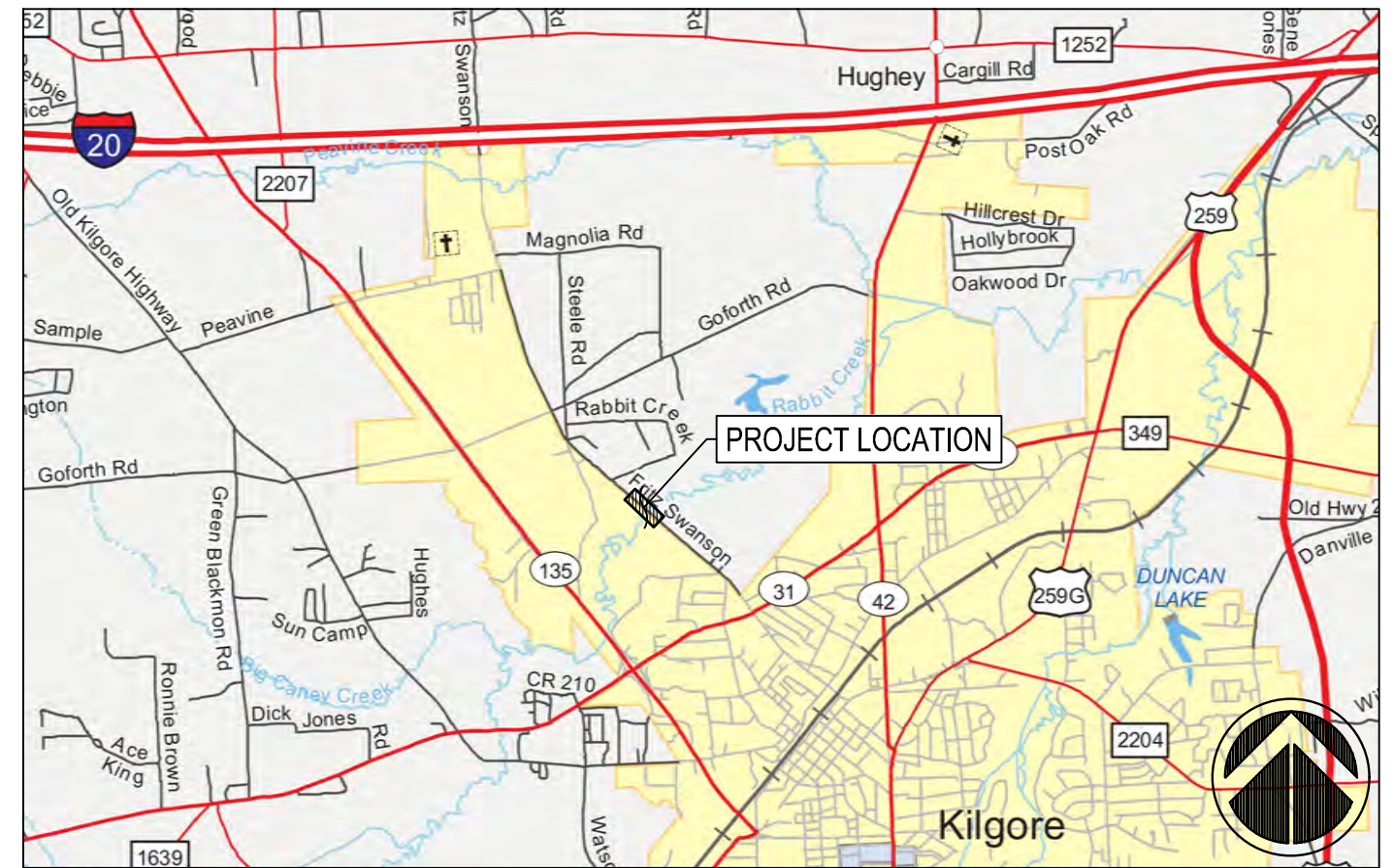


Filename: F:\Facilities\2563\2563-004 Gregg Co Rabbit Creek Bridge Guardrail Rep\CAD\LAND DEVELOPMENT\C1-C5 - Rabbit Creek Guardrail Construction Plan.dwg, Pldt: 11/21/2016 9:03:10 AM

QUANTITY ESTIMATE SUMMARY						
ITEM-CODE			DESCRIPTION	UNIT	TOTAL	
ITEM NO.	DESC CODE	SP NO			EST.	FINAL
THE FOLLOWING ITEMS ARE PROVIDED AND INSTALLED BY GREGG COUNTY						
104	6037		REMOVE CONC (RAIL)	LF	400	
354	6174		PLANE ASPH CONC PAV (1.5" TO 5")	SY	935	
416	2002		DRILL SHAFT (24 IN)	LF	8	
636	2001		ALUMINUM SIGNS (TY. A)	SF	18	
644	2001		IN SM RD SN SUP & AM TY10BWG (1) SA (P)	EA	2	
502	2001		BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	1	
THE FOLLOWING ITEMS ARE PROVIDED AND INSTALLED BY THE GENERAL CONTRACTOR						
432	2039		RIP RAP (MOW STRIP)(4 IN)	CY	10	
451	6004		RETROFIT RAIL (TY T131RC)	LF	400	
500	2001		MOBILIZATION	LS	1	
540	2011		MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4	
544	2011		GUARDRAIL END TREATMENT (INSTALL)	EA	4	



VICINITY MAP

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- C1.0 COVER SHEET
- C2.0 ORIGINAL BRIDGE PLAN - FOR REFERENCE
- C3.0 TRAFFIC CONTROL PLAN
- C4.0 DEMOLITION PLAN
- C5.0 GUARDRAIL RETROFIT PLAN
- C6.0-C6.3 T131RC RETROFIT RAIL ON CURBS
- C7.0 METAL BEAM GUARD FENCE MOW STRIP GF(31) MS-11
- C8.0 METAL BEAM GUARD FENCE TRANSITION GF(31) TR-14
- C9.0 SINGLE GUARDRAIL TERMINAL SGT(8) 31-14
- C10.0 SIGN MOUNTING DETAILS GEN NOTES & DETAILS SMD (GEN)-08
- C11.0 SIGN MOUNTING DETAILS TRIANGULAR SLIPBASE SYSTEM SMD (SLIP-1)-08



JOB # 2563-004

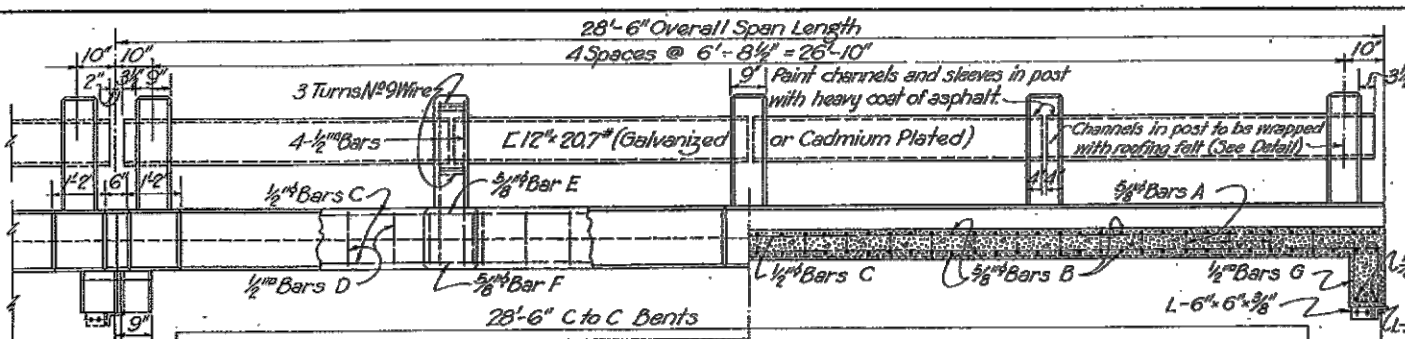
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**RABBIT CREEK BRIDGE
 GUARDRAIL REPLACEMENT
 FRITZ SWANSON ROAD
 GREGG COUNTY, TEXAS**

C1.0 COVER SHEET

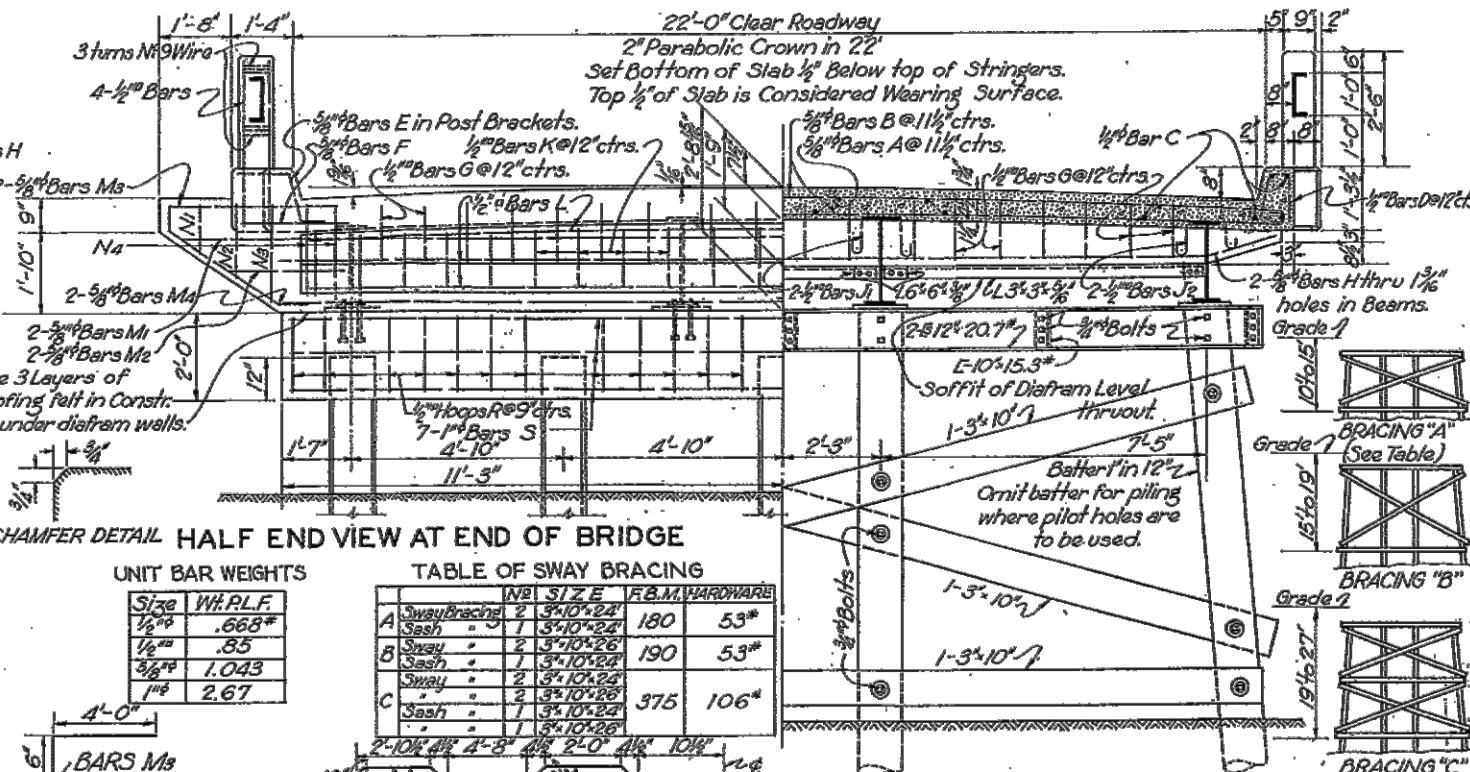
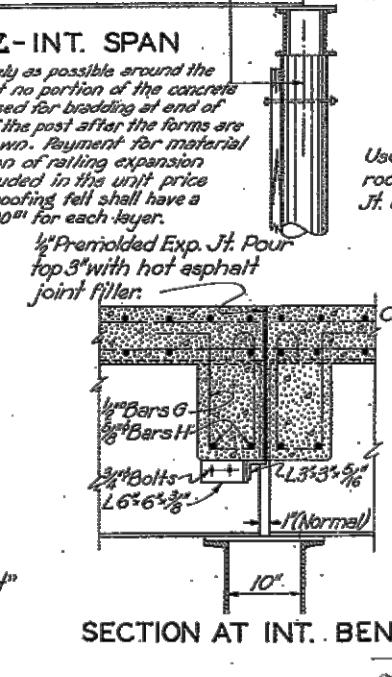
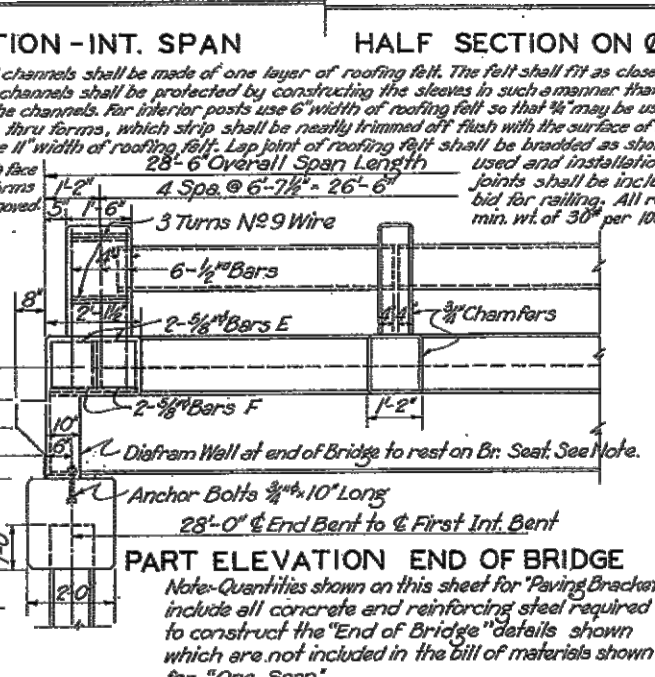
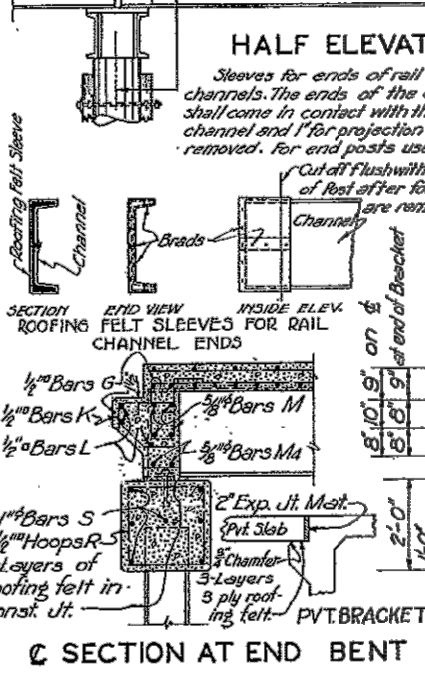
FED. ROAD DIST. NO.	STATE	FEDERAL AID PROJECT NO.	SHEET NO.	TOTAL SHEETS
6	TEXAS			
STATE DIST. NO.	COUNTY	STATE PROJECT NO.	BRIDGE NO.	ROADWAY NO.

