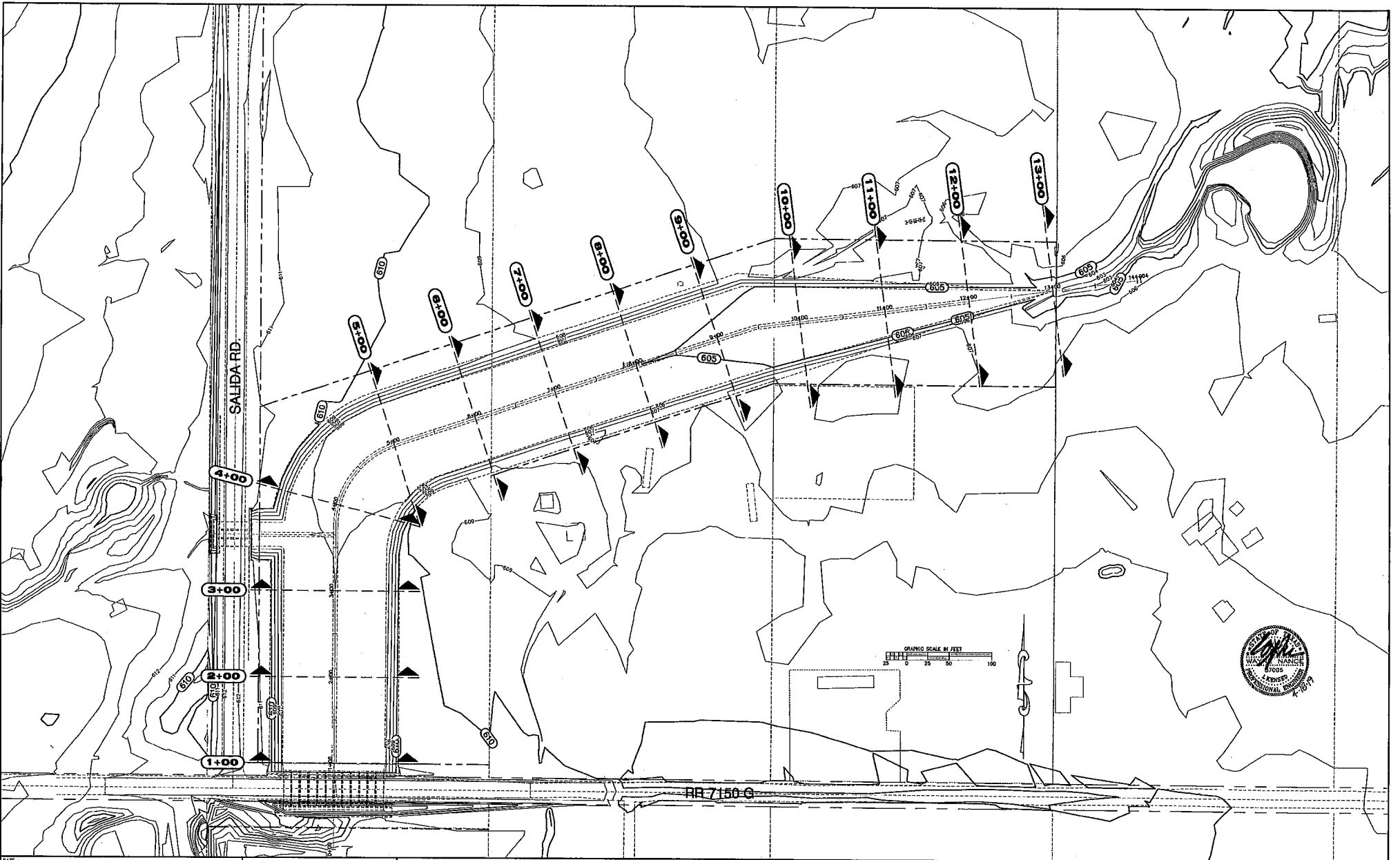
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PLAN OF: **CONSTRUCTION SEQUENCE, DETOUR PLAN & SW3P**



DATE :
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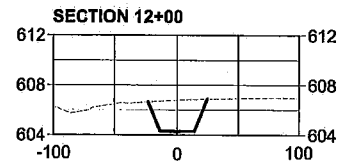
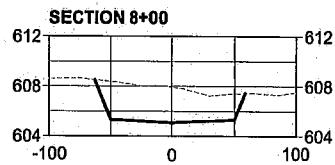
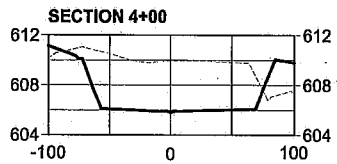
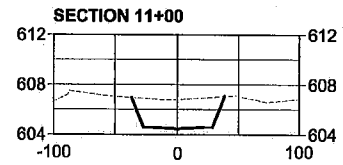
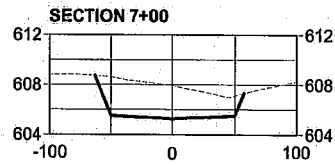
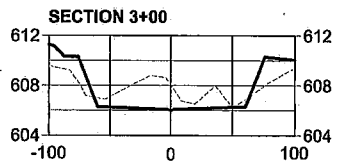
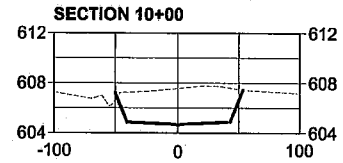
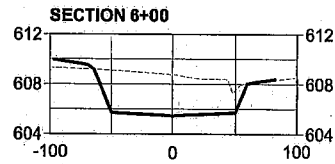
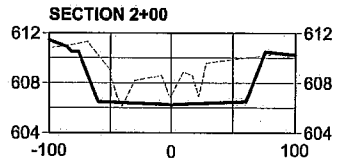
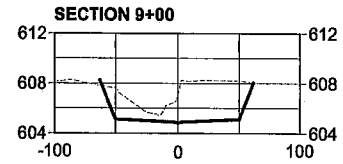
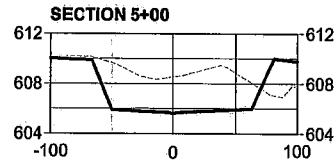
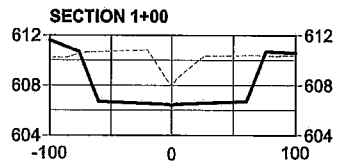
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PLAN OF:
**CHANNEL GRADE PLAN
 & CROSS SECTIONS**

SHEET
 11



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PLAN OF:
CHANNEL CROSS SECTIONS

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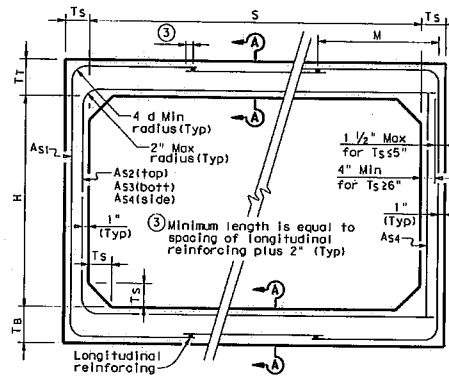
DATE: FILE:

BOX DATA

SECTION DIMENSIONS					Fill Height (ft)	M (Min) (in)	REINFORCING (in ² /ft) ②								Lift Weight (Tons) ①
S (ft)	H (ft)	T _T (in)	T _B (in)	T _S (in)			A _{S1}	A _{S2}	A _{S3}	A _{S4}	A _{S5}	A _{S6}	A _{S7}	A _{S8}	
8	4	8	8	8	<2	-	0.27	0.38	0.29	0.19	0.19	0.19	0.19	11.2	
8	4	8	8	8	2<3	50	0.31	0.34	0.32	0.19	-	-	-	11.2	
8	4	8	8	8	3-5	50	0.25	0.27	0.27	0.19	-	-	-	11.2	
8	4	8	8	8	10	45	0.26	0.28	0.29	0.19	-	-	-	11.2	
8	4	8	8	8	15	41	0.34	0.37	0.38	0.19	-	-	-	11.2	
8	4	8	8	8	20	41	0.44	0.48	0.49	0.19	-	-	-	11.2	
8	5	8	8	8	<2	-	0.24	0.40	0.32	0.19	0.19	0.19	0.19	12.0	
8	5	8	8	8	2<3	50	0.28	0.37	0.35	0.19	-	-	-	12.0	
8	5	8	8	8	3-5	45	0.23	0.29	0.30	0.19	-	-	-	12.0	
8	5	8	8	8	10	45	0.23	0.31	0.32	0.19	-	-	-	12.0	
8	5	8	8	8	15	41	0.30	0.41	0.42	0.19	-	-	-	12.0	
8	5	8	8	8	20	41	0.39	0.52	0.54	0.19	-	-	-	12.0	
8	6	8	8	8	<2	-	0.22	0.42	0.35	0.19	0.19	0.19	0.19	12.8	
8	6	8	8	8	2<3	50	0.25	0.40	0.38	0.19	-	-	-	12.8	
8	6	8	8	8	3-5	50	0.21	0.32	0.33	0.19	-	-	-	12.8	
8	6	8	8	8	10	45	0.22	0.33	0.34	0.19	-	-	-	12.8	
8	6	8	8	8	15	41	0.28	0.43	0.45	0.19	-	-	-	12.8	
8	6	8	8	8	20	41	0.36	0.55	0.57	0.19	-	-	-	12.8	
8	7	8	8	8	<2	-	0.20	0.44	0.37	0.19	0.19	0.19	0.19	13.6	
8	7	8	8	8	2<3	55	0.23	0.43	0.41	0.19	-	-	-	13.6	
8	7	8	8	8	3-5	55	0.19	0.34	0.35	0.19	-	-	-	13.6	
8	7	8	8	8	10	50	0.20	0.34	0.36	0.19	-	-	-	13.6	
8	7	8	8	8	15	41	0.26	0.45	0.47	0.19	-	-	-	13.6	
8	7	8	8	8	20	41	0.33	0.57	0.60	0.19	-	-	-	13.6	
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8	8	8	8	8	2<3	65	0.21	0.45	0.44	0.19	-	-	-	14.4	
8	8	8	8	8	3-5	65	0.19	0.36	0.38	0.19	-	-	-	14.4	
8	8	8	8	8	10	55	0.19	0.35	0.38	0.19	-	-	-	14.4	
8	8	8	8	8	15	45	0.24	0.46	0.49	0.19	-	-	-	14.4	
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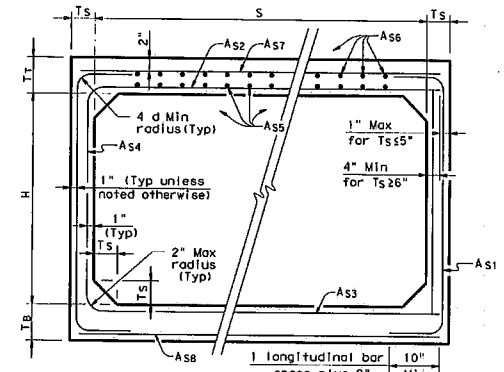
① For Box Length = 8'-0"

② A_{S1} thru A_{S4}, A_{S7} and A_{S8} are minimum required areas of reinforcement per linear foot of box length. A_{S5} and A_{S6} are minimum required areas of reinforcement per linear foot of box width.



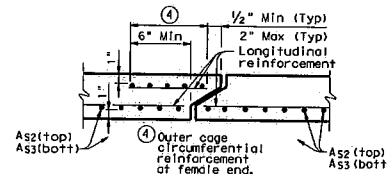
CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT



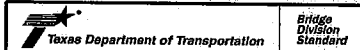
SECTION A-A

(TOP AND BOTTOM SLAB JOINT REINFORCEMENT)

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown. All concrete shall be Class "H" Concrete with a minimum compressive strength of 5,000 psi. See SCP-MD standard sheet for miscellaneous details and notes not shown. In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Shop plans for alternate designs shall be submitted in accordance with Item "Precast Concrete Structural Members Fabrication".