NOTES ON RAILING: The unit price bid for railing shall include the channels concrete in posts, tie wire and all reinforcing not shown in the bill of steel for the span. The channels shall be galvanized by the hot dip method with 2 ounces per square foot or plated with cadmium by the Udylite Process.



HALF ELEVATION - INT. SPAN HALF SECTION ON C-INT. SPAN

Sleeves for ends of rail channels shall be made of one layer of roofing felt. The felt shall fit as closely as possible around the channels. The ends of the channels shall be protected by constructing the sleeves in such a manner that no portion of the concrete shall come in contact with the channels. For interior posts use 6" width of roofing felt so that 1/2" may be used for bradling at end of channel and 1" for projection thru forms, which strip shall be neatly trimmed off flush with the surface of the post after the forms are removed. For end posts use 11" width of roofing felt. Lap joint of roofing felt shall be bradled as shown. Payment for material used and installation of railing expansion joints shall be included in the unit price bid for railing. All roofing felt shall have a min. wt. of 30" per 100" for each layer.



CHAMFER DETAIL HALF END VIEW AT END OF BRIDGE

UNIT BAR WEIGHTS

Size	Wt. P.L.F.
1/2"	.668
3/8"	.85
5/8"	1.043
1"	2.67

TABLE OF SWAY BRACING

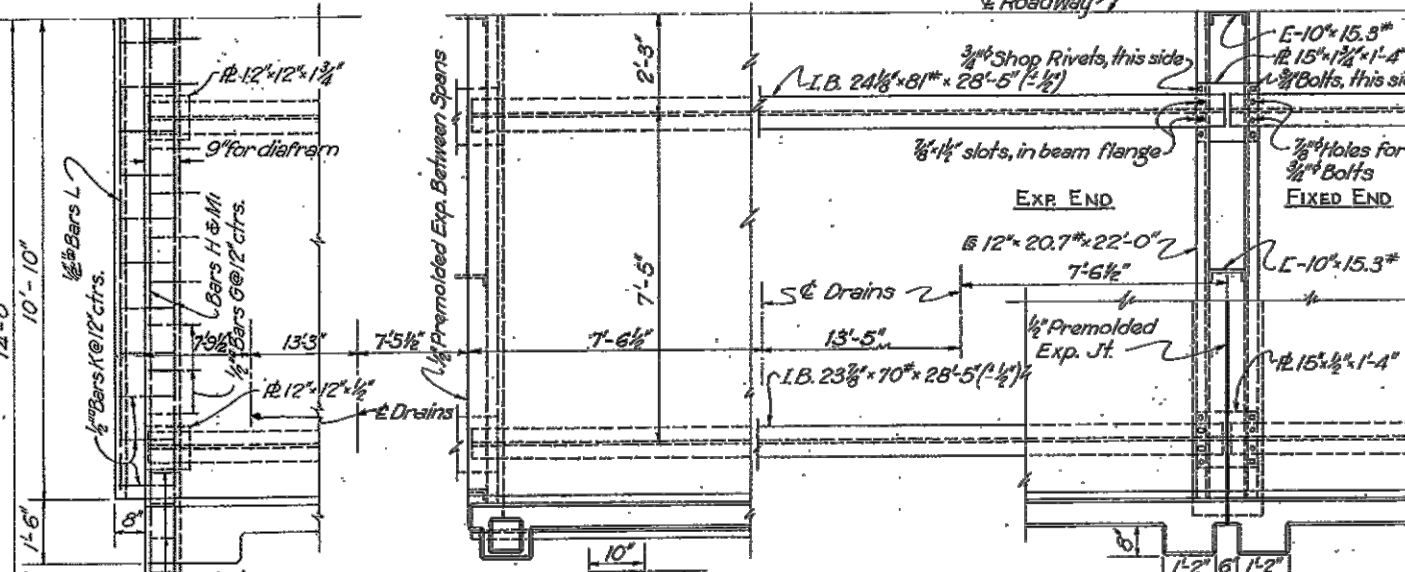
Size	Wt. P.L.F.	INB SIZE	F.B.M. HARDWARE
A	2	3-10x24	180 53"
B	1	3-10x24	190 53"
C	2	3-10x24	375 106"

BILL OF REINFORCING STEEL FOR ONE PAVING BRACKET, ETC.

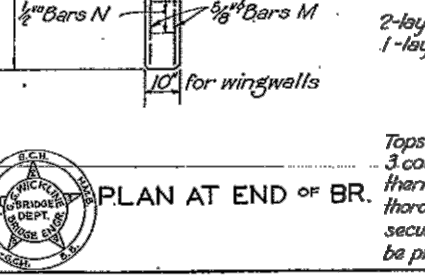
Mark	Spa.	Size	N ^o	Length	Weight
K	12	1/2"	22	3'-6"	65
L	-	1/2"	3	21'-4"	54
M	-	3/8"	2	27'-0"	56
M ₂	-	-	4	2'-9"	11
M ₃	-	-	4	7'-6"	31
M ₄	-	-	2	22'-8"	47
N	9	1/2"	6	3'-10 1/2"	20
N ₂	9	1/2"	4	5'-7"	17
E	-	3/8"	2	7'-1"	15
F	-	3/8"	2	5'-5"	11
Total					327
REINF. FOR ONE END BENT					
R	9	1/2"	24	7'-8"	156
S	-	1"	7	22'-2"	414
Total					570

BILL OF REINFORCING STEEL FOR ONE SPAN

Mark	Spa.	Size	N ^o	Length	Weight
A	11 1/2"	3/8"	20	25'-4"	766
B	-	-	60	24'-5"	1528
C	-	1/2"	20	28'-3"	377
D	12	1/2"	58	3'-0"	148
E	-	3/8"	10	7'-1"	74
F	-	-	10	5'-5"	56
G	12	1/2"	36	4'-8"	143
H	-	3/8"	4	22'-7"	94
J ₁	-	1/2"	8	3'-11"	27
J ₂	-	-	8	3'-5"	23
Total Reinf. One Span					3236

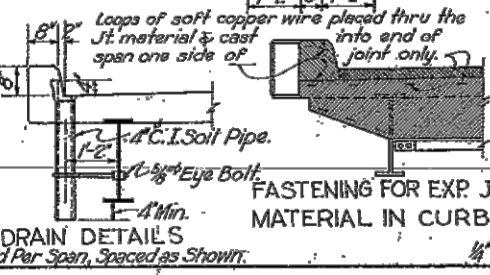


PART PLAN

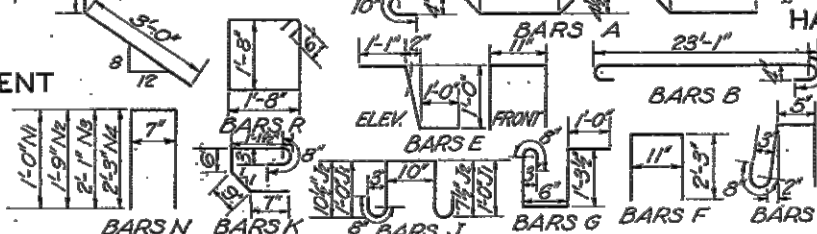


PLAN AT END OF BR.

DETAIL FOR PROTECTION OF PILE TOPS
Tops of all piling for interior bents are to be painted with 3 coats of creosote oil & 1 coat of hot tar. They shall then be covered with 2 layers of 16oz. duck. Duck to be thoroughly coated on both sides with red lead and oil and securely lapped in place. A layer of roofing felt shall then be placed covering the entire top.

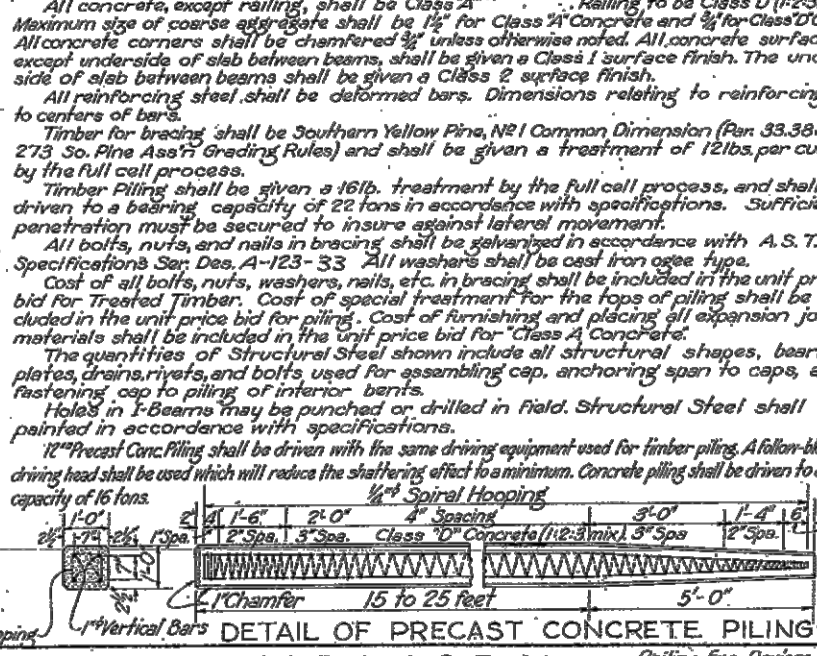


FASTENING FOR EXP. JT. MATERIAL IN CURBS



BARS N BARS K BARS J BARS G BARS F BARS D

GENERAL NOTES:-
Texas State Highway Department Standard Specifications (1926) with special provisions for materials to govern throughout.
Design Load - 2 Typical 15-Ton Trucks. Impact in accordance with specifications. An allowance of 25% of roadway is made for wearing surface.
All concrete, except railing, shall be Class A.
Maximum size of coarse aggregate shall be 1 1/2" for Class A Concrete and 3/4" for Class D Conc.
All concrete corners shall be chamfered 3/8" unless otherwise noted. All concrete surfaces, except underside of slab between beams, shall be given a Class 1 surface finish. The underside of slab between beams shall be given a Class 2 surface finish.
All reinforcing steel shall be deformed bars. Dimensions relating to reinforcing are to centers of bars.
Timber for bracing shall be Southern Yellow Pine, No. 1 Common Dimension (Per 33.38 and 273 So. Pine Ass'n Grading Rules) and shall be given a treatment of 12lbs. per cu. Ft. by the full cell process.
Timber piling shall be given a 16lb. treatment by the full cell process, and shall be driven to a bearing capacity of 22 tons in accordance with specifications. Sufficient penetration must be secured to insure against lateral movement.
All bolts, nuts, and nails in bracing shall be galvanized in accordance with A.S.T.M. Specifications Ser. Des. A-123-33. All washers shall be cast iron ogee type.
Cost of all bolts, nuts, washers, nails, etc. in bracing shall be included in the unit price bid for treated timber. Cost of special treatment for the tops of piling shall be included in the unit price bid for piling. Cost of furnishing and placing all expansion joint materials shall be included in the unit price bid for Class A Concrete.
The quantities of Structural Steel shown include all structural shapes, bearing plates, drains, rivets, and bolts used for assembling cap, anchoring span to caps, and fastening cap to piling of interior bents.
Holes in I-Beams may be punched or drilled in field. Structural Steel shall be painted in accordance with specifications.
Precast Conc. Piling shall be driven with the same driving equipment used for timber piling. A follow-block or driving head shall be used which will reduce the shattering effect to a minimum. Concrete piling shall be driven to a bearing capacity of 16 tons.



DETAIL OF PRECAST CONCRETE PILING

TABLE OF TOTAL QUANTITIES

ITEM	ONE SPAN	ONE PAVING BRACKET	ONE INTERIOR BENT	ONE END BENT
Class A Concrete Cu.Yds.	18.1	1.4		3.4
Reinforcing Steel Lbs.	3236	327		570
Structural Steel Lbs.	8900		1350	200
Bridge Railing Lin.Ft.	570			

* Steel for cap and bearing plates.
** Bearing plates and anchor bolts at End of Bridge.

TEXAS STATE HIGHWAY DEPARTMENT
28' 6" STEEL I-BEAM SPAN
CONCRETE FLOOR 22' ROADWAY
MARCH 1932
I 32-22-28.5

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

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

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



WORKER SAFETY APPAREL NOTES:

1. Workers on foot who are exposed to traffic or to construction equipment within the right-of-way shall wear high-visibility safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel" 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.

LEGEND

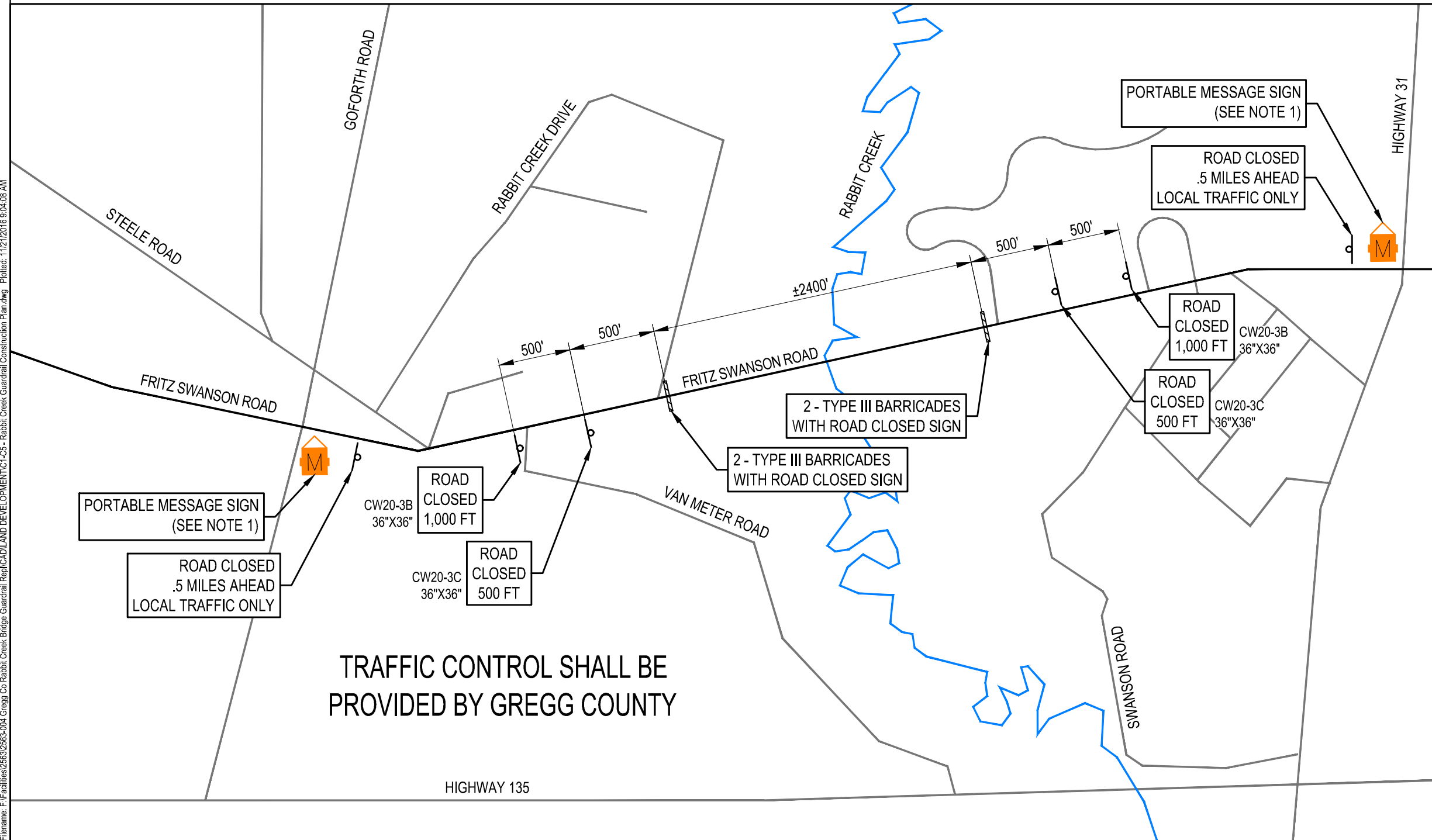
- Type III Barricade
- Portable Changeable Message Sign