HL93 LOADING



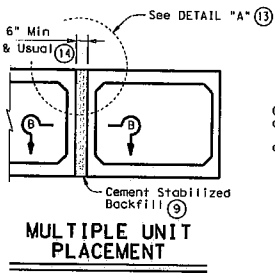
**SINGLE BOX CULVERTS
PRECAST
8'-0" SPAN**

SCP-8

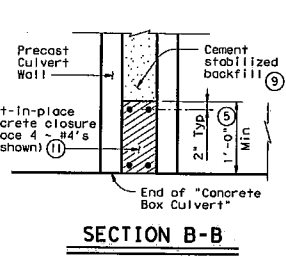
FILE: scp8stdg	DR: GAF	CR: LHM	DR: BWH/TADOT	CR: GAF
DATE: February 2010	CON: SECT	REV: 002	REV: 001	REV: 001
REVISIONS:				
DIST:	COUNTY:			SHEET NO. 13

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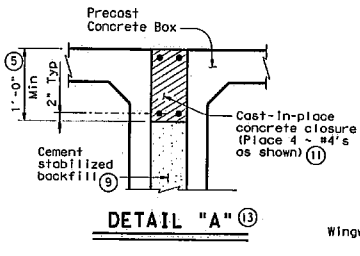
DATE: FILE:



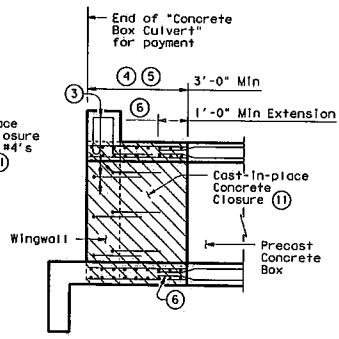
MULTIPLE UNIT PLACEMENT



SECTION B-B

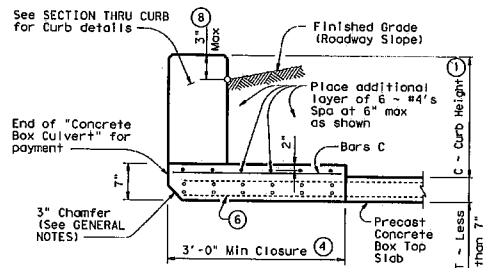


DETAIL "A"

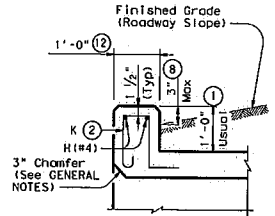


WINGWALL CONNECTION

(Also applies to Safety End Treatment)

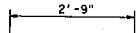


SECTION THRU TOP SLABS LESS THAN 7"

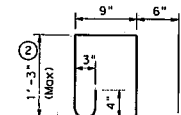


SECTION THRU CURB

(10) QUANTITIES PER FOOT OF CURB	
Reinforcing Steel	4.18 Lb
Concrete	0.037 CY



BARS C ~ #4
(Spa = 1'-0" Max)

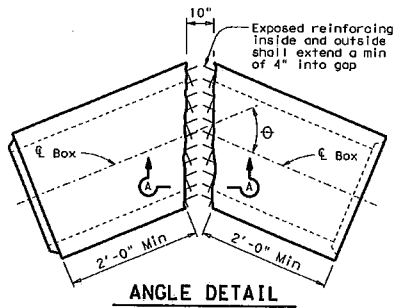


BARS K ~ #4
(Spa = 1'-0" Max)
(Length = 4'-3")

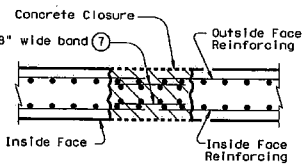
- ① 0" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail or curbs taller than 1'-0", refer to ECD standard. For structures with T6 traffic rail, refer to T6-GM standard. For structures with traffic rail, other than T6, refer to RAC standard.
- ② For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
- ③ Curb, Wingwall or Safety End Treatment reinforcing shall extend into concrete closure. Any reinforcing that does not fit into the closure shall be bent or trimmed as necessary.
- ④ Cast-in-place concrete closure shall be 3'-0" min. Boxes shall be cast short or broken back in the field. All reinforcing in the closure shall be the same size and spacing as in the precast box section. Except where shown otherwise, the cast-in-place closure shall be flush with the inside and outside faces of the precast box section.
- ⑤ For multiple unit placements the length of the closure for the interior walls may be adjusted as necessary. The length of the top slab, bottom slab, and exterior wall closure shall not be less than 3'-0". See Section B-B detail when interior walls are cast full length.
- ⑥ Precast box reinforcing shall extend a minimum of 1'-0" into concrete closure (Typ).
- ⑦ Bands of reinforcing matching the inside and outside face reinforcing shall be placed in the gaps of the top and bottom slabs. A band matching the outside face reinforcing of the wall shall be placed in the gaps of the walls (placed in the outside face only). The bands shall be tack welded to the exposed reinforcing at each point of contact.
- ⑧ For vehicle safety, the following requirements must be met:
 - For structures without bridge rail, curbs shall project no more than 3" above finished grade.
 - For structures with bridge rail, curbs shall be flush with finished grade.
 Curb heights shall be reduced, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- ⑨ Cement Stabilized Backfill between boxes is considered part of the Box Culvert for payment.
- ⑩ All curb concrete and reinforcing is considered part of the Box Culvert for payment.
- ⑪ Any additional concrete and reinforcing required for the closures shall be considered as subsidiary to the Concrete Box Culvert.
- ⑫ 1'-0" typical, 2'-0" when RAC standard is referred to elsewhere in the plans.
- ⑬ For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in DETAIL "A".
- ⑭ This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.

GENERAL NOTES:

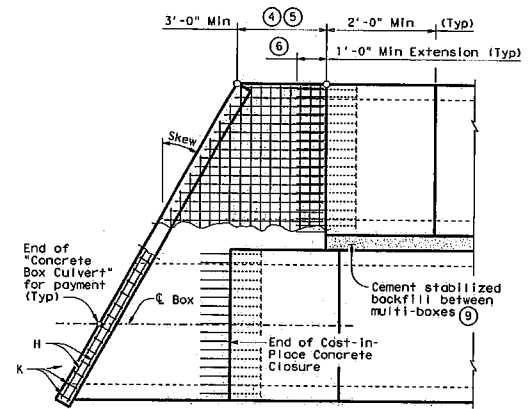
Designed according to AASHTO LRFD Specifications.
 All closure concrete shall be Class "C" with a minimum compressive strength of 3600 psi and shall be placed according to the item, "Concrete Substructures".
 Any additional concrete required for the closures shall be considered as subsidiary to the Concrete Box Culvert.
 Refer to the Single Box Culverts Precast standard for details not shown.
 The bottom edge of the top slab closure shall be chamfered 3 inches at the entrance.



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement)

HL93 LOADING

Texas Department of Transportation

BOX CULVERTS
PRECAST
MISCELLANEOUS DETAILS

SCP-MD

FILE: scpd915.dgn	DN: GAF	CR: LHM	DN: BWH/TADT	CC: GAF
DATE: February 2010	CURT	SECT	JOB	REVISED
REVISIONS				
DATE	DESCRIPTION	BY	CHECKED	SHEET NO.
				14

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DATE: _____
 FILE: _____

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

Maximum Wingwall Height Hw	Dimensions				Variable Reinforcing			Estimated Quantities per ft of wing (2-Wings)	Estimated Quantities per ft of toewall (1-Toewall)			
	W	X	Y	Z	Bars J1		Bars J2					
					Size	Spa	Size			Spa		
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"	#5	6"	348.72	1.804	10.02	0.186
14'-6"	8'-10"	4'-5"	3'-5"	1'-4"	#9	6"	#5	6"	432.94	2.046	10.30	0.219
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)

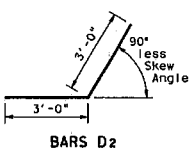
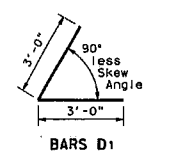
Bar	Size	No.	Spa.
D1	#6	~	1'-0"
D2	#6	~	1'-0"
E1	#4	~	1'-0"
F1	#4	~	1'-0"
G1	#4	~	1'-0"
H1	#6	~	8"
M1	#4	4	~
P	#4	~	1'-0"
V	#4	~	1'-0"

TABLE OF TOEWALL REINFORCING

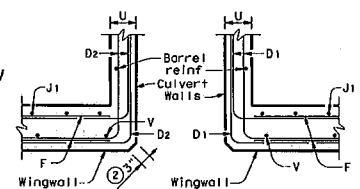
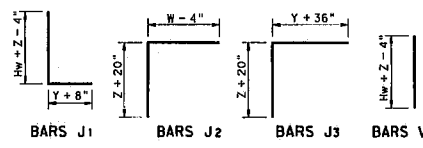
Bar	Size	No.	Spa.
J1	#4	~	1'-0"
J2	#4	2	~
E2	#4	~	1'-0"

WING DIMENSION CALCULATIONS:

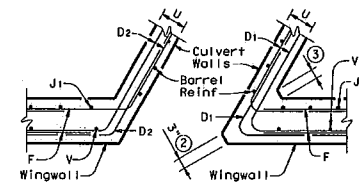
Formulas: (All values are in Feet)
 $Hw = H + T + C$
 $Lw = (Hw)(SL) \div \text{Cosine } \theta$ for Ty PW-1
 $Lw = (Hw - 1') (SL) \div \text{Cosine } \theta$ for Ty PW-2 and $Hw \geq 4'$
 $Lw = (Hw - 0.5') (SL) \div \text{Cosine } \theta$ for Ty PW-2 and $Hw < 4'$
 For Cast-in-place culverts:
 $Ltw = [(N)(S) + (N + 1)(U)1] \div \text{Cosine } \theta$
 For Precast culverts:
 $Ltw = [(N)(2U + S) + (N - 1)(0.5')1] \div \text{Cosine } \theta$
 Total Wingwall Area (Two Wings - SF)
 $= (2)(Hw)(Lw)$ for Ty PW-1
 $= (2)(Hw)(Lw) - 6$ SF for Ty PW-2 and $Hw \geq 4'$
 $= (2)(Hw)(Lw) - 1.5$ SF for Ty PW-2 and $Hw < 4'$



Hw = Height of Wingwall
 Lw = Length of Wingwall
 Ltw = Culvert Toewall Length
 N = Number of Culvert Spans
 $SL1$ = Channel Slope ratio. (Horizontal: 1 Vertical, Usual value is 2:1)
 θ = Culvert Skew
 See applicable box culvert standard for S, H, T and U values.



SECTION C-C



SECTION C-C

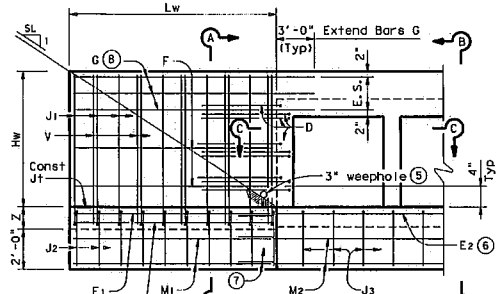
- Skew Angle = 0°
- At discharge end, chamfer may be 3/4".
- For 15° Skew ~ 1"
For 30° Skew ~ 2"
For 45° Skew ~ 3"
- Quantities shown are for two Type PW-1 wings. Adjust concrete volume for Type PW-2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
- Provide weepholes for Hw = 5'-0" and greater. Fill around weepholes with coarse gravel.
- Extend Bars E2 1'-6" minimum into the wingwall footing.
- Lap Bars M1 1'-6" minimum with Bars M2.
- Bars G equally spaced at 8" maximum, place as shown. Provide at least two pair Bars G per wing.
- 0" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail or curbs taller than 1'-0", refer to ECD standard. For structures with traffic rail, refer to T6-CM standard. For structures with traffic rail, other than T6, refer to RAC standard.
- For vehicle safety, the following requirements must be met:
- For structures without bridge rail, curbs cannot project more than 3" above finished grade.
- For structures with bridge rail, build 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.
- 1'-0" typical, 2'-0" typical when RAC standard is referenced elsewhere in the plans.
- 3'-0" for Hw < 4'.
- 6" for Hw < 4'.

GENERAL NOTES:

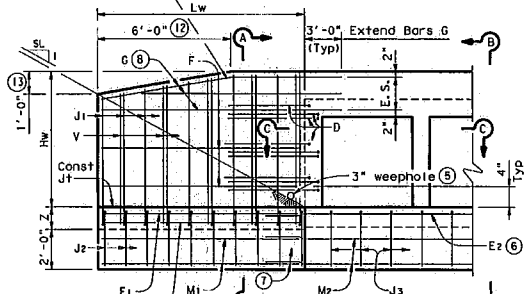
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
 Provide Class "C" Concrete (f'c = 3,600 psi Min) and Grade 60 reinforcing steel.
 Provide 1/4" Min clear cover to reinforcing steel. Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
 See BCS sheet for wingwall type and additional dimensions and information.
 The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

DESIGNER NOTES:

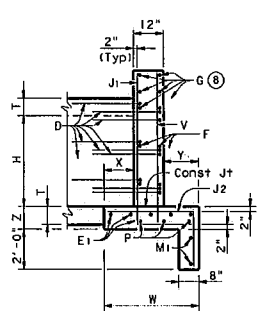
Type PW-1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
 Type PW-2 can only be used for applications without a railing mounted to the wingwall.



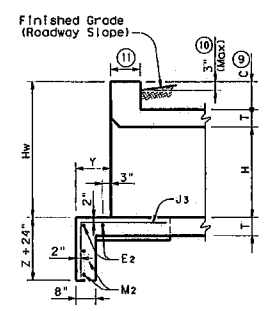
PARTIAL ELEVATION - PW-1



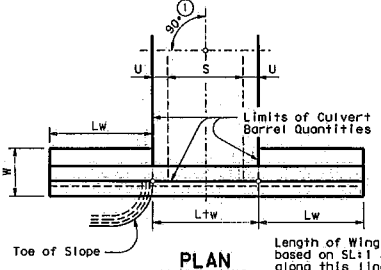
PARTIAL ELEVATION - PW-2



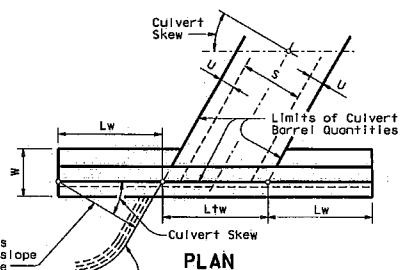
SECTION A-A (Showing Wing Reinf)



SECTION B-B (Showing Wing Reinf)



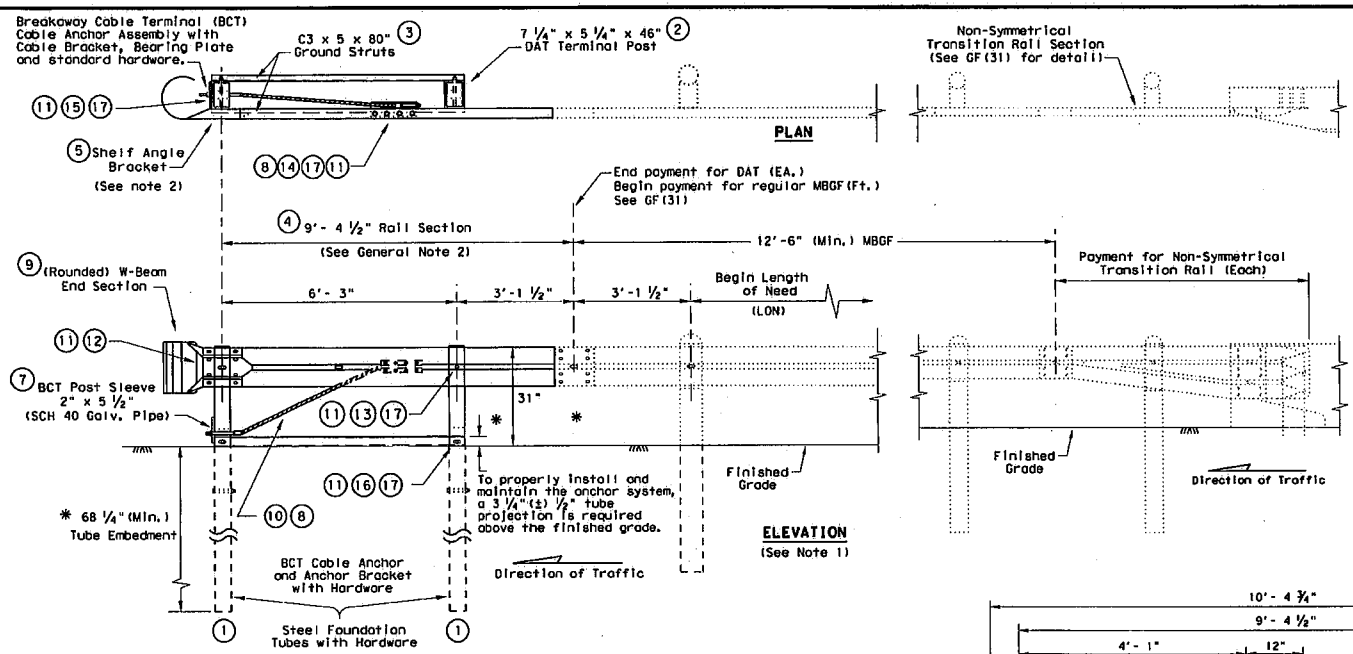
DETAILS FOR NON-SKEWED BOX CULVERTS



DETAILS FOR SKEWED BOX CULVERTS (Showing 30° Skew)

		Bridge Division Standard	
CONCRETE WINGWALLS WITH PARALLEL WINGS FOR BOX CULVERTS TYPES PW-1 AND PW-2			
PW			
FILE: pw10n01.dgn DATE: February 2010	DW: GAF CONT: SECT	DES: CAF JOB:	CR: GAF HIGHWAY:
11-10: REVISED DIMENSIONS 01-12 PW-1 & PW-2	DIST:	COUNTY:	SHEET NO. 15

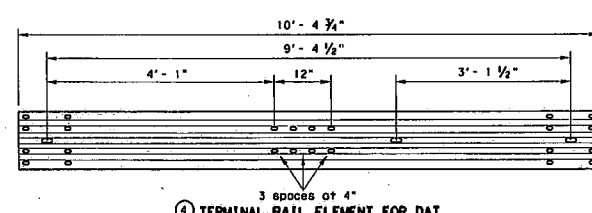
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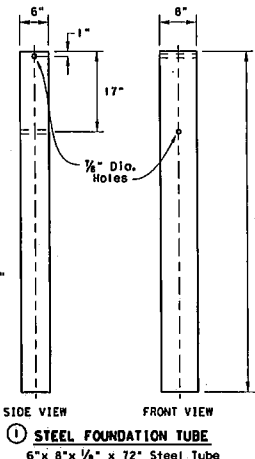
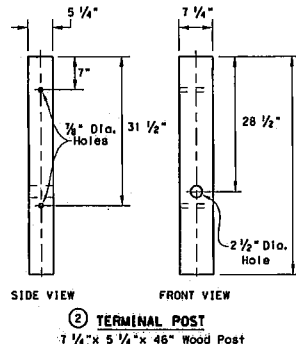
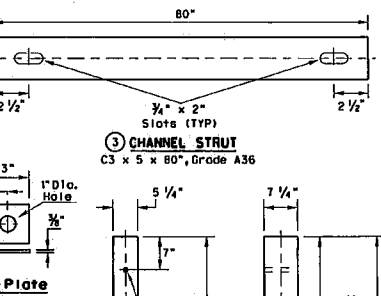
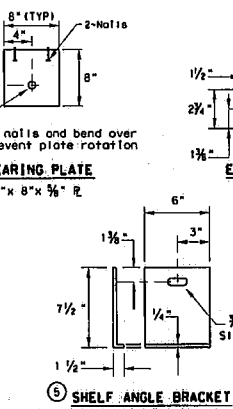
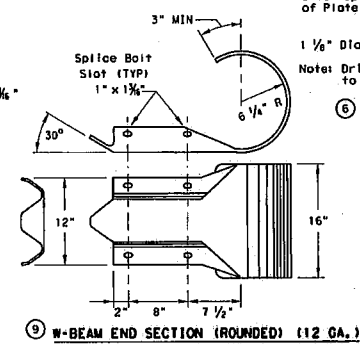
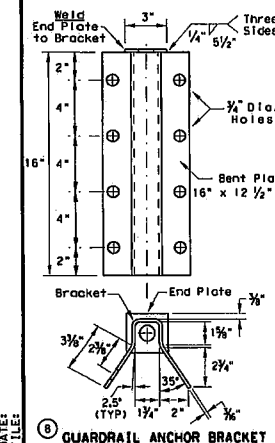
DOWNSTREAM ANCHOR TERMINAL (DAT)
 Only for downstream use, when located outside the horizontal clearance area of opposing traffic.

- GENERAL NOTES**
- The detail shown is the minimum Length of Need (LON) for a DAT connected to a concrete rail.
 - The rail section at the end post is supported by the Shelf Angle Bracket. The rail element is not attached to the end post.
 - The foundation tubes shall not project more than 3 3/4" above the finished grade.
 - All hardware for DAT shall be ASTM A307 unless otherwise shown.
 - Refer to GF(31) sheet for terminal connection details.

MOW STRIP INSTALLATION
 If a mow strip is required with the DAT installation the leave-out area around the steel foundation tubes and the two channel struts may be omitted. This will require a full pour of the foundation tubes.



#	(DAT) PARTS LIST	QTY
1	Steel Foundation Tube	2
2	DAT Terminal Post	2
3	Channel Strut	2
4	Terminal Rail Element	1
5	Shelf Angle Bracket	1
6	BCT Bearing Plate	1
7	BCT Post Sleeve	1
8	Guardrail Anchor Bracket	1
9	(Rounded) W-Beam End Section	1
10	BCT Cable Anchor	1
11	Recessed Nut, Guardrail	20
12	1 1/4" Button Head Bolt	4
13	10" Button Head Bolt	2
14	3/8" x 2" Hex Head Bolt	8
15	3/8" x 8" Hex Head Bolt	4
16	3/8" x 10" Hex Head Bolt	2
17	3/8" Flat Washer	18



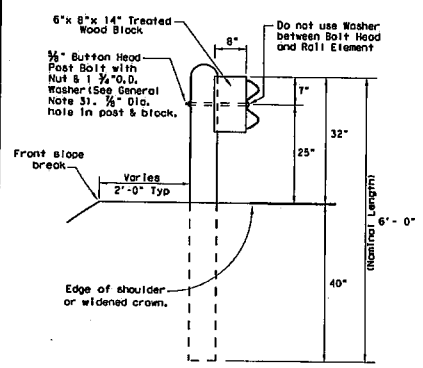
Texas Department of Transportation
 Design Division Standard

METAL BEAM GUARD FENCE
 (Downstream Anchor Terminal)

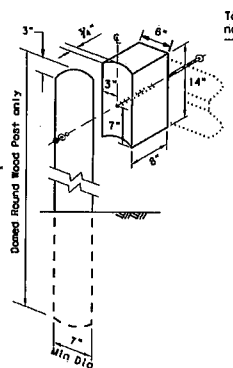
GF (31) DAT-14

FILE: gf31dat14.dgn	DNV: TxDOT	CHK: AJ	DRN: VP	CHK: EGL
© TxDOT: December 2011	CONT: SECT	JOB:	HIGHWAY	
REVISIONS	DISC	COURTY	SHEET NO.	16

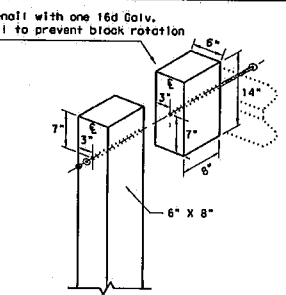
UNLESS SHOWN OTHERWISE, THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PROFESSION ACT". NO WARRANTY OF ANY KIND IS MADE BY ANY PURPOSER WHATSOEVER. THE USER ASSUMES ALL LIABILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



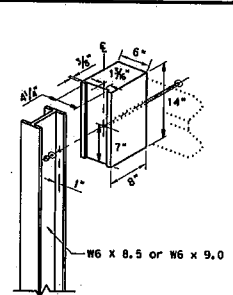
TYPICAL POST



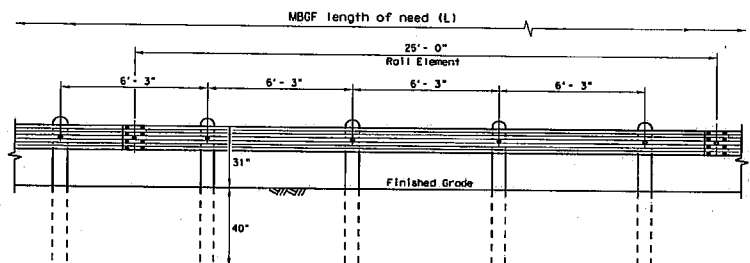
WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST

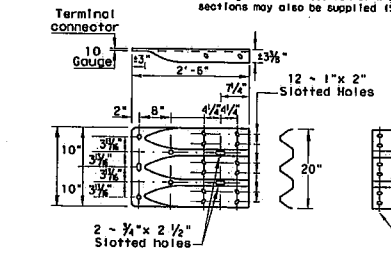


WOOD BLOCK TO STEEL POST

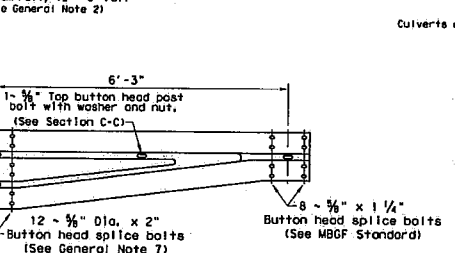


ELEVATION MID-SPAN RAIL SPLICE

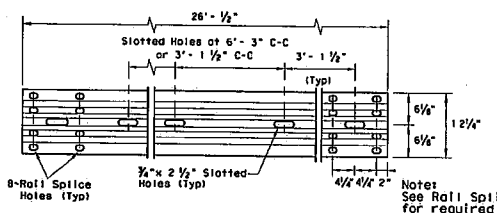
Showing a 25'-0" section of W-Beam rail, 12'-6" rail sections may also be supplied (See General Note 2)



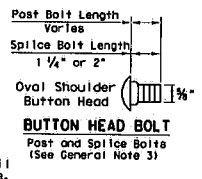
THREE-BEAM TERMINAL CONNECTION
(SEE GENERAL NOTES 6 & 7 FOR REQUIRED HARDWARE)



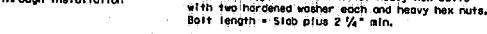
NON-SYMMETRICAL TRANSITION TO W-BEAM (10 GAUGE)



ELEVATION 25'-0" (NOM.) W-BEAM SECTION
12'-6" RAIL SECTIONS MAY ALSO BE SUPPLIED (SEE GENERAL NOTE 2)



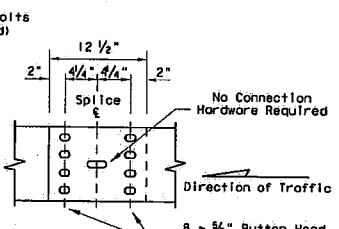
BUTTON HEAD BOLT
Post and Splice Bolts (See General Note 3)



LOW FILL CULVERT POST

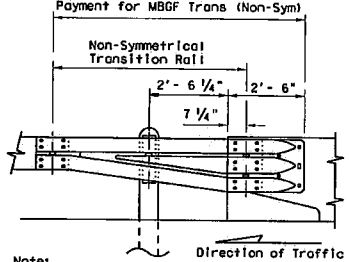
Culverts of 25 ft. or less, see GF(31)LS standard for "Long Span" option.