NOTES:

1. USE THE FOLLOWING TEXT FOR THE PORTABLE CHANGEABLE MESSAGE SIGNS:

1-WEEK PRIOR TO CLOSURE
 (1) FRITZ SWANSON ROAD
 CLOSED
 9/15-10/15
 (2) THRU
 TRAF USE
 HIGHWAY 135

DURING CLOSURE
 (1) FRITZ SWANSON ROAD
 CLOSED
 AHEAD
 (2) THRU
 TRAF USE
 HIGHWAY 135



TRAFFIC CONTROL SHALL BE PROVIDED BY GREGG COUNTY

JOB # 2563-004

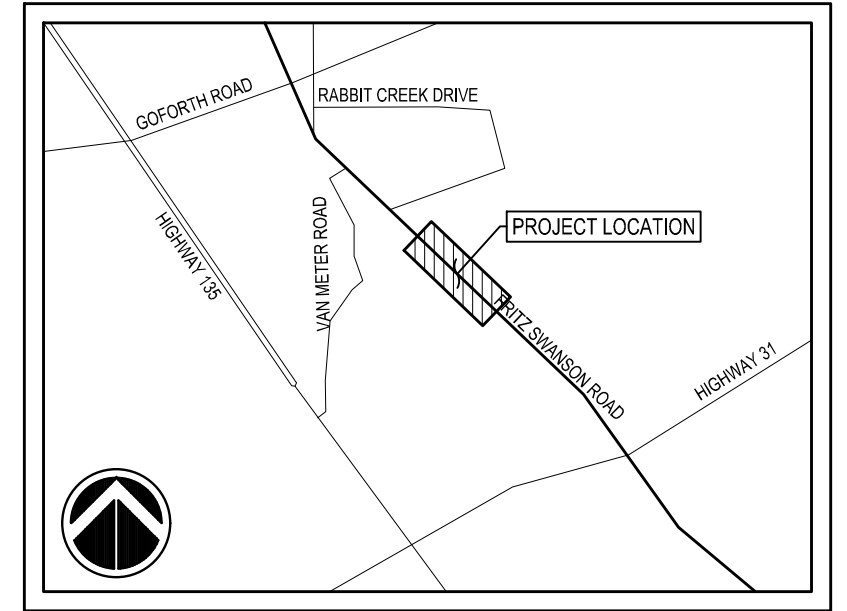


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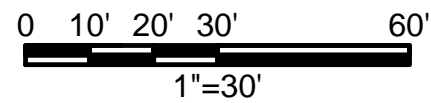
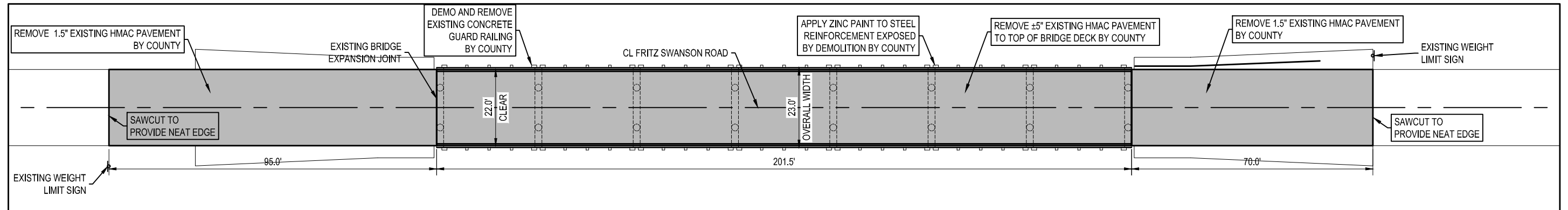
**RABBIT CREEK BRIDGE
 GUARDRAIL REPLACEMENT
 FRITZ SWANSON ROAD
 GREGG COUNTY, TEXAS**

C3.0 TRAFFIC CONTROL PLAN

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VICINITY MAP

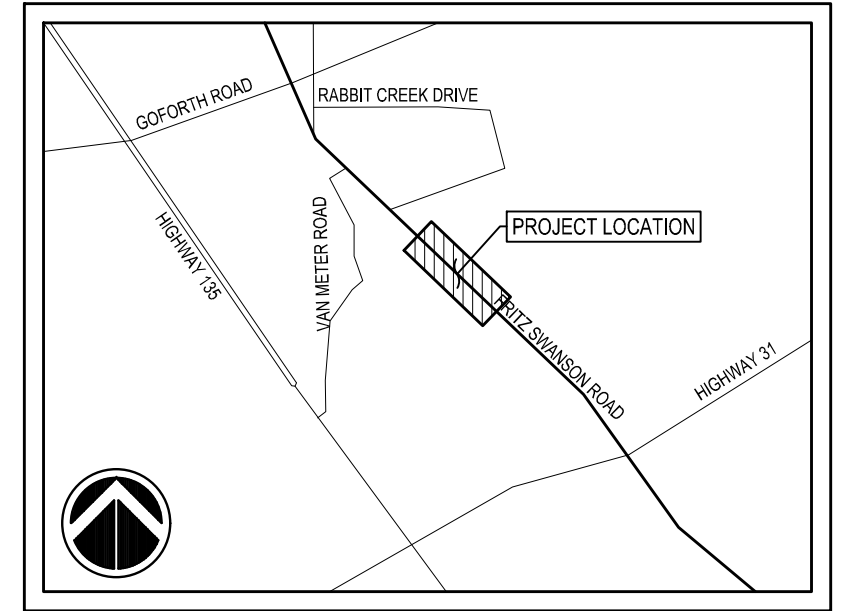


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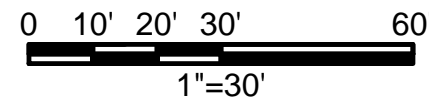
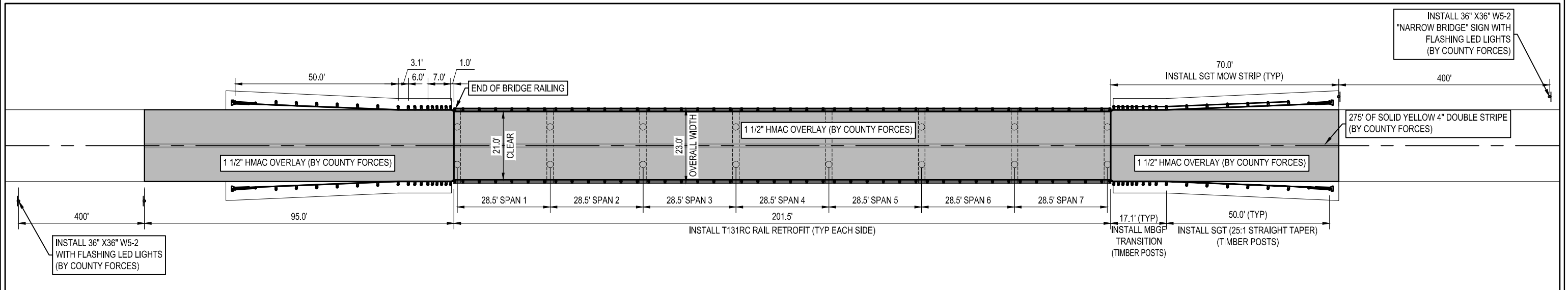
**RABBIT CREEK BRIDGE
 GUARDRAIL REPLACEMENT
 FRITZ SWANSON ROAD
 GREGG COUNTY, TEXAS**

C4.0 DEMOLITION PLAN

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VICINITY MAP



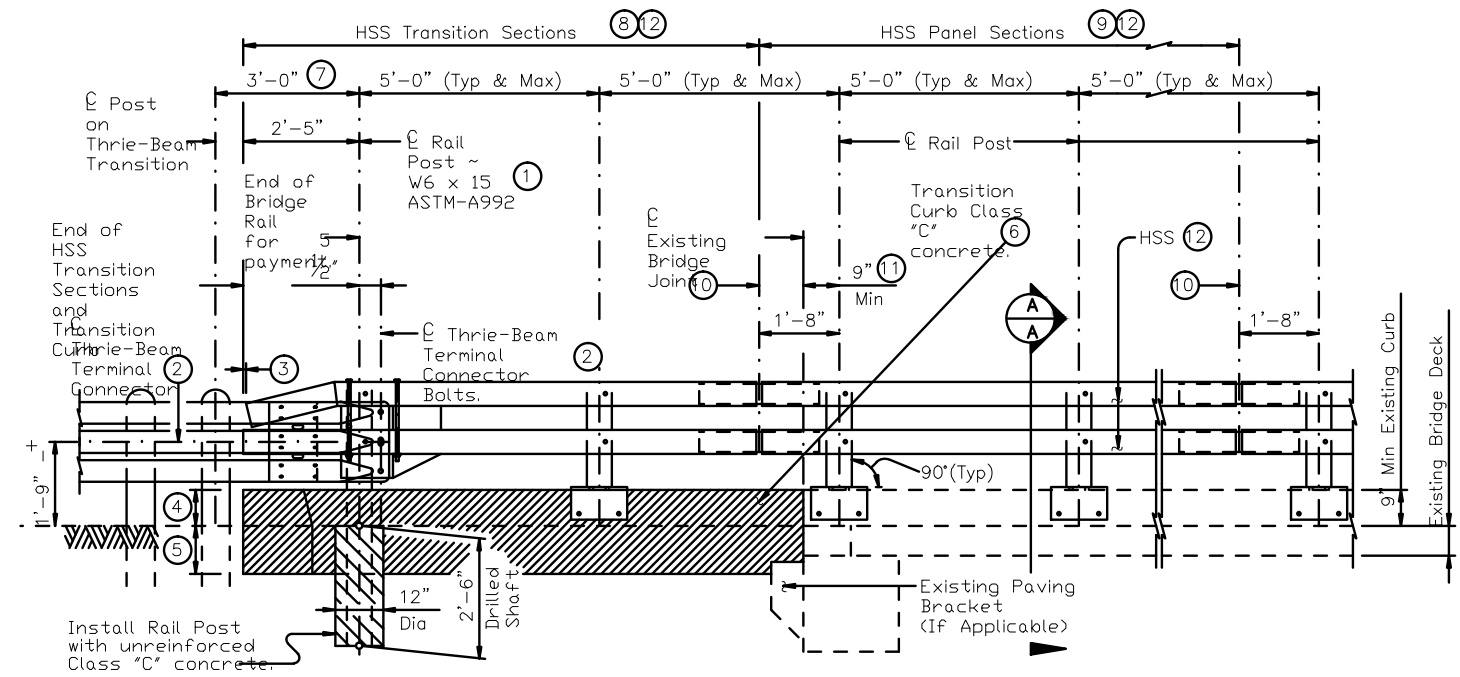
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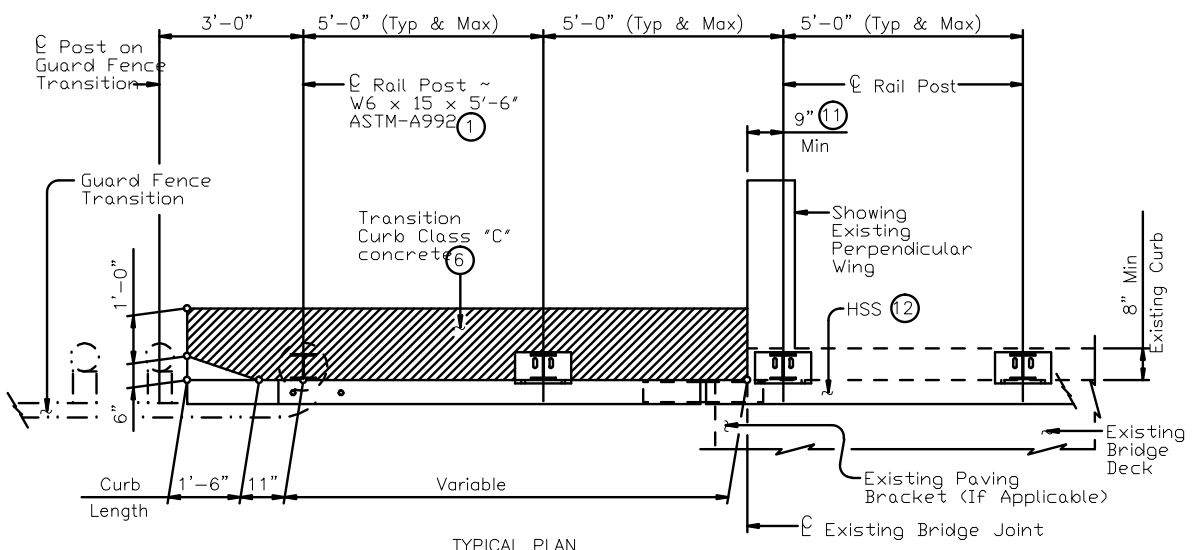
**RABBIT CREEK BRIDGE
GUARDRAIL REPLACEMENT
FRITZ SWANSON ROAD
GREGG COUNTY, TEXAS**

C5.0 GUARDRAIL RETROFIT PLAN

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TYPICAL ROADWAY ELEVATION

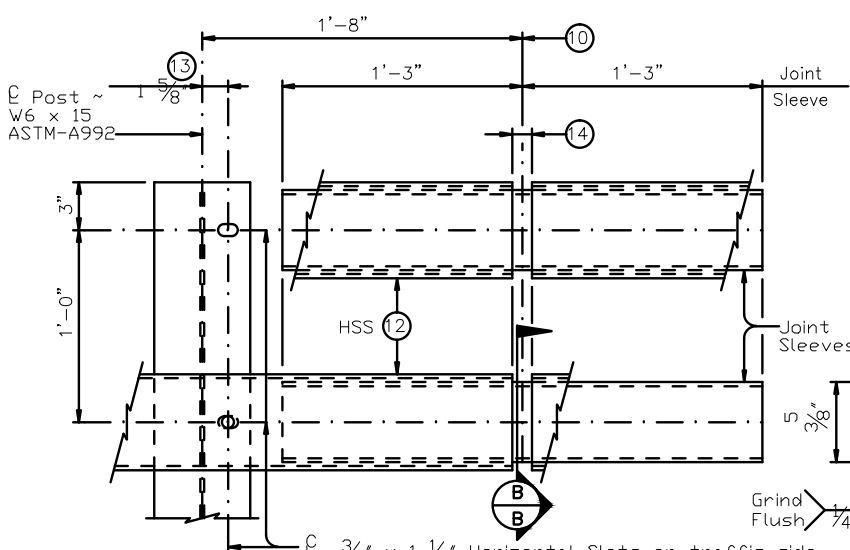


TYPICAL PLAN

EXAMPLE "B" RETROFIT WITH PERPENDICULAR WING

(Showing 9" high and 8" wide curbs, higher and wider curbs similar)

- 1 Post length = Top of rail elevation minus bottom of drilled shaft elevation.
- 2 Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach the appropriate Metal Beam Guard Fence Transitions or Downstream Anchor Terminal to the bridge rail using 3 bolts as shown, and extend along the embankment.
- 3 Top HSS can be shorter than bottom HSS 5/8" plus or minus.
- 4 Match existing bridge curb height.
- 5 Cast transition curb 1'-0" into soil or top of concrete approach slab. Remove any asphaltic concrete or mow strip if present.
- 6 Match existing bridge curb face on traffic side of transition curb. Transition curb 6" x 1'-6" taper will remain vertical.
- 7 Showing first post for a TL-3 rated guard fence transition. First post for a TL-2 rated guard fence transition or a guard fence downstream anchor terminal is 4'-4 3/4".
- 8 HSS Transition Sections must have one soil mounted end post embedded in an unreinforced, Class "C" concrete drilled shaft as shown, and a minimum of one curb mounted post per transition section.
- 9 HSS Panel Sections must have a minimum of three posts and a maximum of eight posts per panel section.
- 10 L HSS Expansion Joint or L HSS Splice Joint as required.
- 11 Use 9" minimum for both expansion joints and construction/controlled joints.
- 12 HSS 6 x 6 x 1/4 ASTM-A1085 or A500 Grade C.
- 13 May be placed on either side of W6 x 15 web.
- 14 Place HSS Expansion Joints in rail at every slab Expansion Joint. For Expansion and Splice Joints openings, use the greater of 1" or (slab opening plus 1/2").

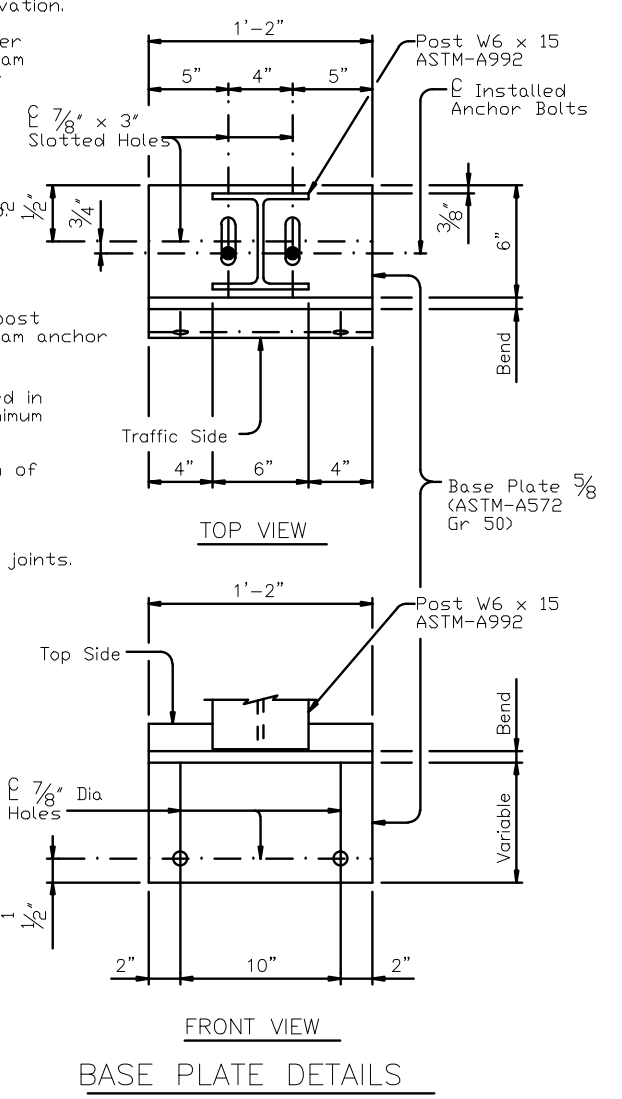


TYPICAL POST CONNECTION AND SPLICE DETAIL FOR HSS

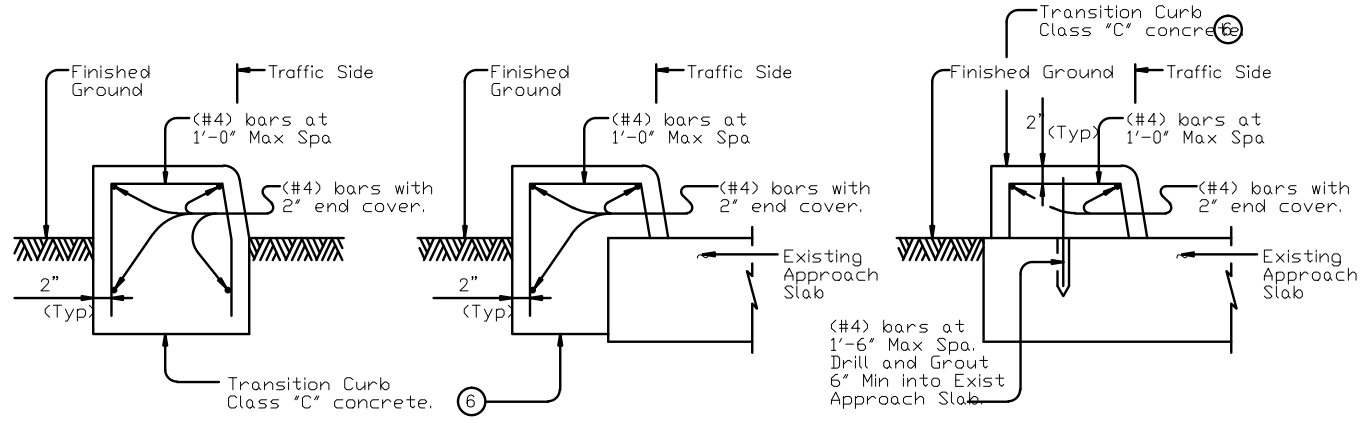
Showing post with HSS and HSS splice.

SECTION B-B

Showing typical joint sleeve.



BASE PLATE DETAILS



EXAMPLES OF TRANSITION CURB SECTIONS

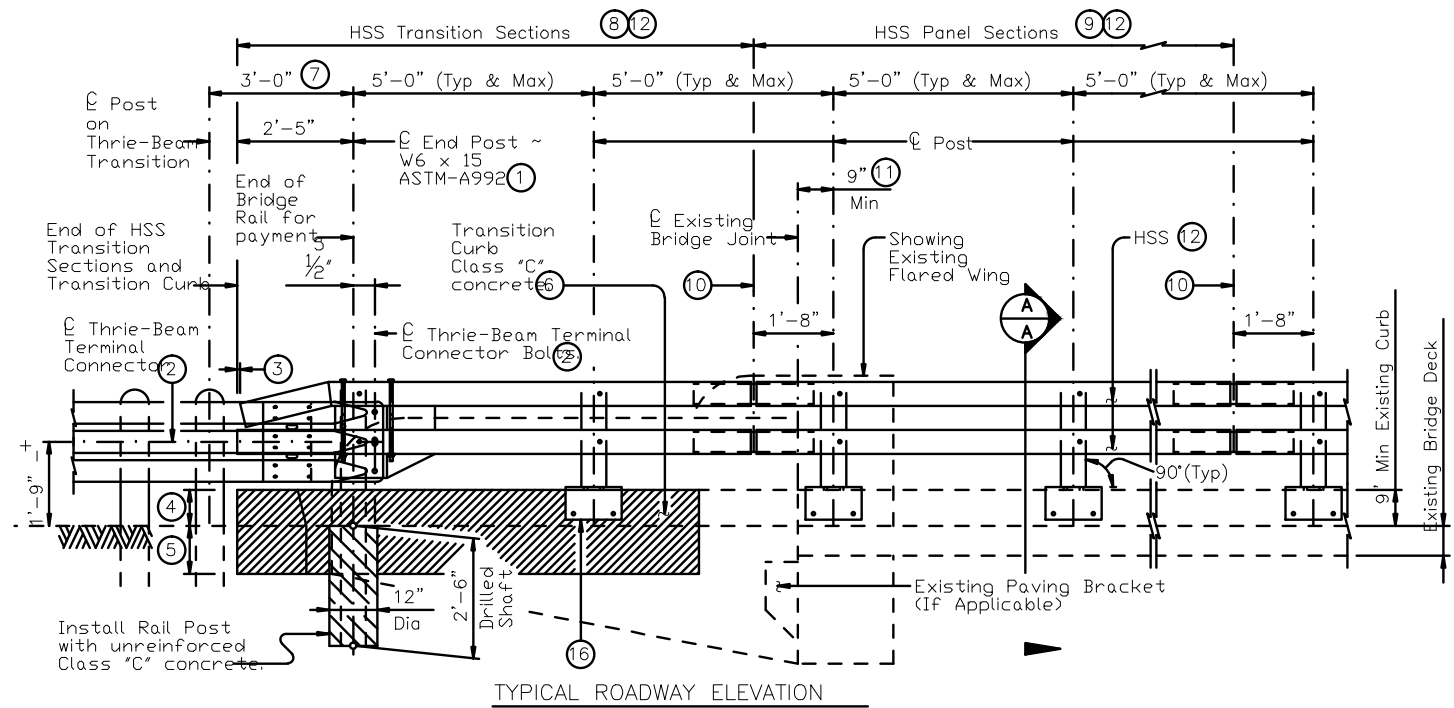


		<i>Bridge Division Standard</i>	
RETROFIT GUIDE FOR T131RC RAIL ON CURBS RABBIT CREEK BRIDGE FRITZ SWANSON ROAD TYPE T131RC (MOD)			
FILE: r1stds34.dgn	DN: TxDOT	CK: JMH	DW: JTR
©TxDOT July 2014	CONT	SECT	JOB
REVISIONS		HIGHWAY	
03-18: Revised Material Notes.	DIST	COUNTY	SHEET NO.
			C6.1

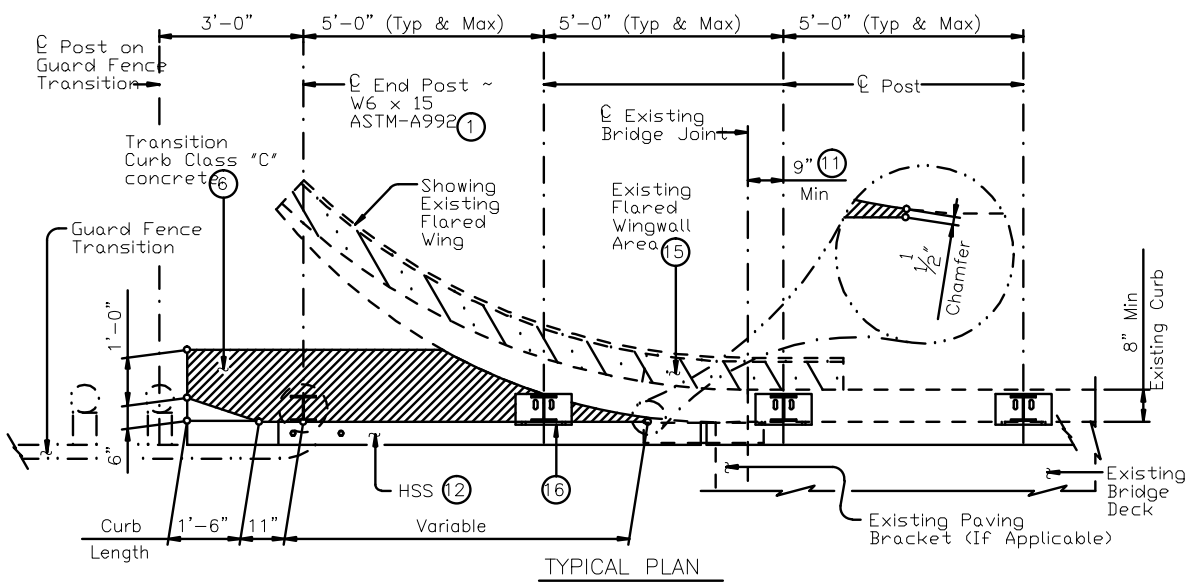
DATE: FILE:

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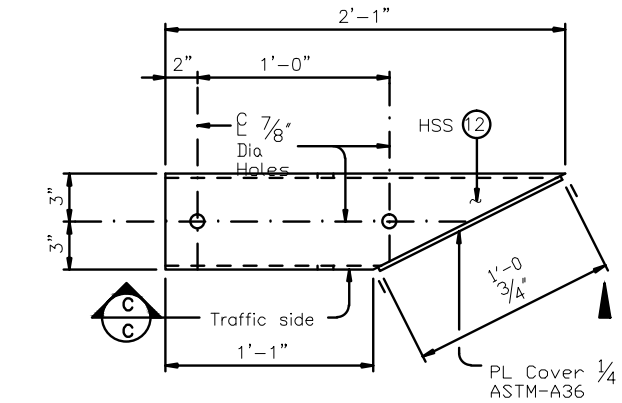
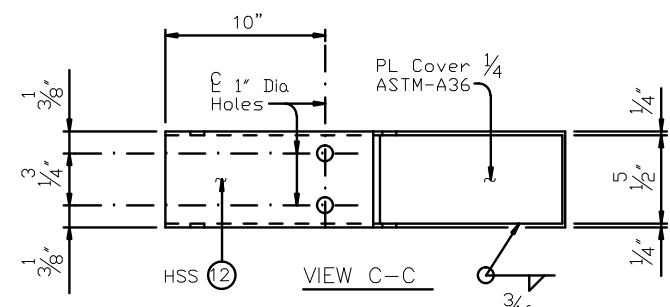
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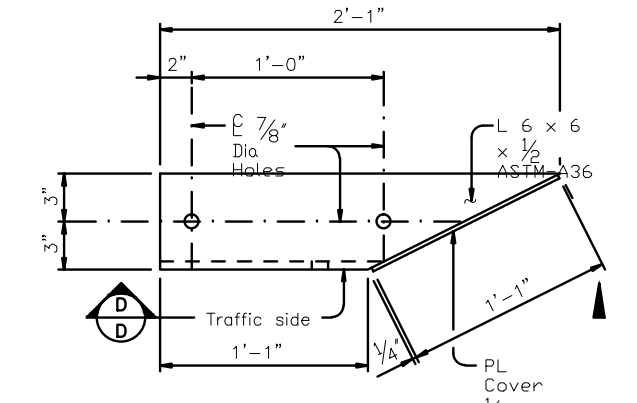
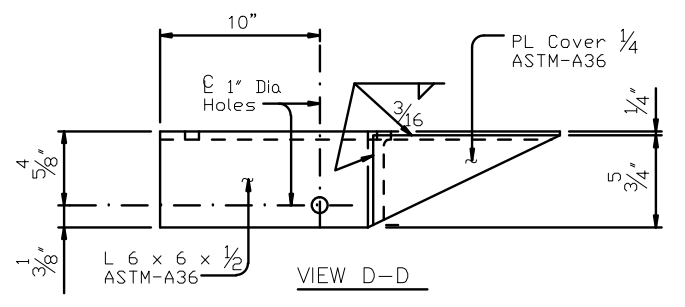
TYPICAL ROADWAY ELEVATION



EXAMPLE "C" RETROFIT WITH FLARED WING
(Showing 9" high and 8" wide curbs, higher and wider curbs similar)



HSS SHOE DETAILS



ANGLE SHOE DETAILS

Angle Shoe shown is detailed for one side only, other side similar. For other side shoe must be built for opposite hand.