Epoxy Note
Epoxy Anchor Option: This option may only be used if the culvert slab is 8" min. thick. Threaded anchor rods must be 3/4" 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, "Epoxyes and Adhesives", may be used if it can be demonstrated that they meet or exceed the strength of Hilti HIT RE 500 with the same embedment depth and threaded rod dia. Follow the manufacturer's requirements for installing epoxied threaded rods. Extend rods 1/4" min. beyond nut.



MID-SPAN RAIL SPLICE DETAIL

Notes: GF(31), Mid-Span rail splices are required with 6'-3" post spacings.



DOWNSTREAM RAIL ATTACHMENT

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

GENERAL NOTES

- 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."
- Rail element 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'-1/2" C-C or 6'-3" C-C. A special length of rail may be manufactured to accommodate the downstream anchor terminal (DAT) and the transition sections of guardrail.
- Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 3/4" O.D.) washer and not more than 1" beyond the button head splice bolts (ASTM A307) are 3/4" x 1 1/4" (or 2" long at triple rail splices) with a 3/8" double recessed nut (ASTM A563). Triple beam "connection" 3/4" dia. (ASTM A325) hex bolts shall be of sufficient length to extend through the full thickness of the rail, washers, and nuts.
- Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
- Crown shall be widened to accommodate the Metal Beam Guard Fence.
- The lateral approach to the guard fence, shall have a maximum slope of 1V:10H.
- 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.
- 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.
- If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, or drill two 12" dia. front to back overlapping holes, 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 a cohesionless material.
- Posts shall not be set in concrete, of any depth.
- Special fabrication will be required at installations having a curvature of less than 150 ft. radius.
- Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or 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 posts and/or blocks.
- For posts located partially or wholly between precast box culvert units, the use of a cast-in-place closure between boxes is required. See Detail "A" on Bridge Standard SCP-MD.



METAL BEAM GUARD FENCE

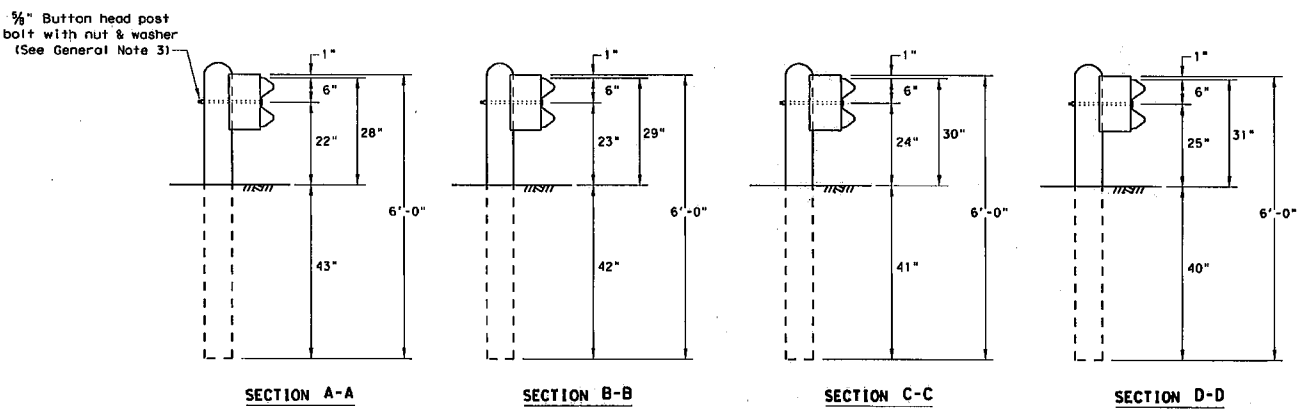
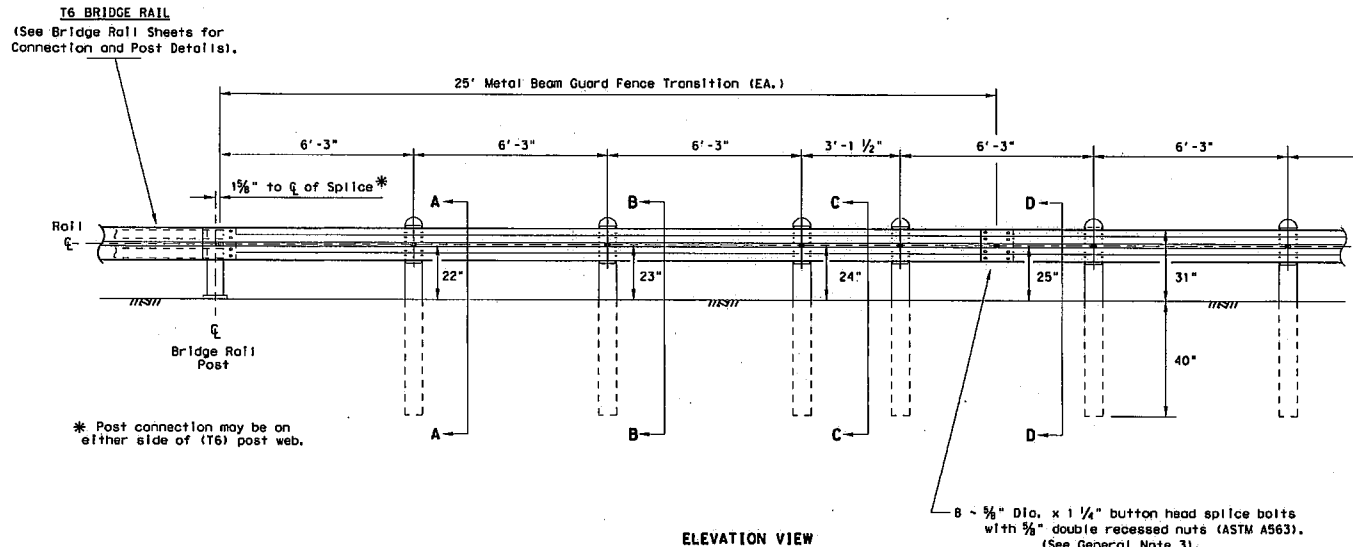
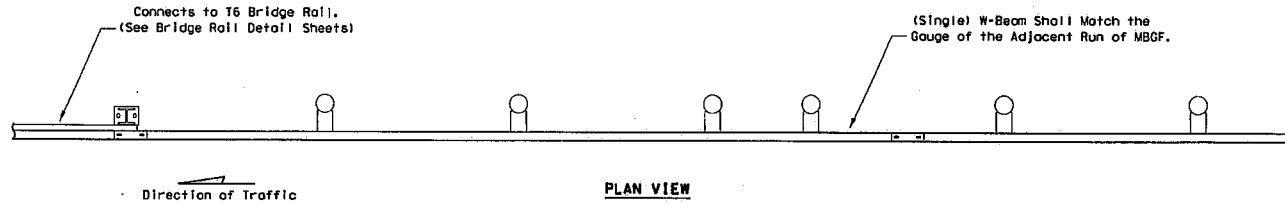
GF(31)-14

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	DIST.	COUNTY		SHEET NO.
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DATE: FILE:

GENERAL NOTES

1. The type of post (round wood post, rectangular wood post, or steel post) will be shown elsewhere in the plans. The exact position of transitions shall be shown elsewhere in the plans or as directed by the Engineer.
2. Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified on the plans.
3. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and the Type A 1 1/4" O.D. washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are 5/8" x 1 1/4" with 5/8" double recessed nuts (ASTM A563).
4. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item requiring construction of the transition.
5. Crown will be widened to accommodate transitions.
6. If solid rock is encountered, see the GF(31) standard sheet for proper installation guidance.
7. Posts shall not be set in concrete.
8. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or 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 can furnish composite material posts and/or blocks.
9. Refer to GF(31) and T6 Standard Sheet for additional details.

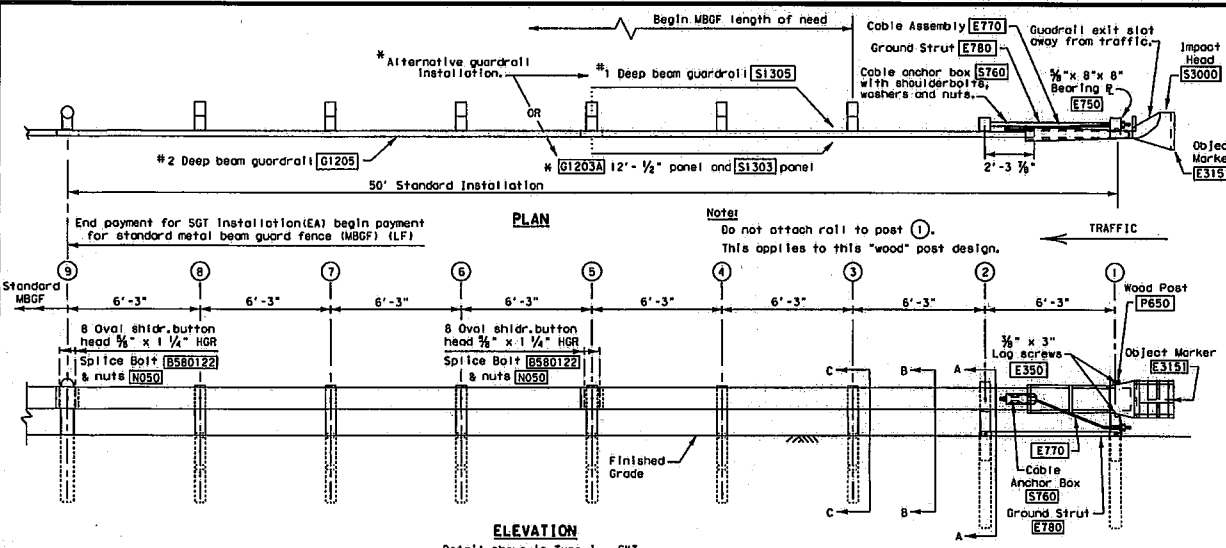


		Design Division Standard	
METAL BEAM GUARD FENCE TRANSITION (T6) GF (31) T6-14			
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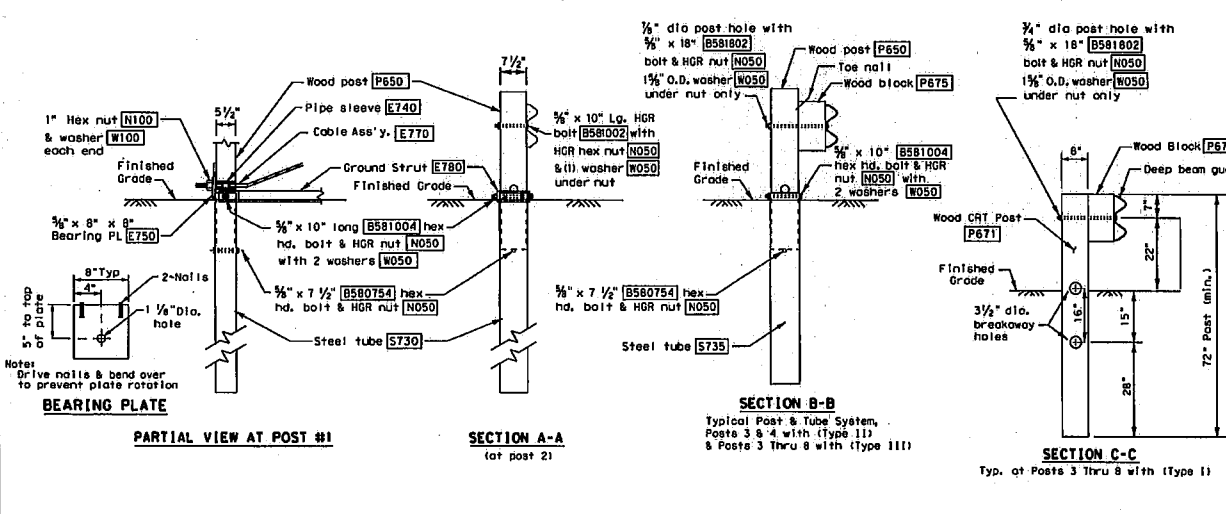
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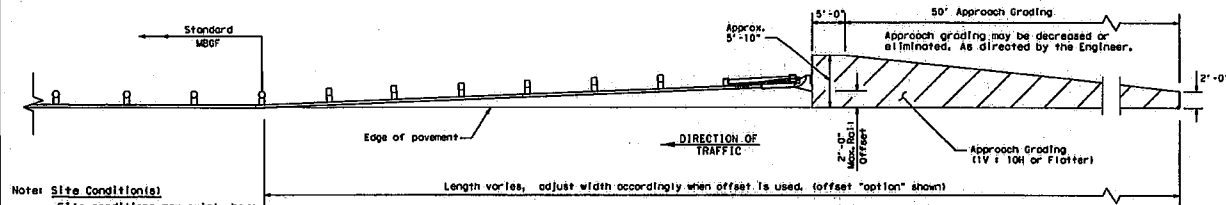


- GENERAL NOTES**
- For additional information contact: Interstate Steel Inc. (432) 263-3725
 - The Type of SGT unit will be specified elsewhere in the plans. The numbers in the circles indicate post position. The Type of SGT unit chosen is a maintenance consideration and does not affect the systems performance.