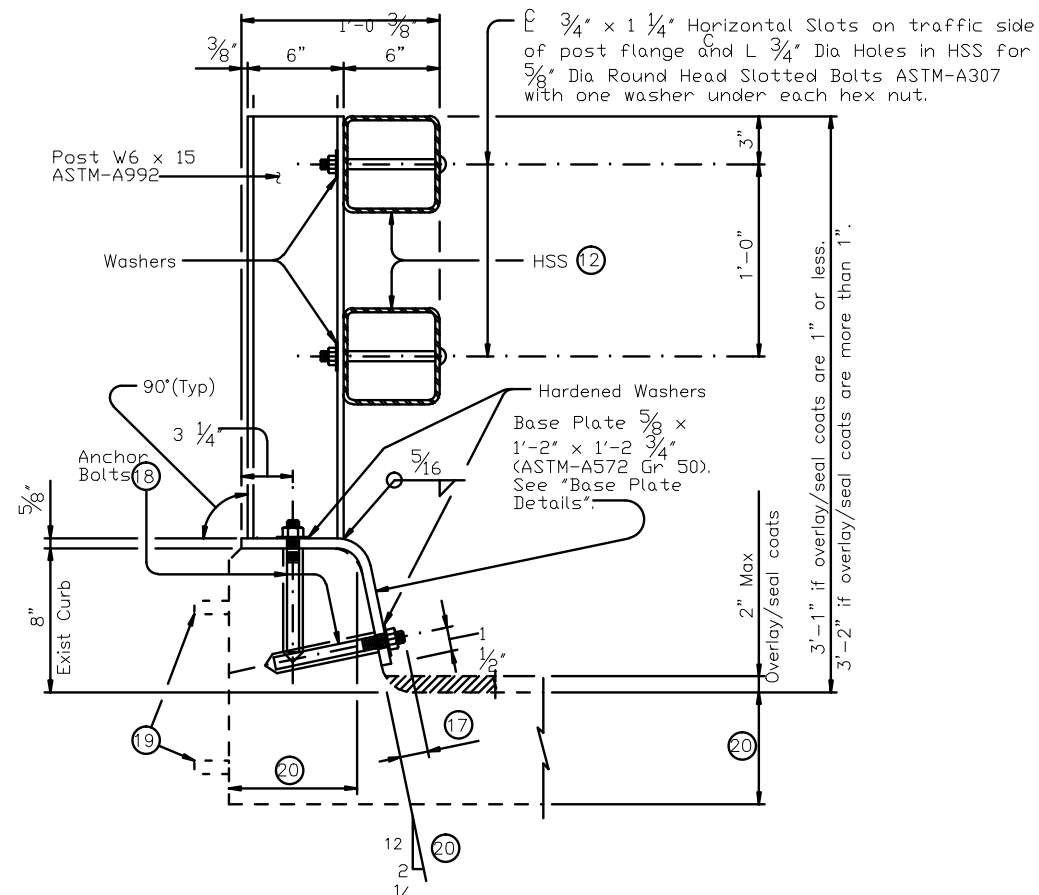
- ① Post length = Top of rail elevation minus bottom of drilled shaft elevation.
- ② Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". The appropriate Metal Beam Guard Fence Transitions or Downstream Anchor Terminal must be attached to the bridge rail and extended along the embankment.
- ③ Top HSS can be shorter than bottom HSS 5/8" plus or minus.
- ④ Match existing bridge curb height.
- ⑤ Cast transition curb 1'-0" into soil or top of concrete approach slab. Remove any asphaltic concrete or mow strip if present.
- ⑥ Match existing bridge curb face on traffic side of transition curb. Transition curb 6" x 1'-6" taper will remain vertical.
- ⑦ Showing first post for a TL-3 rated guard fence transition. First post for a TL-2 rated guard fence transition or a guard fence downstream anchor terminal is 4'-4 3/4".
- ⑧ HSS Transition Sections must have one soil mounted end post embedded in an unreinforced, Class "C" concrete drilled shaft as shown, and a minimum of one curb mounted post per transition section.
- ⑨ HSS Panel Sections must have a minimum of three posts and a maximum of eight posts per panel section.
- ⑩ ⌀ HSS Expansion Joint or ⌀ HSS Splice Joint as required.
- ⑪ Use 9" minimum for both expansion joints and construction/controlled joints.
- ⑫ HSS 6 x 6 x 1/4 ASTM-A1085 or A500 Grade C.
Remove all existing structure area from top of existing curb. Cut and grind flush all existing reinforcing extending from top of
- ⑬ existing curb and paint ends with two coats of zinc-rich paint conforming to the Item "Galvanizing".
- ⑭ Only one post can be mounted to the transition curb as shown and the transition curb must be supported laterally by the existing wingwall/curb when doing so.



SHEET 3 OF 4

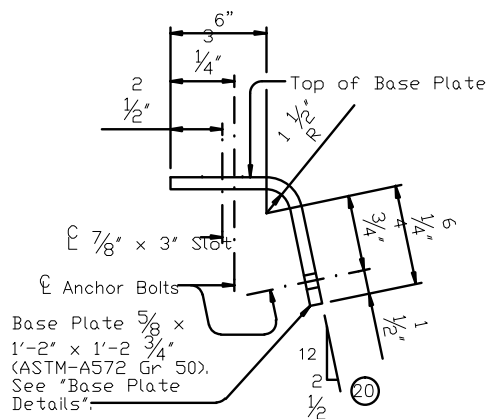
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RETROFIT GUIDE FOR T131RC RAIL ON CURBS RABBIT CREEK BRIDGE FRITZ SWANSON ROAD TYPE T131RC (MOD)			
FILE: r1stds34.dgn	DN: TxDOT	CK: JMH	DW: JTR
©TxDOT July 2014	CONT	SECT	JOB
REVISIONS		HIGHWAY	
05-18: Revised Material Notes.	DIST	COUNTY	SHEET NO.
			C6.2

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SECTION A-A OF 8" HIGH CURBS

(Showing example of 8" Min width curb, wider curbs similar)



9" HIGH CURB BASE PLATE DETAIL

- ⑫ HSS 6 x 6 x 1/4 ASTM-A1085 or A500 Grade C.
- ⑬ 1 3/4" Bolt Projection (Typ).
- ⑭ See "Material Notes" for anchor Bolt information.
- ⑮ Remove existing railing (including posts), cut and grind anchor bolts flush and paint ends with two coats of zinc-rich paint conforming to the Item "Galvanizing".
- ⑯ See elsewhere in plans for dimensions (curb width and height, slab and overlay thickness). Slope of curb may differ from what is shown. Adjust base plate as necessary to conform to curb face geometry.

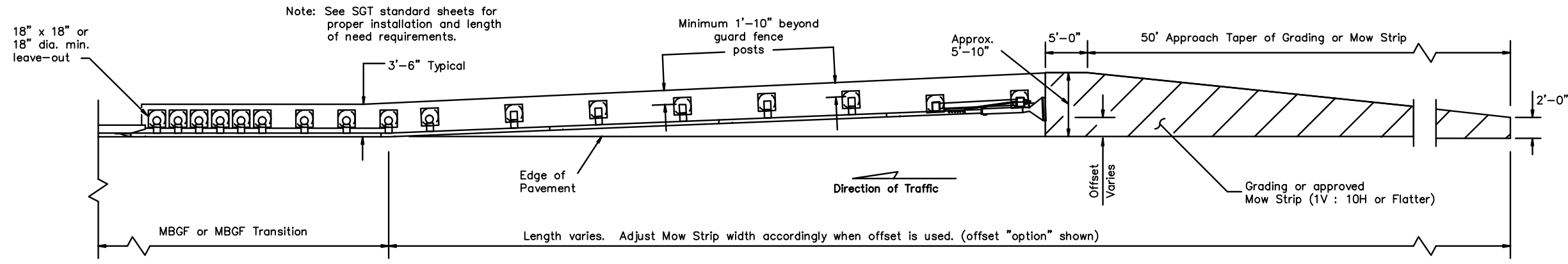


SHEET 4 OF 4

		Bridge Division Standard	
RETROFIT GUIDE FOR T131RC RAIL ON CURBS RABBIT CREEK BRIDGE FRITZ SWANSON ROAD TYPE T131RC (MOD)			
FILE: ristds34.dgn	DN: TxDOT	CK: JMH	DW: JTR
©TxDOT July 2014	CONT	SECT	JOB
REVISIONS			
03-18: Revised Material Notes.	DIST	COUNTY	SHEET NO.
			C6.3

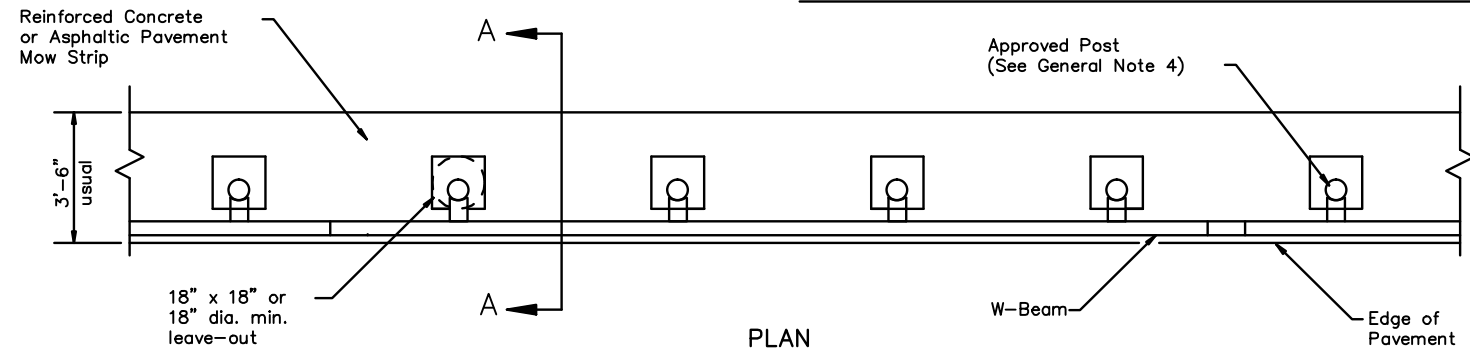
DATE:
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GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS

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.

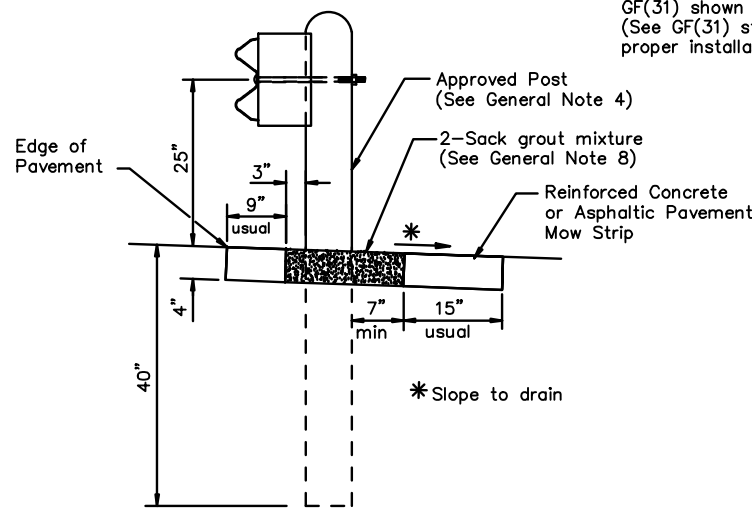


PLAN

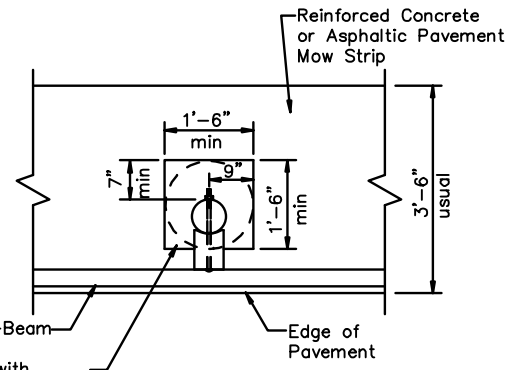
GF(31) shown with Mow Strip
 (See GF(31) standard sheet for proper installation)

GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments (See SGT standards for proper SGT installation).
2. Mow strips shall be asphaltic pavement or reinforced concrete (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Asphaltic pavement shall meet the requirements of the item, and be placed in accordance with the pertinent bid item as shown in the plans. 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. The type of approved post will be as shown in the plans. See the applicable standard sheets for additional details and information.
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 asphaltic pavement or reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with no more than a 2-sack grout mixture and placed in accordance with Section 421.2.F, "Mortar and Grout." Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of asphaltic pavement or reinforced concrete.

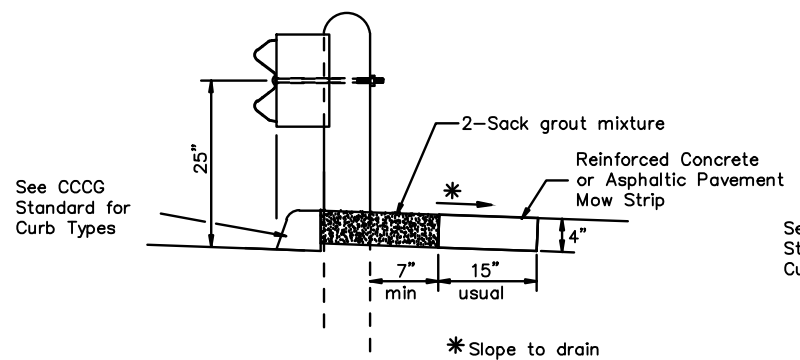


SECTION A-A
 Typical



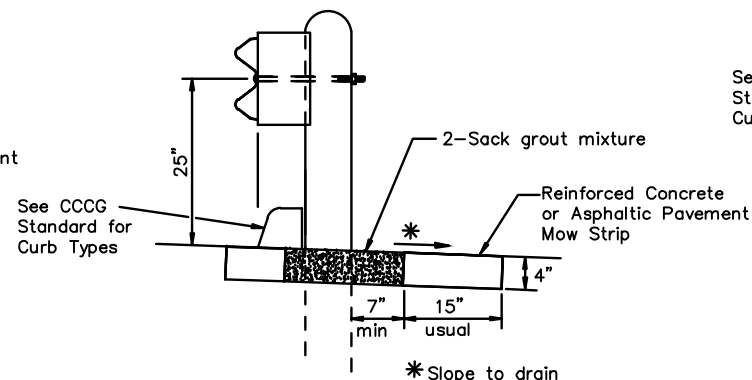
MOW STRIP DETAIL

Reinforced Concrete or Asphaltic Pavement Mow Strip with 18" x 18" or 18" dia. minimum leave-out.



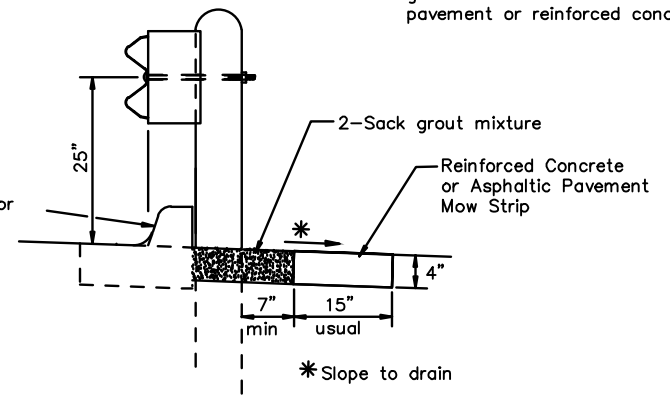
CURB OPTION (1)

This option will increase the post embedment through out the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

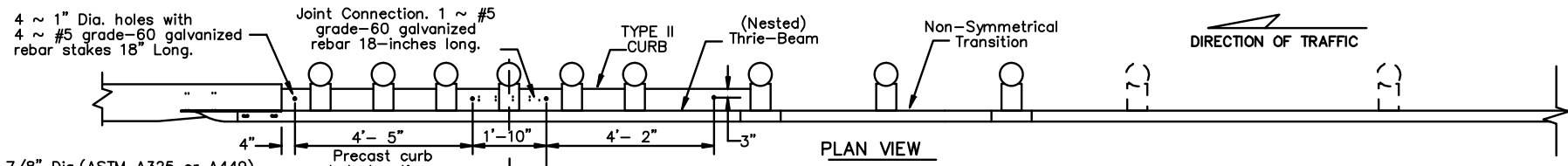


METAL BEAM GUARD FENCE (MOW STRIP)
 GF(31)MS-11

FILE: gf31ms11.dgn	DWG: TxDOT	CHK: AM	DWG: BD	CHK:
©TxDOT December 2011	CONT:	SECT:	JOB:	HIGHWAY:
REVISIONS		DIST:	COUNTY:	SHEET NO.:
				7

DATE:
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4 ~ 1" Dia. holes with 4 ~ #5 grade-60 galvanized rebar stakes 18" Long.

Joint Connection. 1 ~ #5 grade-60 galvanized rebar 18-inches long.

TYPE II CURB (Nested) Thrie-Beam

Non-Symmetrical Transition

DIRECTION OF TRAFFIC

5 ~ 7/8" Dia. (ASTM A325 or A449) Heavy Hex Head Bolts, with two 1 3/4" O.D. washers under each head and nut. Bolts shall be of sufficient length to extend through the full thickness of the rail, washer, and nut. Install with bolt heads on traffic face.

18'-9" Metal Beam Guard Fence Transition (EA)

6'-3" Non-Symmetrical Transition to W-Beam

End payment for Metal Beam Guard Fence Transition. Begin payment for Metal Beam Guard Fence. (See GF(31) Standard Sheet) Showing Direct Connection to GF(31)

5 Spaces at 18 3/4" 7'-0" Long Post (All Types)

3 Spaces 3'-1 1/2" 6'-0" Long Post (All Types)

3'-1 1/2" 6'-3"

7 1/4" 11 1/2" 2'-6" ±2"

MBGF

1'-9"

Chamfer required on concrete rails that extend beyond the face of the curb and/or guardrail transition.

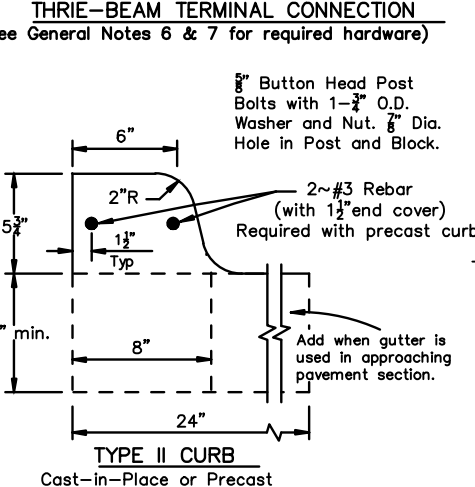
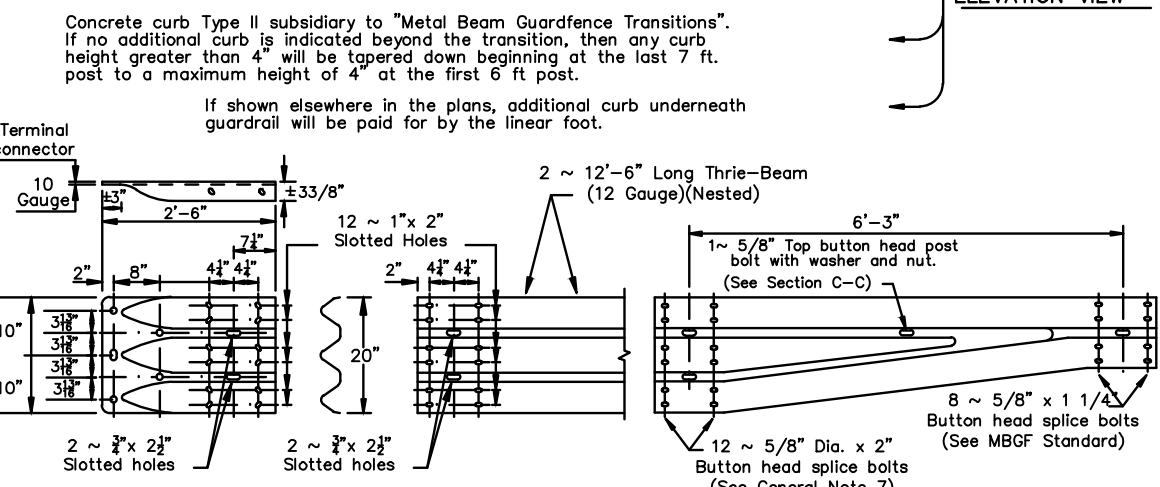
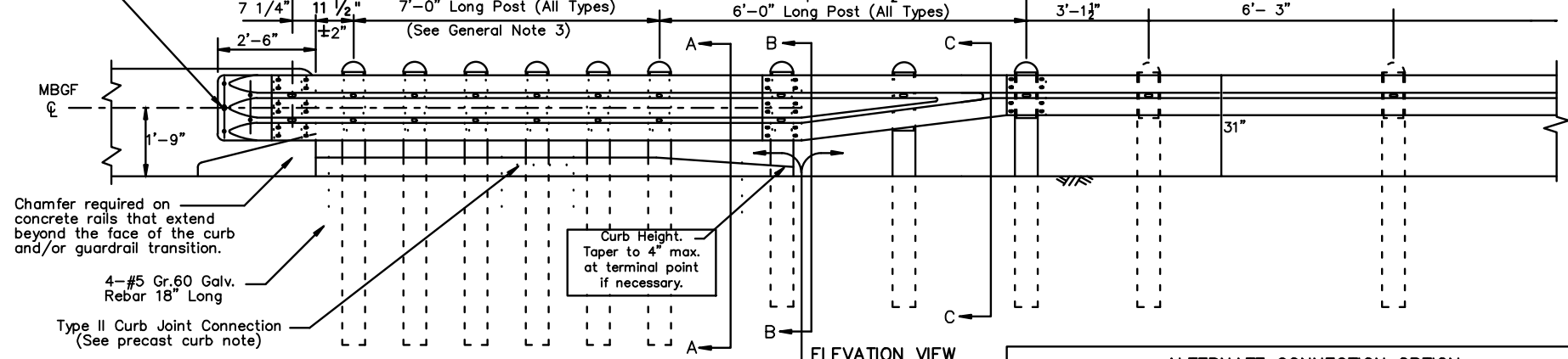
4-#5 Gr.60 Galv. Rebar 18" Long

Type II Curb Joint Connection (See precast curb note)

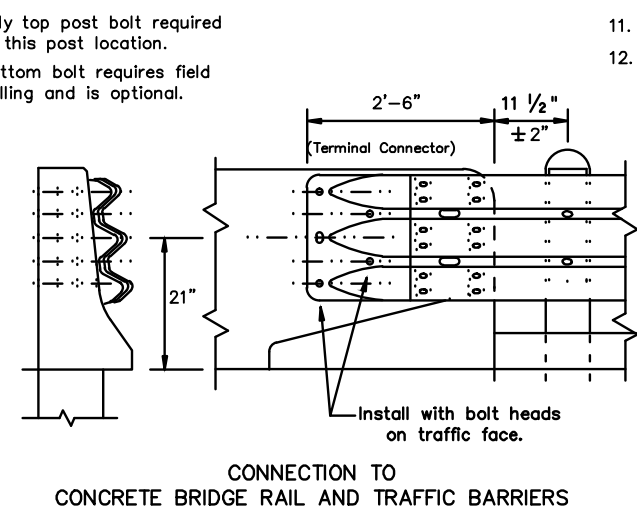
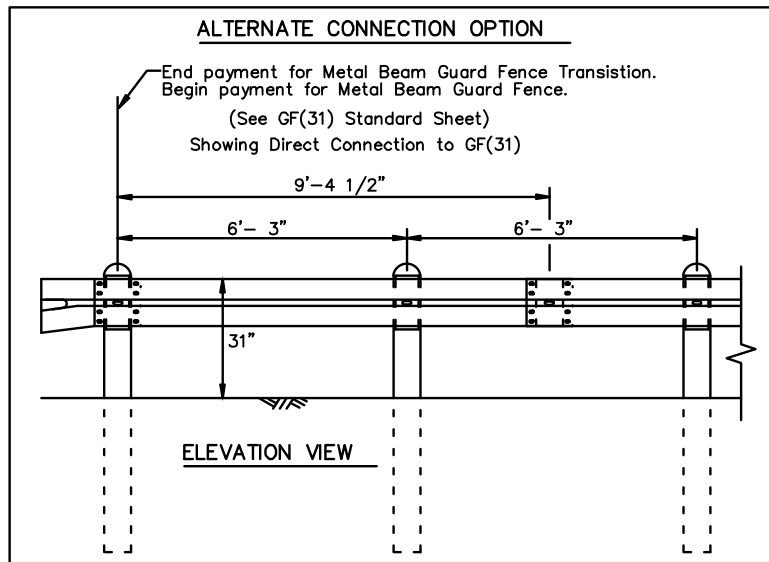
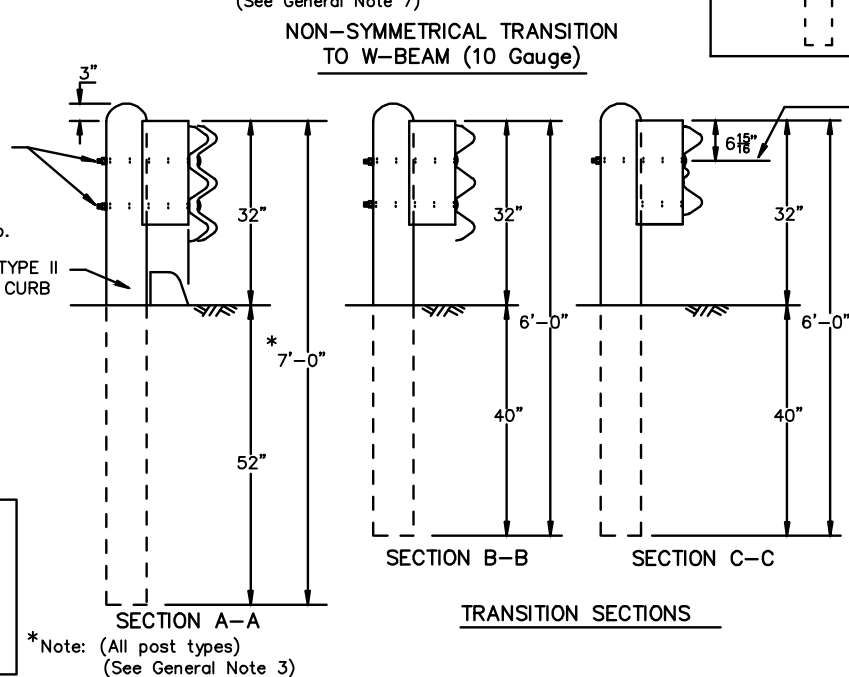
Concrete curb Type II subsidiary to "Metal Beam Guard Fence Transitions". If no additional curb is indicated beyond the transition, then any curb height greater than 4" will be tapered down beginning at the last 7 ft. post to a maximum height of 4" at the first 6 ft post.

If shown elsewhere in the plans, additional curb underneath guardrail will be paid for by the linear foot.