Post & Tube Options		Post Only	
Type I Posts	① thru ②	Posts ③ thru ⑧	
Type II Posts	① thru ④	Posts ⑤ thru ⑧	
Type III Posts	① thru ④	None	
 - SGT's placed within the "minimum" 150 ft. radius, shall be installed straight. Standard roll elements may be installed within the radius, without special fabrication.
 - All bolts, nuts cable assemblies, cable anchors, steel tubes & bearing plates shall be galvanized.
 - A flare rate of 25:1 may be used over the first 50 ft. of the system to prevent the terminal head from encroaching the shoulder. The flare may be decreased or eliminated for specific installations, if directed by the Engineer.
 - The steel tubes shall not protrude more than 4 inches above ground. Site grading may be necessary to meet this requirement.
 - The steel tubes may be driven with an approved driving head. They shall not be driven with the wood post in the tube. If the steel tubes are placed in drilled holes, the backfill material must be satisfactorily compacted to prevent tube settlement.
 - If solid rock is encountered. See the Manufacturer's installation manual for the proper installation guidance.
 - The breakaway cable assembly must be taut. A locking device, (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening the nuts.
 - The wood blocks shall be "toe nailed" to the rectangular wood posts to prevent them from turning when the wood shrinks. The bearing plate on the front post shall also be "toe nailed" to prevent rotation.
 - For curb installations, the roll tubes and posts shall be installed at the proper ground elevation behind the curb. The posts will then require field drilling new holes to accommodate the roll to post connection bolt to maintain the proper height of the roll above the gutter pan. The excess post length above the roll will be removed if directed by the Engineer.
 - An object marker shall be installed on the front of the impact head as detailed on D&M(VIA).



ITEM #	Post & Tube Options			BILL OF MATERIAL	
	Type I	Type II	Type III	DESCRIPTION	
S3000	1	1	1	Impact Head	
S1305	1	1	1	#1 Deep Beam Guardrail (12 Ga.)	
G1205	1	1	1	#2 Deep Beam Guardrail (12 Ga.)	
G1303	1	1	1	GUARDRAIL (12 GA.) 12'-6" SKT	
G1203A	1	1	1	GUARDRAIL (12 GA.) 12'-6"	
S730	2	2	2	Steel Tube - 6" x 8" x 72" x 1/8" min. or 3/8"	
S735	0	2	6	Steel Tube - 6" x 8" x 54" x 1/8" min. or 3/8"	
P650	2	4	8	Wood Posts - 5 1/2" x 7 1/2" x 45"	
P671	6	4	0	Wood CRT Posts - 6" x 8" x 72"	
P675	6	6	6	Wood Block - 6" x 8" x 14"	
E740	1	1	1	Pipe Sleeve - 2" Std. Pipe x 5 1/2"	
E750	1	1	1	Bearing Plate - 3/8" x 8" x 8"	
S760	1	1	1	Cable Anchor Box	
E770	1	1	1	Cable Assembly	
E780	1	1	1	Ground Strut	
HARDWARE					
B580754	2	4	8	3/8" x 7 1/2" Hex Hd. Bolt	
B581004	2	4	8	3/8" x 10" Hex Hd. Bolt (Top of Tubes)	
W050	11	15	23	3/8" Washers	
B581002	1	1	1	3/8" x 10" HGR Post Bolt (Post 2)	
B580122	16	16	16	3/8" x 1 1/4" HGR Splice Bolt	
B581802	6	6	6	3/8" x 18" HGR Post Bolt (Posts ③ thru ⑧)	
N050	27	31	39	3/8" HGR Nut (16-Spl, Varies Posts, 2-Strut)	
E350	2	2	2	3/8" x 3" Log Screw	
N100	2	2	2	1" Hex Nut (Anchor Cable)	
W100	2	2	2	1" Washer (Anchor Cable)	
S812A	8	8	8	Cable Anchor Box Shoulder Bolts	
N012A	8	8	8	1/2" Structural Nut	
W012A	8	8	8	1/2" Structural Washer	
E3151	1	1	1	Object Marker - (18" x 10")	



All measurements should be taken from bottom of posts.
UNIVERSAL WOOD POST [P650]

POST & TUBE OPTIONS
 Type I post ① thru ②
 Type II post ① thru ④
 Type III post ① thru ⑧

TEXAS DEPARTMENT OF TRANSPORTATION Design Division Standard

SINGLE GUARDRAIL TERMINAL (SKT 350) (WOOD POST) SGT (8) - 14

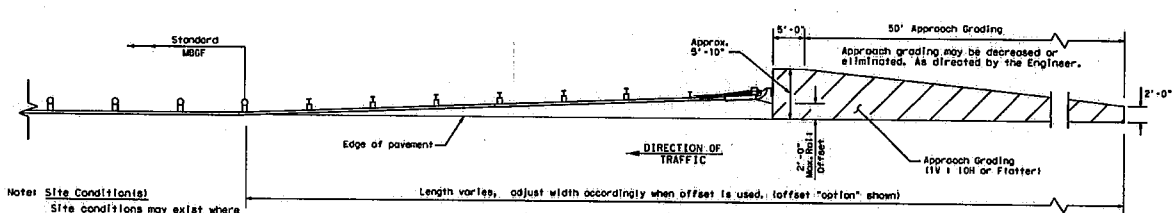
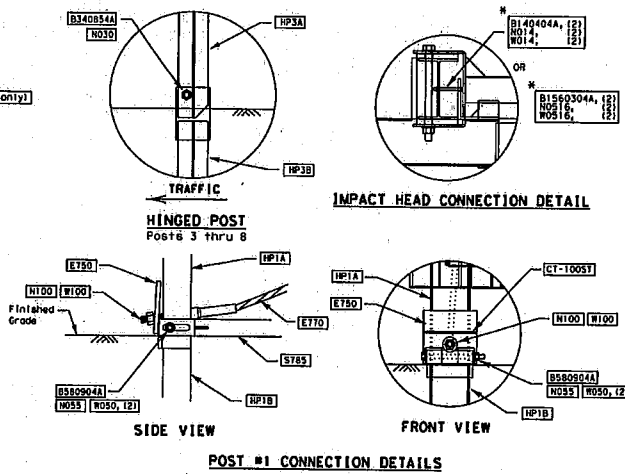
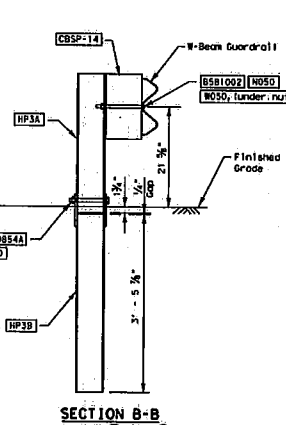
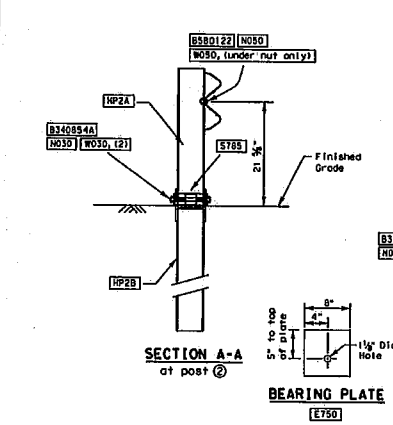
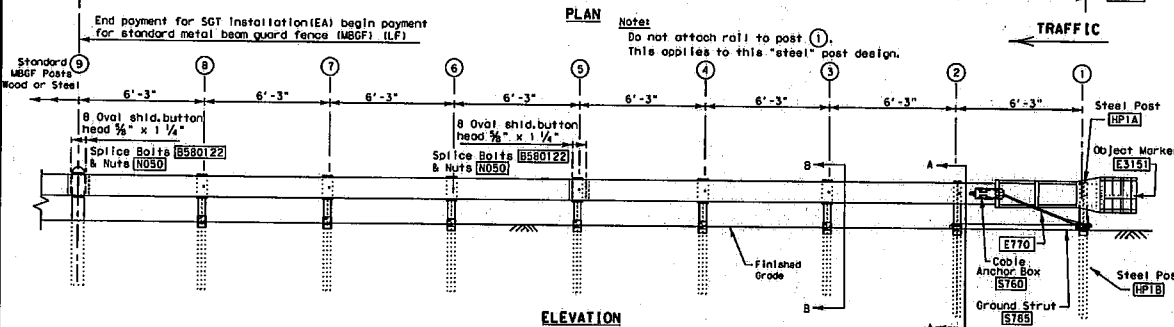
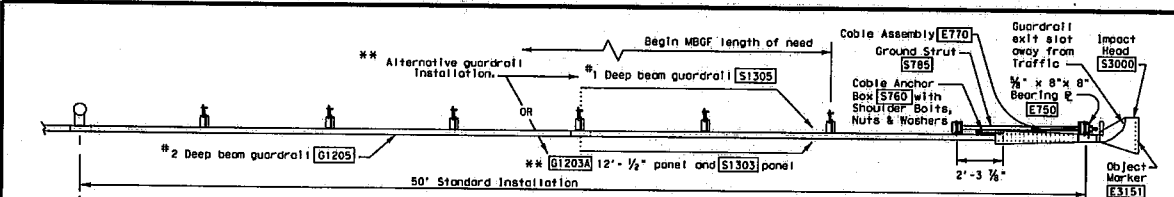
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Civil: TxDOT, CEM, AM, DM, BD/VP, CEM, VP
 COUNTY: _____ SHEET NO.: 19

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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 AT GUARDRAIL END TREATMENTS

- GENERAL NOTES**
- For additional information contact: Interstate Steel Inc. (432) 263-3725
 - All bolts, nuts cable assemblies, cable anchors, steel tubes & bearing plates shall be galvanized.
 - SGT's placed within the "minimum" 150 ft. radius, shall be installed straight. Standard rail elements may be installed within the radius, without special fabrication.
 - A flare rate of 25:1 may be used over the first 50 ft. of the system to prevent the terminal head from encroaching the shoulder. The flare may be decreased or eliminated for specific installations, if directed by the Engineer.
 - The lower sections of the post shall not protrude more than 4 inches above finished ground. Site grading may be necessary to meet this requirement.
 - The lower section of the steel posts should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
 - If solid rock is encountered. See manufacturer's installation manual for the proper installation guidance.
 - The breakaway cable assembly must be taut, & locking device, (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening the nuts.
 - Hinge bolts shall not be set below finished grade. At curb locations the posts shall be installed at the proper grade elevation behind the curb. The posts will then require field drilling new holes to accommodate the rail to post connection bolt to maintain the proper height of the rail above the gutter pan. The excess post length above the rail will be removed if directed by the Engineer.
 - An object marker shall be installed on the front of the impact head as detailed on D&M(VIA).