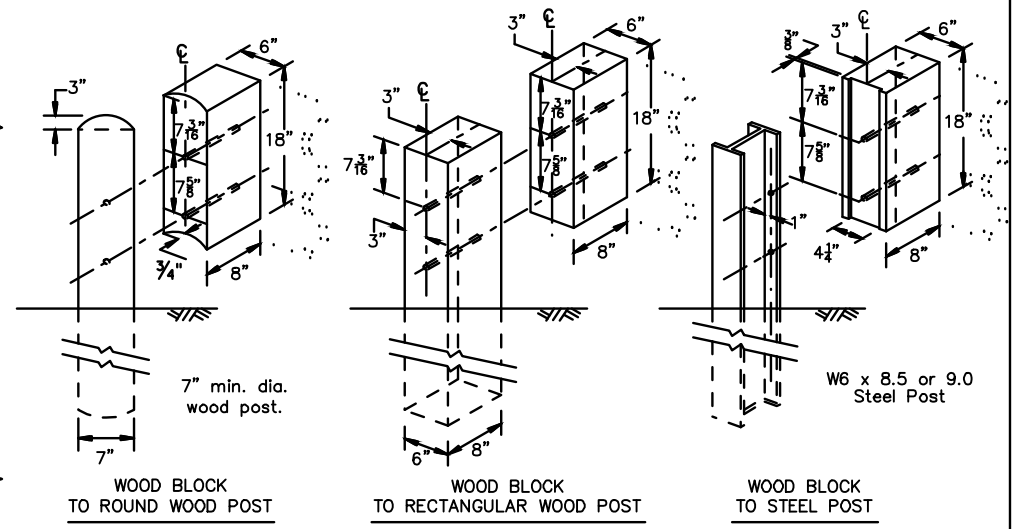
Curb Height. Taper to 4" max. at terminal point if necessary.



PRECAST CURB: Type II Precast Curb secured with 4-#5 Gr.60 Galv. Rebar stakes 18" long. The 12'-2" section of curb may be cast in two sections. Section 1 5'-8" long Section 2 6'-6" long with the last 3'-6" of curb tapered to a 4" height. The Joint Connection is two 9" long 1" Dia. female ends connected with 1-#5 Gr.60 Galv. Rebar 18" long.



(12) Galvanized rectangular washers (FWR03) are required under the recessed nut at the terminal connector splice to nested thrie-beam. (See General Notes 6 & 7).



- GENERAL NOTES**
- Concrete curb may be cast-in-place or precast as shown on this sheet. When used in conjunction with thrie-beam guard fence transitions, curb shall be Type II (Typically 5 3/4" height above surface; See CCCG standard sheet) unless otherwise shown in the plans. 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.
 - Contact the Design Division for drainage cut options needed within the curb section of the transition.
 - The type of post (round wood post, rectangular wood post or steel post) will be as shown in the plans.
 - 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.
 - Rail element 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.
 - Unless otherwise shown in the plans, transitions shall be placed with the block face in front of or directly above the curb face.
 - Galvanized washers used with the 5/8" dia. post bolts shall be Type A 1 3/4" O.D. washers. The (12) plate washers (FWR03) required at the terminal connector splice.
 - Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) 5/8" Dia. x 2" (at triple rail splices) with 5/8" double recessed 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 transitions.
 - If solid rock is encountered. See the MBGF standard sheet for the proper installation guidance.
 - Posts shall not be set in concrete.
 - 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.

Texas Department of Transportation

Design Division Standard

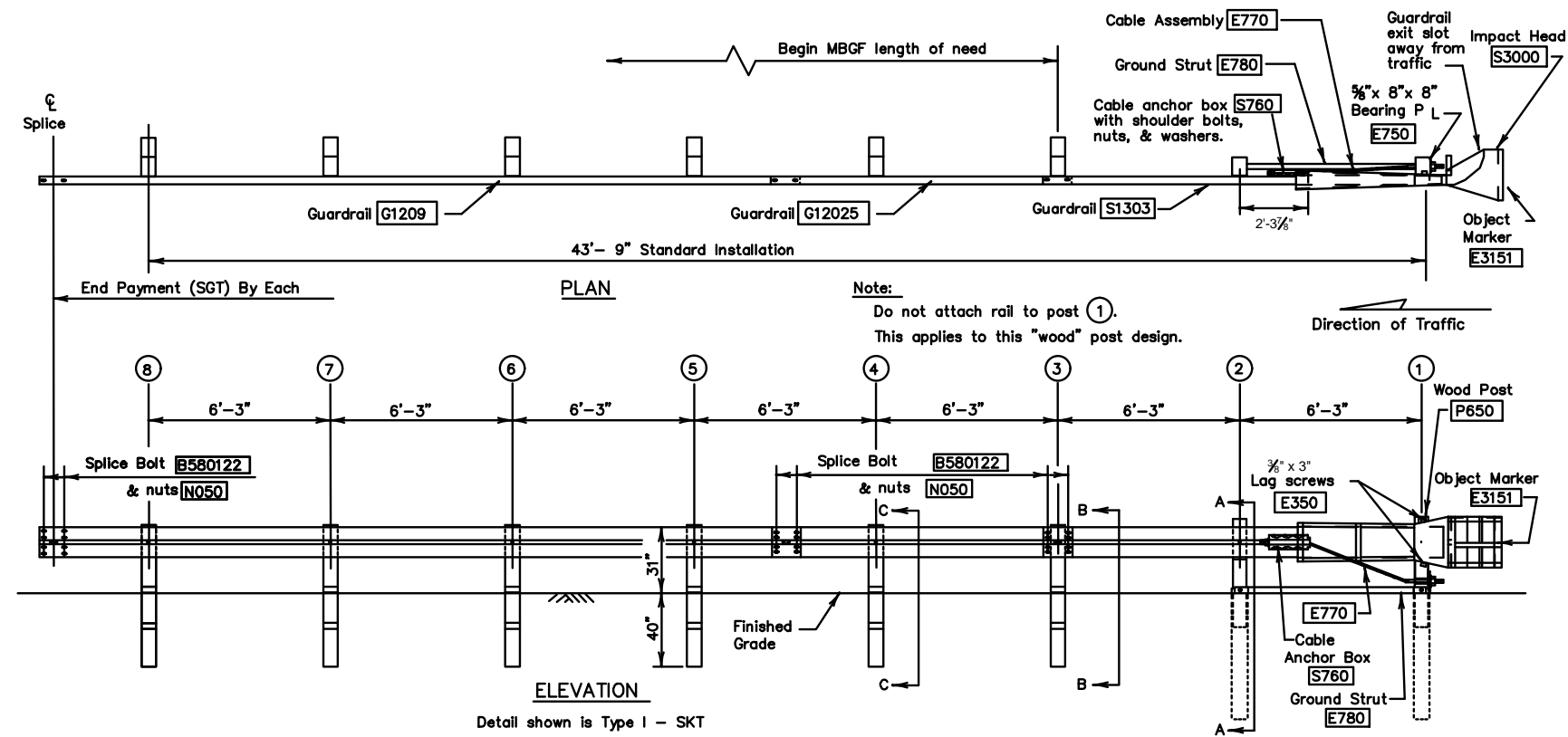
METAL BEAM GUARD FENCE TRANSITION (Thrie-Beam Transition) GF(31)TR-14

FILE: gf31tr14.dgn	DWG: TxDOT	CHK: AM	DWG: VP	CHK: CGL
©TxDOT: December 2011	CONT: SECT	JOB	HIGHWAY	
REVISIONS		DIST	COUNTY	SHEET NO.
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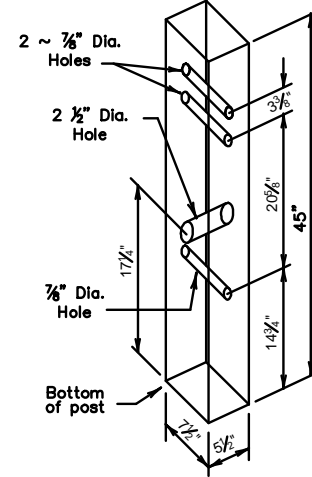
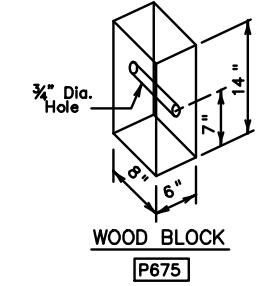
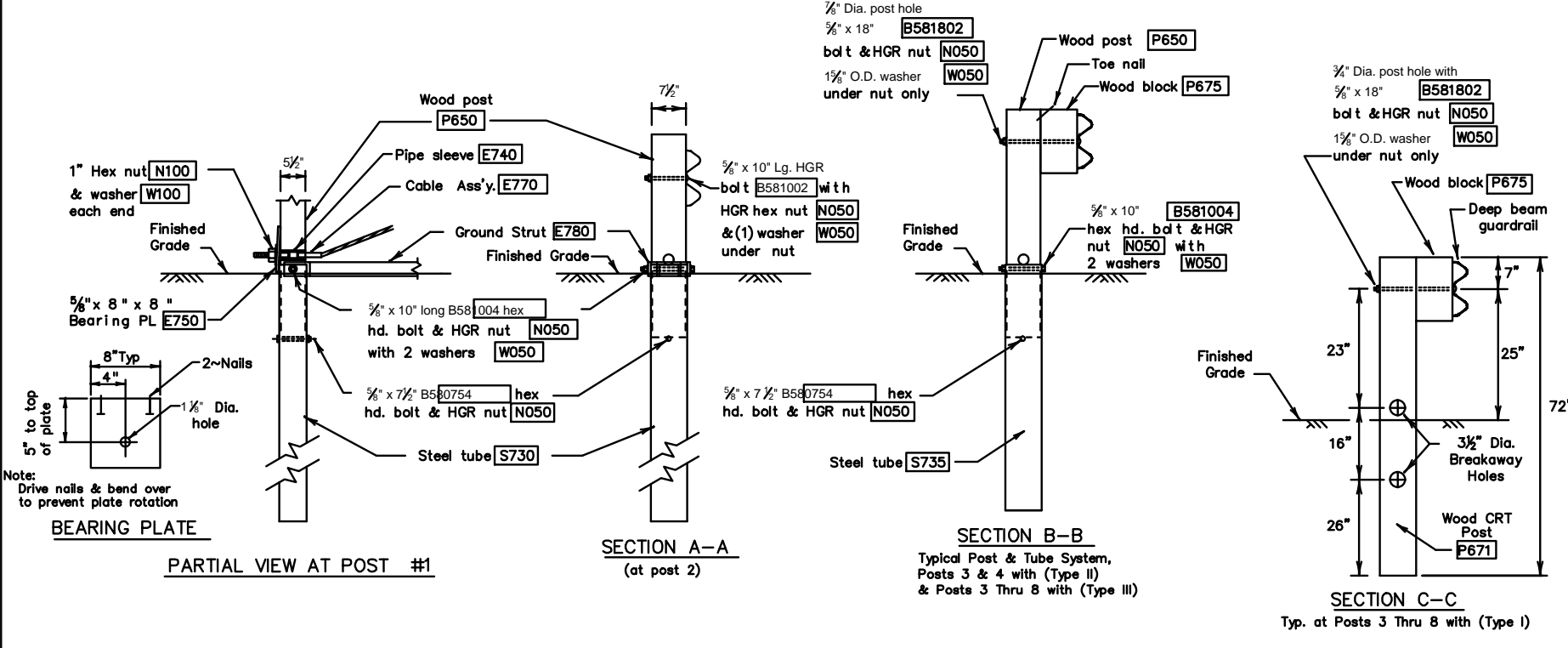
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- GENERAL NOTES**
- For additional information contact: Interstate Steel Inc. (432) 263-3735
 - The Type of SGT unit will be specified elsewhere in the plans. The numbers in the circles indicate post position. The Type of SGT unit chosen is a maintenance consideration and does not affect the systems performance.

Post & Tube Options		Post Only	
Type I Posts	1 thru 2	Type II Posts	1 thru 8
Type II Posts	3 thru 8	Type III Posts	1 thru 8
Type III Posts	1 thru 8		None
 - 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.
 - 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 soil 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 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&OM(VIA).

Detail shown is Type I - SKT

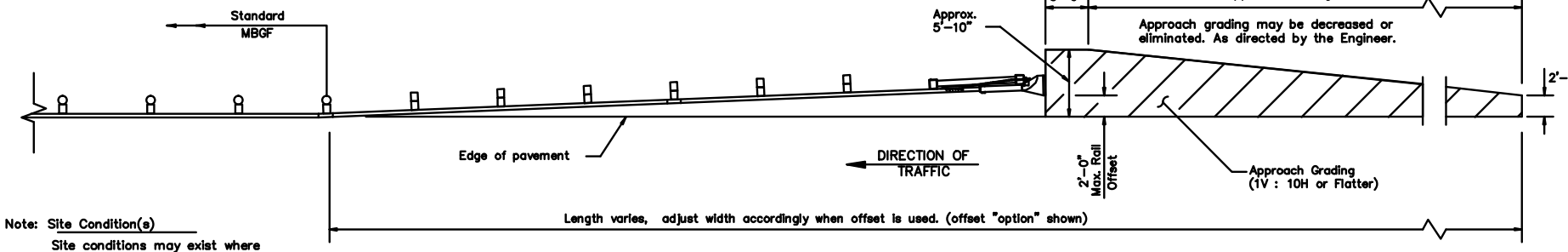


All measurements should be taken from bottom of posts.

UNIVERSAL WOOD POST (P650)

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

Item #	POST & TUBE OPTIONS			DESCRIPTION
	Type I	Type II	Type III	
S1303	1	1	1	Guardrail (12 Ga.) 12'- 6" SKT
G12025	1	1	1	Guardrail (12 Ga.) 9'- 4 1/2"
G1209	1	1	1	Guardrail (12 Ga.) 25'- 0"
S730	2	2	2	Steel Tube - 6" x 8" x 72" x 1/8" min. or 3/16"
S735	0	2	6	Steel Tube - 6" x 8" x 54" x 1/8" min. or 3/16"
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 - 1/2" x 8" x 8"
S760	1	1	1	Cable Anchor Box
E770	1	1	1	Cable Assembly
E780	1	1	1	Ground Strut
S3000	1	1	1	Impact Head
HARDWARE				
B580754	2	4	8	5/8" x 7 1/2" Hex Hd. Bolt
B581004	2	4	8	5/8" x 10" Hex Hd. Bolt (Top of Tubes)
W050	11	15	23	3/8" Washers
B581002	1	1	1	5/8" x 10" HGR Post Bolt (Post 2)
B580122	16	16	16	1/2" x 1 1/2" HGR Splice Bolt
B581802	6	6	6	5/8" x 18" HGR Post Bolt (Posts 3 thru 8)
N050	35	39	47	3/4" HGR Nut (24-Spl, Varies-Posts, 2-Strut)
E350	2	2	2	3/4" x 3" Lag Screw
N100	2	2	2	1" Hex Nut (Anchor Cable)
W100	2	2	2	1" Washer (Anchor Cable)
SB12A	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 18")



APPROACH GRADING AT GUARDRAIL END TREATMENTS

Design Division Standard

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

FILE: sgt83114.dgn	DN: TxDOT	CR: AM	DW: BD/VP	CR: VP
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REVISIONS				
DIST	COUNTY			SHEET NO.
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SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

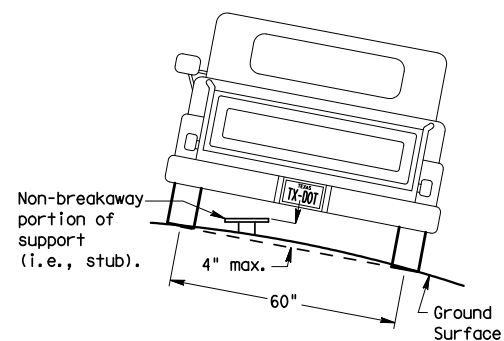
Post Type
 FRP = Fiberglass Reinforced Plastic Pipe (see SMD (FRP))
 TWT = Thin-Walled Tubing (see SMD (TWT))
 10BWG = 10 BWG Tubing (see SMD (SLIP-1) to (SLIP-3))
 S80 = Schedule 80 Pipe (see SMD (SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

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

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

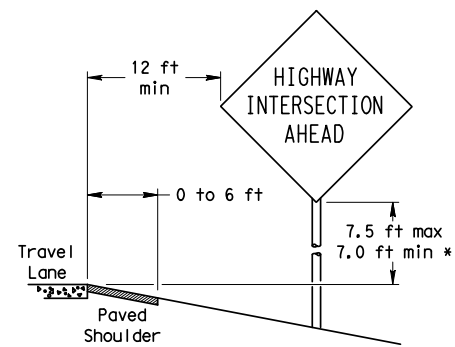
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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).