Note:
 See Alternative Guardrail Installation, **

ITEM NO.	QTY	BILL OF MATERIALS
S3000	1	IMPACT HEAD
S1205	1	M-BEAM GUARDRAIL END SECTION - 12 GA., 25'
G1205A	1	M-BEAM GUARDRAIL - 12 GA., 25'
OR		
S1305	1	M-BEAM GUARDRAIL (12 GA.) 12'-6" SKT
G1205A	1	M-BEAM GUARDRAIL (12 GA.) 12'-6"
NP1A	1	FIRST POST ASSEMBLY TOP, 2' - 4 3/8"
NP1B	1	FIRST POST ASSEMBLY BOTTOM, 6' - 0"
NP2A	1	SECOND POST ASSEMBLY TOP, 2' - 6 3/8"
NP2B	1	SECOND POST ASSEMBLY BOTTOM, 6' - 0"
NP3A	6	HINGED LINE POST TOP, 2' - 5 3/8"
NP3B	6	HINGED LINE POST BOTTOM, 3' - 5 3/8"
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
S785	1	GROUND STRUT (SPECIAL FOR HINGED POST)
CSP-14	6	ROUTED BLOCK
CT-100ST	1	CABLE TIE - STEEL
HARDWARE		
B580122	17	3/8" Dia. x 1/2" SPLICE BOLT, POST #2
B580904A	1	3/8" Dia. x 9" HEX BOLT GR. 5
B340854A	7	3/4" Dia. x 8 1/2" HEX BOLT GR. 5
B581002	6	3/8" Dia. x 10" H.G.R. BOLT (Posts 3 Thru 8)
N050	23	3/8" Dia. H.G.R. NUT (at Splice [16] & Posts 2 Thru 8)
N055	1	3/8" Dia. HEX NUT (Post 1 only)
N050	9	H.G.R. WASHER 1/4" Post 1 [2], & Post 2 thru 8)
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
B140404A, 121	2	1/4" x 4" HEX BOLT GR. 5
OR		
W014	2	1/4" HEX NUT
OR		
W014	2	1/4" WASHER
B1560304A, 121	4	3/8" x 4" HEX BOLT GR. 5
N0516	2	3/8" HEX NUT
W0316	2	3/8" WASHER
S812A	8	CABLE ANCHOR BOX SHOULDER BOLT
N030	7	3/8" HEX NUT
N012A	8	1/2" STR. NUT
N030	2	WASHER
W012A	8	1/2" STR. WASHER
E3151	1	OBJECT MARKER (18" x 18")

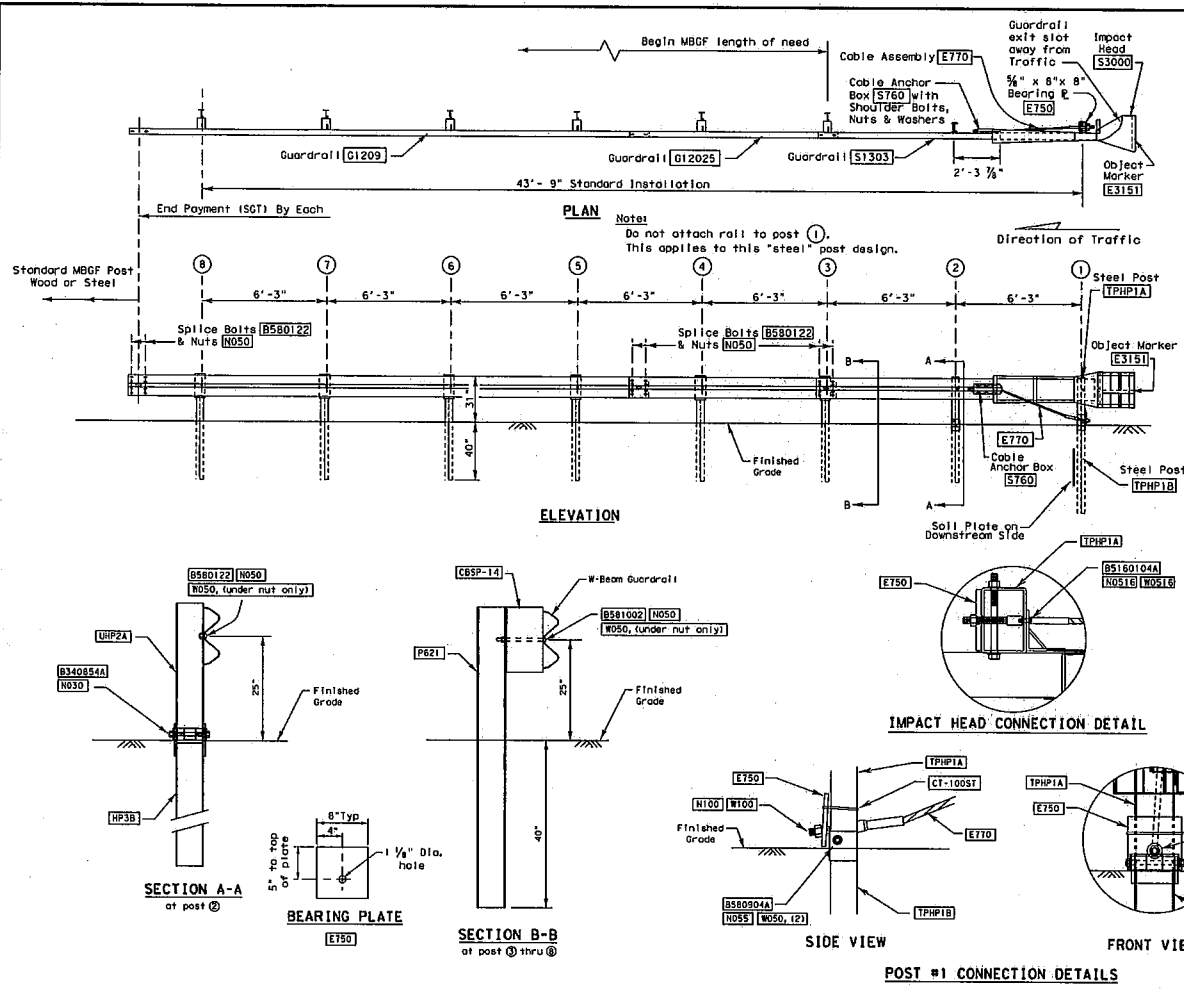
Texas Department of Transportation
 Design Division Standard

SINGLE GUARDRAIL TERMINAL (SKT 350) (HINGED STEEL POST) SGT (8)H-14

FILE: SGT8H14.dgn	DATE: 1/20/01	DESIGNER: JMM	CHECKER: JMM	DATE: 1/20/01
©1/20/01	FEBRUARY 2003	COMP: 303	SECT: 303	JOB: 08/BD/VP
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GENERAL NOTES

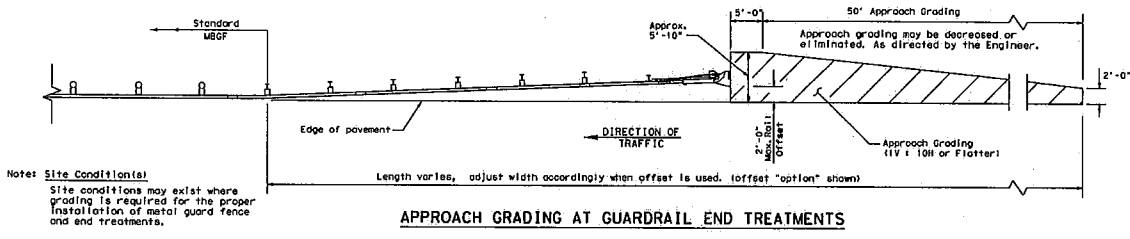
1. For additional information contact: Interstate Steel Inc., (432) 263-3725.
2. All bolts, nuts cable assemblies, cable anchors, steel posts & bearing plates shall be galvanized.
3. SGT's placed within the "minimum" 150 ft. radius, shall be installed straight. Standard roll elements may be installed within the radius without special fabrication.
4. A flare rate of 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.
5. The lower sections of the post shall not protrude more than 4 inches above finished ground. Site grading may be necessary to meet this requirement.
6. The lower section of the steel posts should not be driven with the upper post attached. If the post is placed in a drilled hole, the backfill material must be satisfactorily compacted to prevent settlement.
7. If solid rock is encountered, see manufacturer's installation manual for the proper installation guidance.
8. The breakaway cable assembly must be taut. A locking device, (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening the nuts.
9. Hinge bolts shall not be set below finished grade. At curb locations the posts shall be installed at the proper grade elevation behind the curb. The posts will then require field drilling new holes to accommodate the roll to post connection bolt to maintain the proper height of the roll above the gutter pan. The excess post length above the roll will be removed as directed by the Engineer.
10. An object marker shall be installed on the front of the impact head as detailed on D80M(VIA).

ITEM NO.	QTY	BILL OF MATERIALS
S1303	1	GUARDRAIL (12 GA) 12' - 6" SKT Panel
G12025	1	GUARDRAIL (12 GA) 9' - 4 1/2"
G1209	1	GUARDRAIL (12 GA) 25' - 0"
TPHP1A	1	FIRST POST ASSEMBLY TOP, TUBE
TPHP1B	1	FIRST POST ASSEMBLY BOTTOM, 6' - 0"
URP2A	1	SECOND POST ASSEMBLY TOP
HP3B	1	SECOND POST ASSEMBLY BOTTOM, 3' - 5 1/2"
P621	6	STANDARD STEEL LINE POST 6' - 0" (POST 3 THRU 8)
E750	1	BEARING PLATE
S760	1	CABLE ANCHOR BOX
E770	1	BCT CABLE ANCHOR ASSEMBLY
CT-1005T	1	CABLE TIE - STEEL
CBSP-14	6	ROUTED BLOCK
S3000	1	IMPACT HEAD
HARDWARE		
B580122	25	3/8" Dia. x 1 1/4" SPLICE BOLT
B580904A	1	3/8" Dia. x 9" HEX BOLT GR. 5
B340854A	1	3/4" Dia. x 8 1/2" HEX BOLT GR. 5
B581002	6	3/8" Dia. x 10" H.G.R. BOLT (Post 3 thru 8)
N055	1	3/8" Dia. HEX NUT (Post 1 only)
N050	31	3/8" Dia. H.G.R. NUT (at splices & at Post 2 thru 8)
W050	9	H.G.R. WASHER (at Post 1 (2) & 2 thru 8)
N100	2	1" ANCHOR CABLE HEX NUT
W100	2	1" ANCHOR CABLE WASHER
B5160104A	2	3/8" x 1" HEX BOLT, GR. 5
N0516	2	3/8" HEX NUT
W0516	4	3/8" WASHER
S812A	8	CABLE ANCHOR BOX SHOULDER BOLT
N030	1	3/4" HEX NUT
N012A	8	1/2" STR. NUT
W012A	8	1/2" STR. WASHER
E3151	1	OBJECT MARKER (18" x 18")

Texas Department of Transportation
Design Division Standard

SINGLE GUARDRAIL TERMINAL
(SKT-31)
(STEEL POST)
SGT (8S) 31-14

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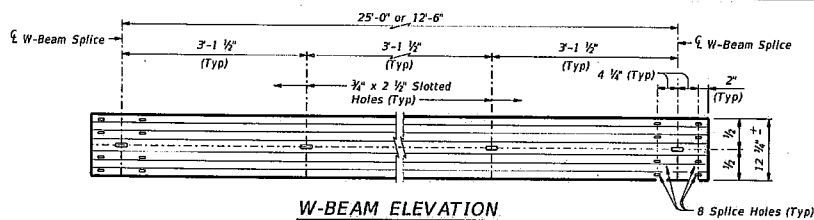


Note: Site Conditions
Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

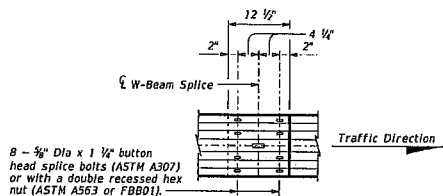
APPROACH GRADING AT GUARDRAIL END TREATMENTS

DISCLAIMER: This standard is governed by the Texas Engineering Practice Act. No warranty of any kind is made by TxDOT for or for incorrect results or damages resulting from its use.

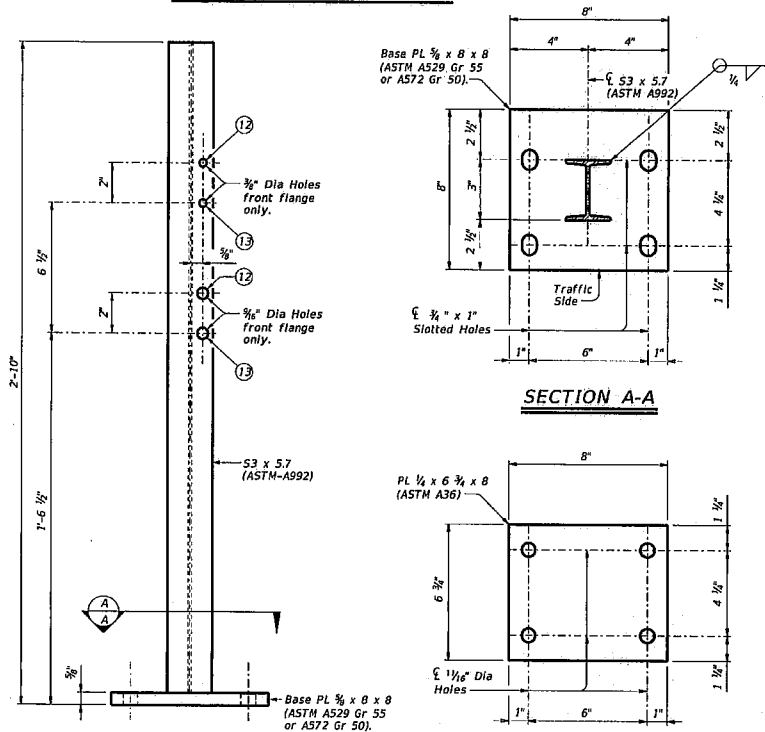
DATE: FILE:



W-BEAM ELEVATION



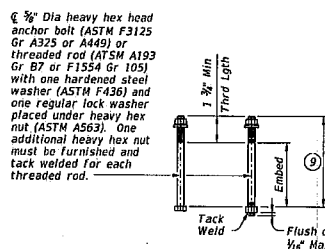
W-BEAM SPLICE ELEVATION



SECTION A-A

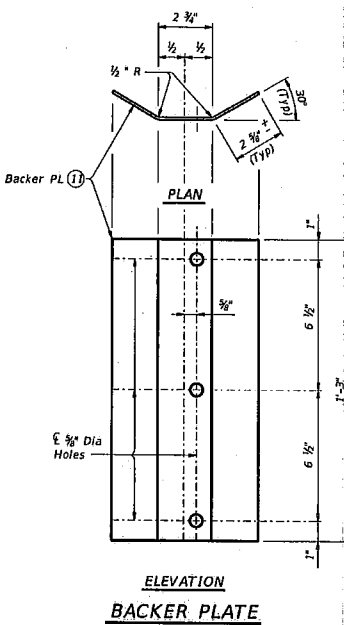
POST ELEVATION

WASHER PLATE DETAIL



CAST-IN-PLACE & FORMED HOLE ANCHOR BOLT OPTIONS

- 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 1/2" x 8 x 1'-3" (ASTM A1011 C5 or S5 Gr 33, or A1008 C5 or S5 Gr 33 (11 Gage acceptable)).
- 12 Used for structures with overlay.
- 13 Used for structures without overlay.



ELEVATION

BACKER PLATE

MBGF AND END TREATMENT NOTES:

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

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 1/8" 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 1/8" by grinding. Shop drawings are not required for this rail.

MATERIAL NOTES:

Galvanize all steel components. Anchor bolts for base plate must be 3/8" 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 3/8" 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 1/2". 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. W-Beam must have slotted holes at 3'-1 1/2". Some part numbers from the "Task Force 13" Guide to Standardized Highway Barrier Hardware have been furnished for quick reference.

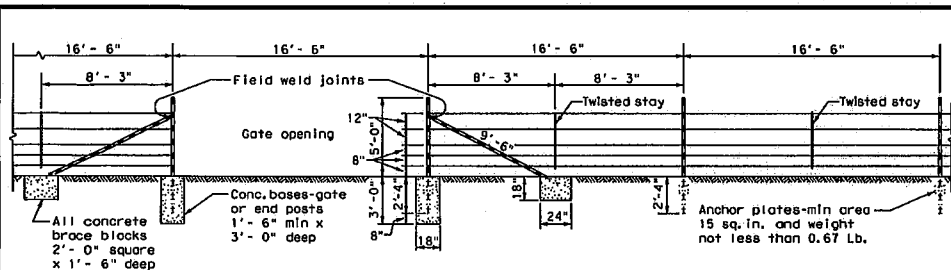
GENERAL NOTES:

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.

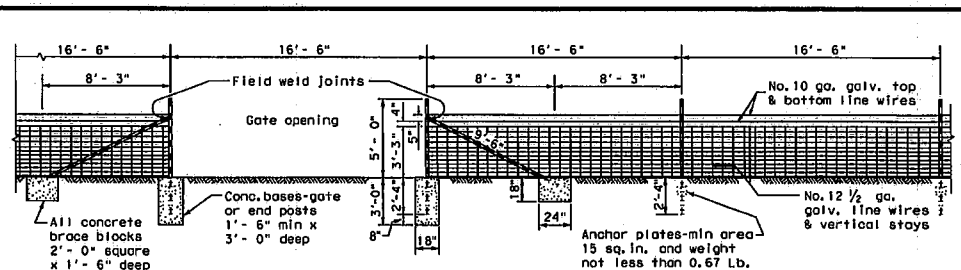
SHEET 2 OF 2

		Bridge Division Standard	
		TRAFFIC RAIL	
TYPE T631			
FILE: r1st038-10.dgn	DN: TxDOT	EC: AES	DM: JIR
©TxDOT March 2018	CDPT	SECT	JOB
REVISIONS	DATE	COUNTY	SHEET NO.
			23

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SECTION GALVANIZED BARBED WIRE FENCE WITH METAL POSTS
 BRACING DETAIL USED AT ENDS AND GATES
TYPE "C" FENCE
 (See General Note 8)

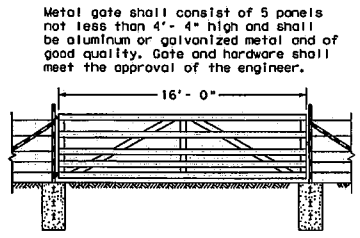


SECTION GALVANIZED WOVEN WIRE FENCE WITH METAL POSTS
 BRACING DETAIL USED AT ENDS AND GATES
TYPE "D" FENCE
 (See General Note 8)

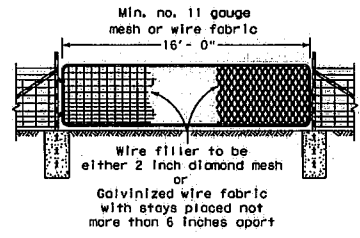
Notes:
 For Steel pipe and T-Post requirements. (See General Notes 6 & 7)

GENERAL NOTES

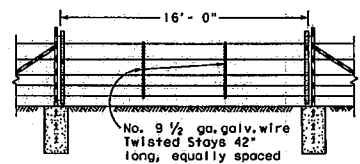
- Any high point which interferes with the placing of wire mesh shall be excavated to provide a 2 inch clearance.
 - Latches for Type 1 and Type 2 gates shall be of good commercial quality and design. Latch of the spring, fork or chain type. All latches shall be suitable to the gate and shall be approved by the Engineer.
 - Hinges for Type 2 gates shall be of a commercial design approved by the Engineer suitable for post and gate.
 - Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
 - Steel anchor plates shall be of a design and thickness sufficient to prevent turning of the post in firm soil.
 - Steel pipe end posts, corner and pull posts shall be a minimum of 2" Std. pipe (2.375" O.D., 0.154" wall thickness) with a 1/4" Std. pipe brace (1.660" O.D., 0.140" wall thickness), with a 2"x2"x1/4" angle, or other as approved by the Engineer. Fasteners for securing barbed wire or woven wire fence to metal posts shall be a minimum of 11 gauge galvanized steel wire. Tubular posts shall be fitted with water malleable iron caps.
 - If Steel pipe is used for posts and braces, use standard pipe in accordance with ASTM A 53, Class B or A 501. For T-Posts use steel that meets ASTM A 702. Metal line posts shall be not less than 6'-6" in length and shall weigh not less than (1.33 lbs./lin. ft.). These items shall be in accordance with Item 552, "Wire Fence."
 - Barbed Wire shall be in accordance with ASTM A 121, Class 1 Design designation 12-2-4-1 4R or 12-2-5-1 4R, or as approved by the Engineer.
- Woven Wire Fence (Type D) shall be in accordance with ASTM A 116, Class 1 No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
- The location of gates and corner posts will be as indicated elsewhere in these plans.



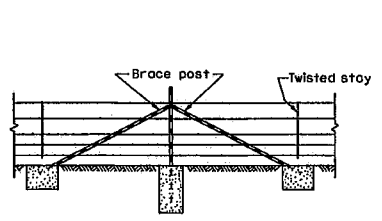
DETAIL TYPE 1 GATE



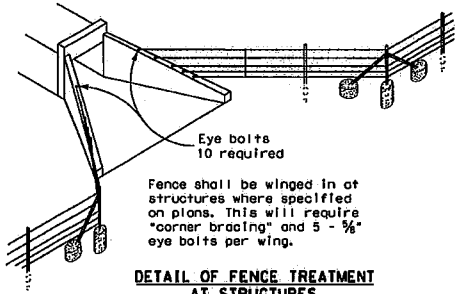
DETAIL TYPE 2 GATE



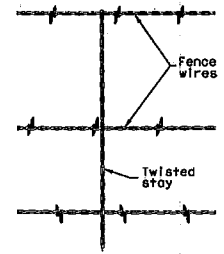
DETAIL TYPE 3 GATE



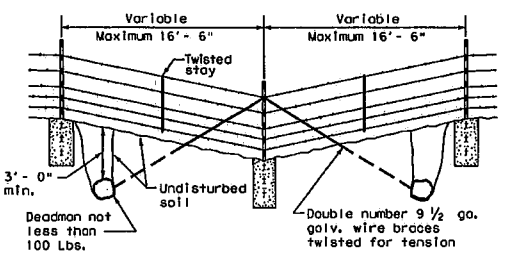
CORNER OR PULL POST ASSEMBLY



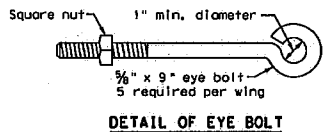
DETAIL OF FENCE TREATMENT AT STRUCTURES



DETAIL OF STAY (Barbed Wire Fence)



DETAIL OF FENCE SAG

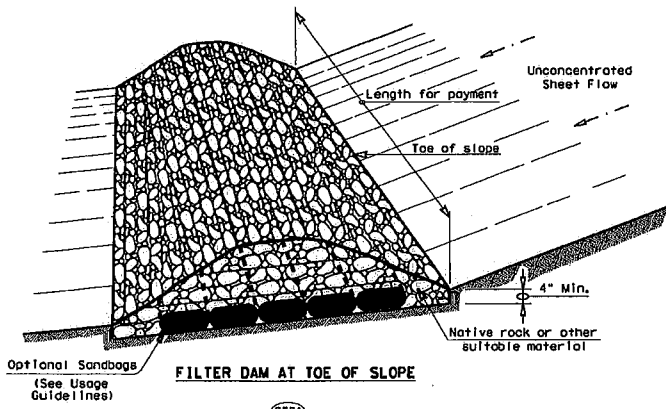


DETAIL OF EYE BOLT

		Design Division Standard	
BARBED WIRE AND WOVEN WIRE FENCE (STEEL POSTS) WF (2) - 10			
FILES: wf210.dgn	DATE: 12/01/01	CHK: AM	DRN: YP
© TxDOT 1996	COIT: SECT	JOB:	HIGHWAY:
REVISIONS		01ST	COUNTY
			SHEET NO. 24

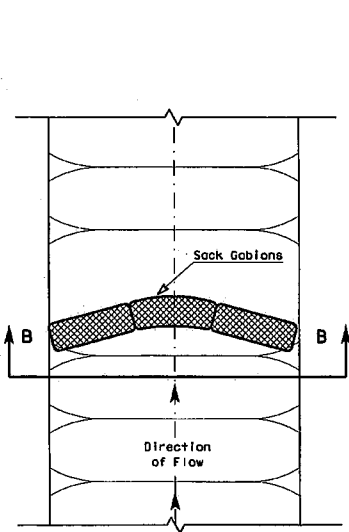
DATE: FILE:

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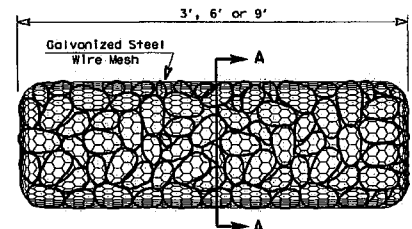


FILTER DAM AT TOE OF SLOPE

(RFD1)

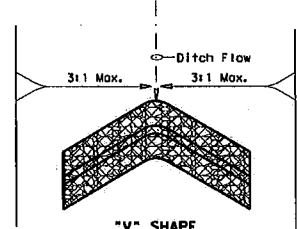


PLAN VIEW

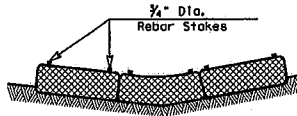


TYPE 4 (SACK GABIONS)

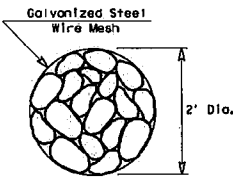
(RFD4)



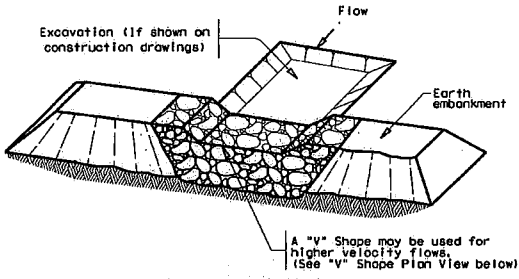
"V" SHAPE PLAN VIEW



SECTION B-B

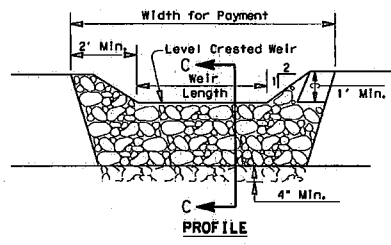


SECTION A-A

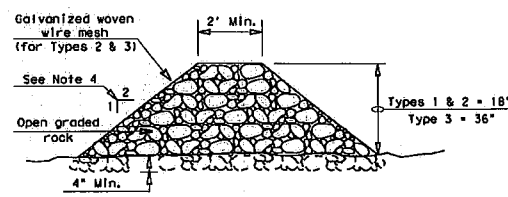


FILTER DAM AT SEDIMENT TRAP

(RFD1) OR (RFD2)



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT² of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

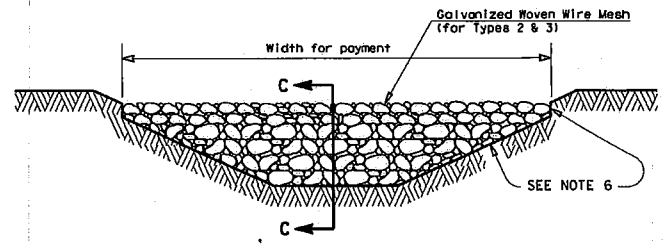
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximately 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 may be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

(RFD1) OR (RFD2) OR (RFD3)