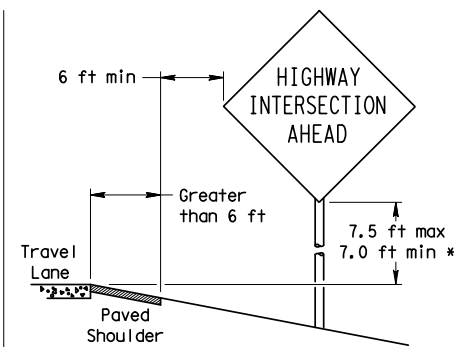
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

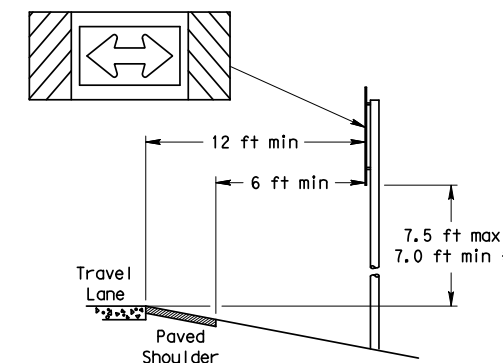
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



GREATER THAN 6 FT. WIDE

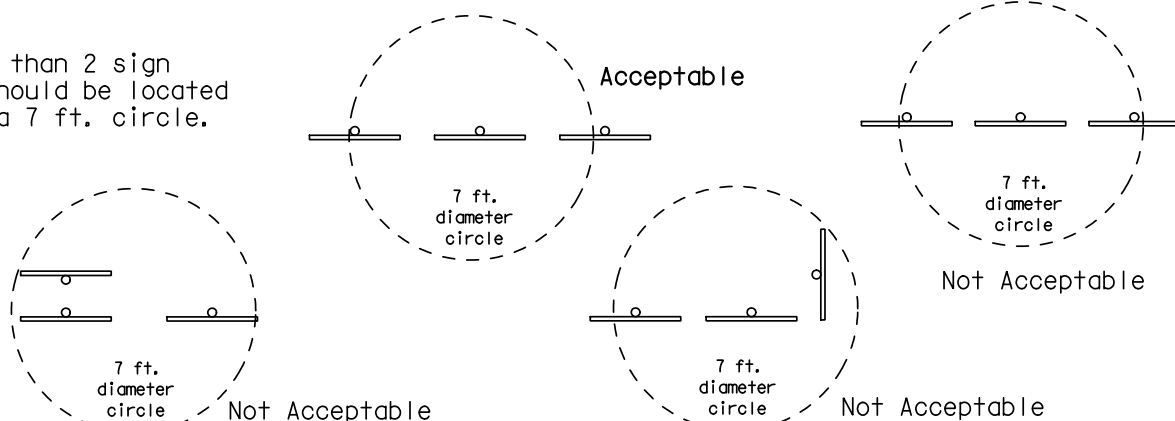
When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

T-INTERSECTION

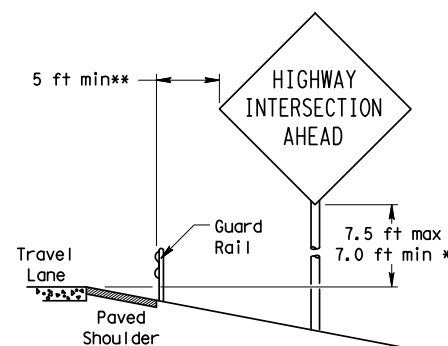


When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.

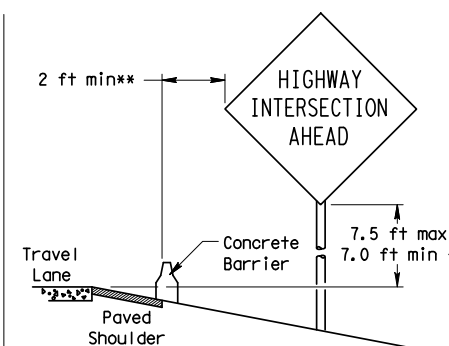
No more than 2 sign posts should be located within a 7 ft. circle.



BEHIND BARRIER

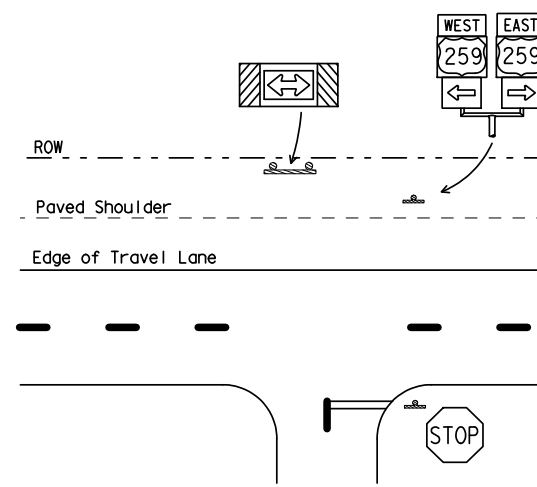


BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

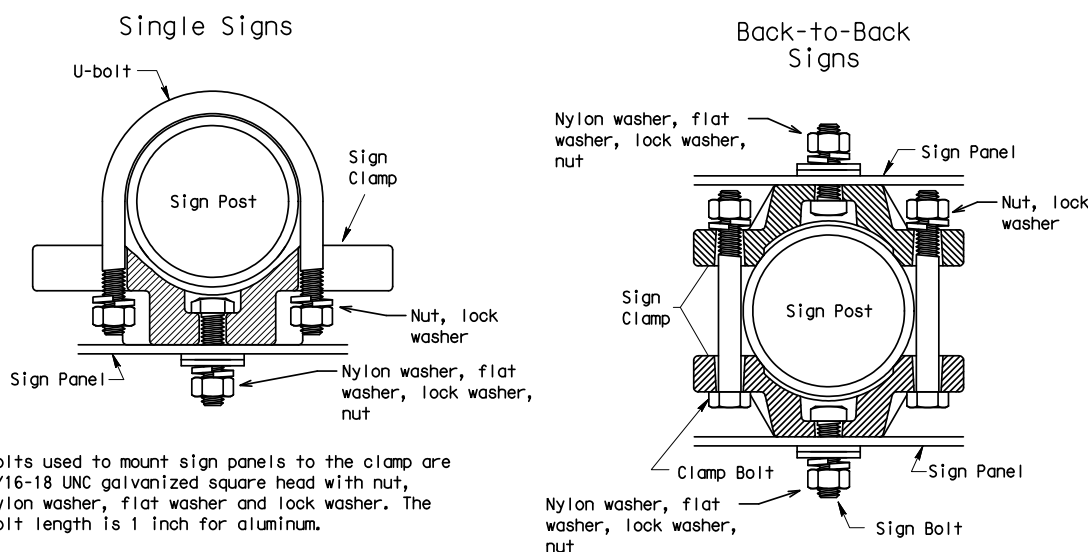
- (1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or
- (2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

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

TYPICAL SIGN ATTACHMENT DETAIL



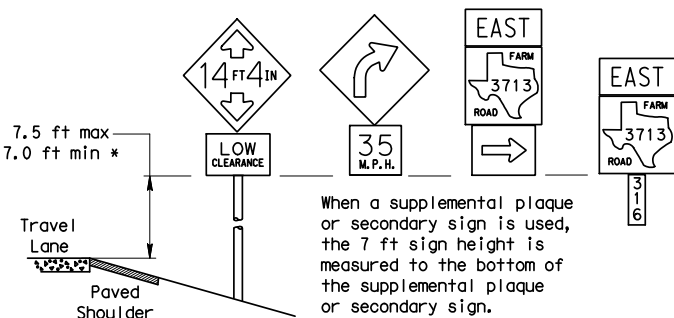
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

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

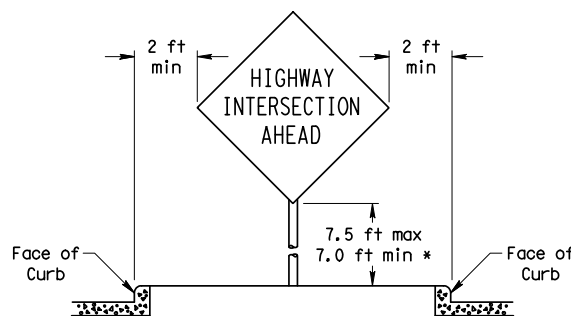
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES

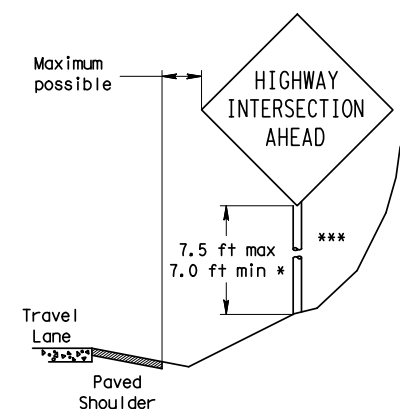


When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY (When 6 ft min. is not possible.)



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

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

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

Texas Department of Transportation
 Traffic Operations Division

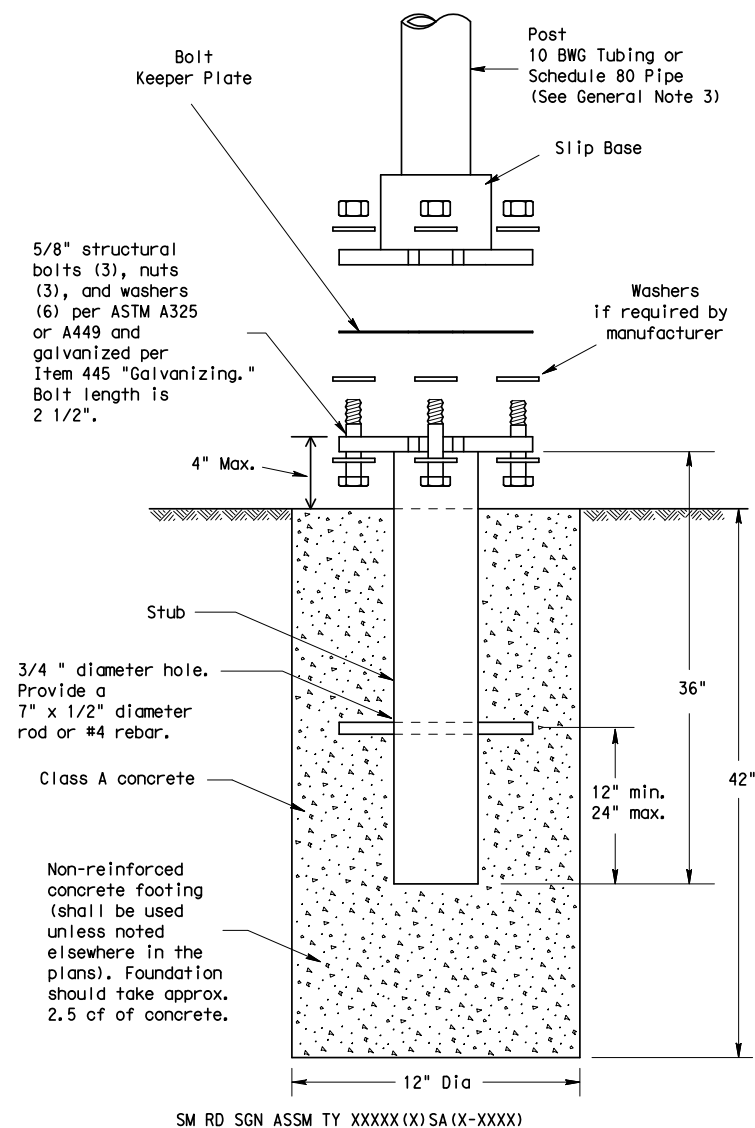
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD (GEN) -08

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TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

- Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
- Material used as post with this system shall conform to the following specifications:
 - 10 BWG Tubing (2.875" outside diameter)
 - 0.134" nominal wall thickness
 - Seamless or electric-resistance welded steel tubing or pipe
 - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
 - Other steels may be used if they meet the following:
 - 55,000 PSI minimum yield strength
 - 70,000 PSI minimum tensile strength
 - 20% minimum elongation in 2"
 - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
 - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
 - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
 - Schedule 80 Pipe (2.875" outside diameter)
 - 0.276" nominal wall thickness
 - Steel tubing per ASTM A500 Gr C
 - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
 - 46,000 PSI minimum yield strength
 - 62,000 PSI minimum tensile strength
 - 21% minimum elongation in 2"
 - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
 - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
 - Galvanization per ASTM A123
- See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: <http://www.txdot.gov/publications/traffic.htm>
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

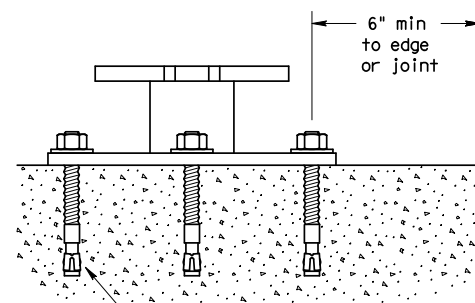
Foundation

- Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
- The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
- Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
- Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
- The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support

- Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
- Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



5/8" diameter Concrete Anchor - 8 places (embed a minimum of 5 1/2" and torque to min. of 50 ft-lbs). Anchor may be expansion or adhesive type.

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Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxyes and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

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**SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM**

SMD(SLIP-1)-08

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