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with 3/4" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 1/2" x 3 1/4"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

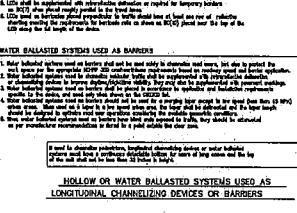
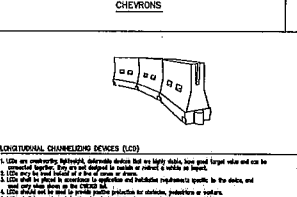
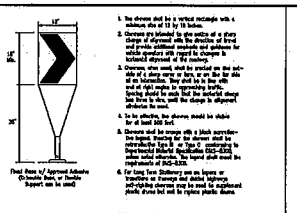
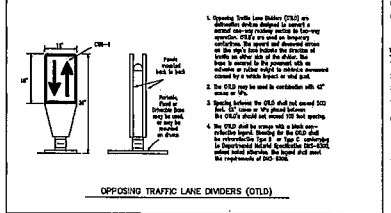
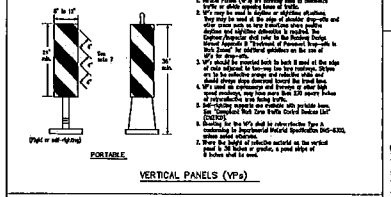
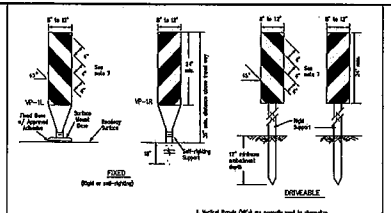
PLAN SHEET LEGEND

- Type 1 Rock Filter Dam (RFD1)
- Type 2 Rock Filter Dam (RFD2)
- Type 3 Rock Filter Dam (RFD3)
- Type 4 Rock Filter Dam (RFD4)

		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES			
ROCK FILTER DAMS			
EC(2)-16			
FILE: ec216	DATE: ec216	BY: ec216	CHK: ec216
© TxDOT: JULY 2016	CONF: ec216	SECT: ec216	JOB: ec216
REVISIONS		DIST	COUNT
			SHEET NO. 25

DATE: ec216

FILE: ec216



GENERAL NOTES

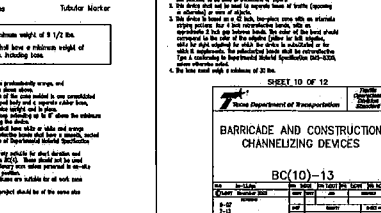
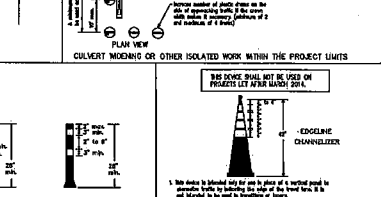
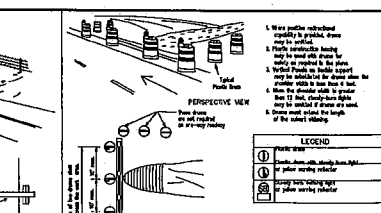
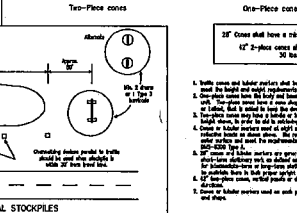
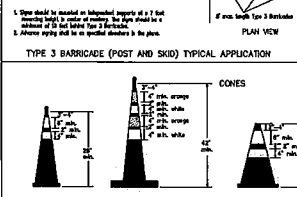
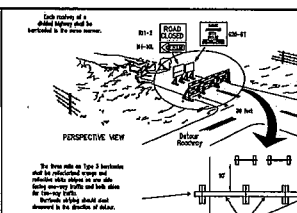
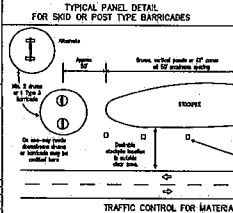
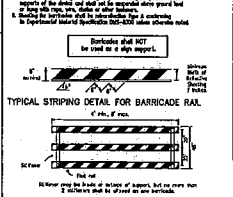
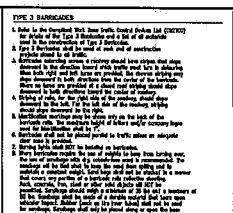
1. The above shall be a minimum standard with a minimum of 1/2 inch.
2. Dimensions shall be in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
3. All signs shall be made of aluminum or other suitable material.
4. All signs shall be made of reflective sheet material.
5. All signs shall be made of reflective sheet material.
6. All signs shall be made of reflective sheet material.
7. All signs shall be made of reflective sheet material.
8. All signs shall be made of reflective sheet material.
9. All signs shall be made of reflective sheet material.
10. All signs shall be made of reflective sheet material.

LONGITUDINAL CHANNELIZING DEVICES (CCD)

Model	Material	Height	Weight	Spacing
CCD-1	Aluminum	12"	150 lbs	10'
CCD-2	Aluminum	12"	150 lbs	10'
CCD-3	Aluminum	12"	150 lbs	10'
CCD-4	Aluminum	12"	150 lbs	10'
CCD-5	Aluminum	12"	150 lbs	10'
CCD-6	Aluminum	12"	150 lbs	10'
CCD-7	Aluminum	12"	150 lbs	10'
CCD-8	Aluminum	12"	150 lbs	10'
CCD-9	Aluminum	12"	150 lbs	10'
CCD-10	Aluminum	12"	150 lbs	10'

WATER BALLASTED SYSTEM USED AS BARRIERS

Model	Material	Height	Weight	Spacing
WB-1	Aluminum	12"	150 lbs	10'
WB-2	Aluminum	12"	150 lbs	10'
WB-3	Aluminum	12"	150 lbs	10'
WB-4	Aluminum	12"	150 lbs	10'
WB-5	Aluminum	12"	150 lbs	10'
WB-6	Aluminum	12"	150 lbs	10'
WB-7	Aluminum	12"	150 lbs	10'
WB-8	Aluminum	12"	150 lbs	10'
WB-9	Aluminum	12"	150 lbs	10'
WB-10	Aluminum	12"	150 lbs	10'



GENERAL

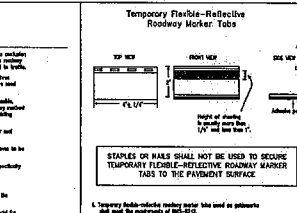
1. The Contractor shall be responsible for providing work zone and advance warning signs and shall maintain them until the work is completed.
2. Advance warning signs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
3. Advance warning signs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
4. Advance warning signs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
5. Advance warning signs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
6. Advance warning signs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
7. Advance warning signs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
8. Advance warning signs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
9. Advance warning signs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
10. Advance warning signs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.

RAISED PAVEMENT MARKERS

1. Raised pavement markers shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
2. Raised pavement markers shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
3. Raised pavement markers shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
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9. Raised pavement markers shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
10. Raised pavement markers shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.

MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor shall be responsible for maintaining work zone and advance warning signs and shall maintain them until the work is completed.
2. Advance warning signs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
3. Advance warning signs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
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8. Advance warning signs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
9. Advance warning signs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
10. Advance warning signs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.



TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS TO THE PAVEMENT SURFACE

1. Temporary flexible-reflective roadway marker tabs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
2. Temporary flexible-reflective roadway marker tabs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
3. Temporary flexible-reflective roadway marker tabs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
4. Temporary flexible-reflective roadway marker tabs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
5. Temporary flexible-reflective roadway marker tabs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
6. Temporary flexible-reflective roadway marker tabs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
7. Temporary flexible-reflective roadway marker tabs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
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9. Temporary flexible-reflective roadway marker tabs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
10. Temporary flexible-reflective roadway marker tabs shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.

RAISED PAVEMENT MARKERS USED AS CHURDANERS

1. Raised pavement markers shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
2. Raised pavement markers shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
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9. Raised pavement markers shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.
10. Raised pavement markers shall be placed in accordance with the Texas Department of Transportation (TxDOT) Standard Specifications for Road and Bridge Construction.

DEPARTMENTAL MATERIAL SPECIFICATIONS

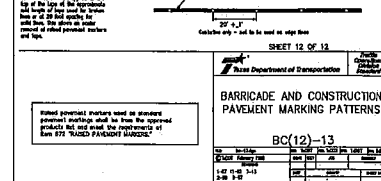
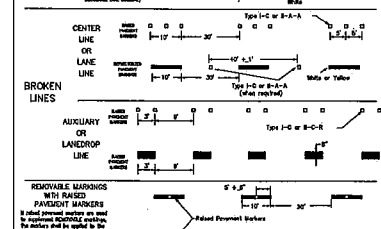
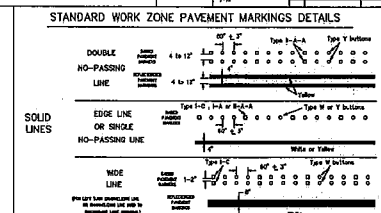
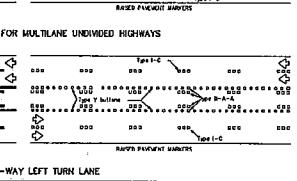
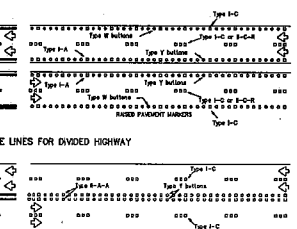
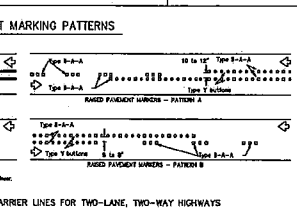
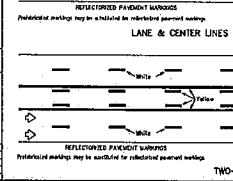
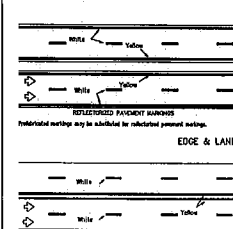
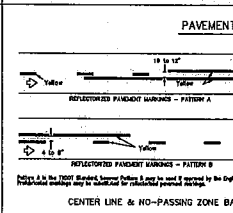
Material	Specification
PAVEMENT MARKING (REFLECTORIZED)	BC(9)-10
PAVEMENT MARKING (REFLECTORIZED)	BC(9)-11
PAVEMENT MARKING (REFLECTORIZED)	BC(9)-12
PAVEMENT MARKING (REFLECTORIZED)	BC(9)-13
PAVEMENT MARKING (REFLECTORIZED)	BC(9)-14
PAVEMENT MARKING (REFLECTORIZED)	BC(9)-15
PAVEMENT MARKING (REFLECTORIZED)	BC(9)-16
PAVEMENT MARKING (REFLECTORIZED)	BC(9)-17
PAVEMENT MARKING (REFLECTORIZED)	BC(9)-18
PAVEMENT MARKING (REFLECTORIZED)	BC(9)-19
PAVEMENT MARKING (REFLECTORIZED)	BC(9)-20

DEPARTMENTAL MATERIAL SPECIFICATIONS

Material	Specification
PAVEMENT MARKING (REFLECTORIZED)	BC(10)-10
PAVEMENT MARKING (REFLECTORIZED)	BC(10)-11
PAVEMENT MARKING (REFLECTORIZED)	BC(10)-12
PAVEMENT MARKING (REFLECTORIZED)	BC(10)-13
PAVEMENT MARKING (REFLECTORIZED)	BC(10)-14
PAVEMENT MARKING (REFLECTORIZED)	BC(10)-15
PAVEMENT MARKING (REFLECTORIZED)	BC(10)-16
PAVEMENT MARKING (REFLECTORIZED)	BC(10)-17
PAVEMENT MARKING (REFLECTORIZED)	BC(10)-18
PAVEMENT MARKING (REFLECTORIZED)	BC(10)-19
PAVEMENT MARKING (REFLECTORIZED)	BC(10)-20

DEPARTMENTAL MATERIAL SPECIFICATIONS

Material	Specification
PAVEMENT MARKING (REFLECTORIZED)	BC(11)-10
PAVEMENT MARKING (REFLECTORIZED)	BC(11)-11
PAVEMENT MARKING (REFLECTORIZED)	BC(11)-12
PAVEMENT MARKING (REFLECTORIZED)	BC(11)-13
PAVEMENT MARKING (REFLECTORIZED)	BC(11)-14
PAVEMENT MARKING (REFLECTORIZED)	BC(11)-15
PAVEMENT MARKING (REFLECTORIZED)	BC(11)-16
PAVEMENT MARKING (REFLECTORIZED)	BC(11)-17
PAVEMENT MARKING (REFLECTORIZED)	BC(11)-18
PAVEMENT MARKING (REFLECTORIZED)	BC(11)-19
PAVEMENT MARKING (REFLECTORIZED)	BC(11)-20



VERTICAL SCALE: 1" = 1'
HORIZONTAL SCALE: 1" = 10'

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WEBB COUNTY, TEXAS LAS LOMAS CULVERT IMPROVEMENTS

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BARRICADE & CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-13

BARRICADE & CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-13