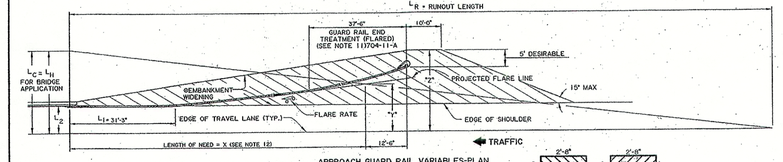
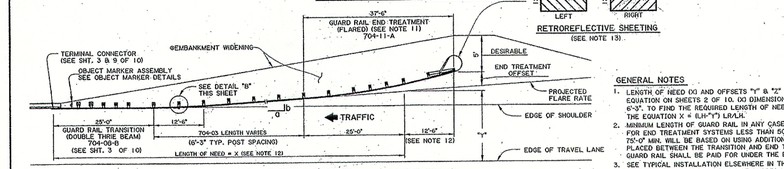
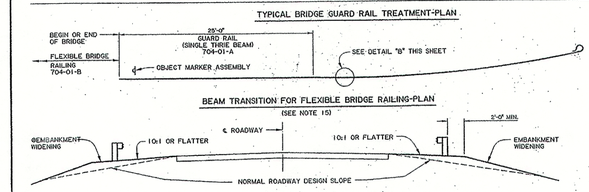


APPROACH GUARD RAIL VARIABLES-PLAN

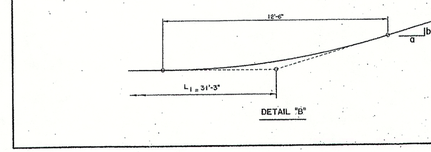


TYPICAL BRIDGE GUARD RAIL TREATMENT-PLAN



BEAM TRANSITION FOR FLEXIBLE BRIDGE RAILING-PLAN (SEE NOTE 15)

TYPICAL EMBANKMENT WIDENING SECTION (SEE NOTE 4)



GUARD RAIL PAY ITEMS.

704-01-A	GUARD RAIL (SINGLE THRIE BEAM) (3'-1 1/2" POST SPA.)
704-01-B	GUARD RAIL (SINGLE THRIE BEAM) (6'-3" POST SPA.)
704-01-C	GUARD RAIL (DOUBLE THRIE BEAM) (3'-1½" POST SPA.)
704-01-D	GUARD RAIL (DOUBLE THRIE BEAM) (6'-3" POST SPA.)
704-03	BLOCKED OUT GUARD RAIL
704-05	GUARD RAIL ANCHOR SECTIONS (BCT)
704-06	GUARD RAIL ANCHOR SECTIONS (TRAILING END)
704-06-A	GUARD RAIL ANCHOR SECTIONS (TRAILING END) (SINGLE THRIE BEAM)
704-07-A	GUARD RAIL BRIDGE ATTACHMENTS (SINGLE THRIE BEAM)
704-08-B	GUARD RAIL TRANSITIONS (DOUBLE THRIE BEAM)
704-11-A	GUARD RAIL END TREATMENT (FLARED)
704-11-B	GUARD RAIL END TREATMENT (TANGENT)
704-11-C	GUARD RAIL END TREATMENT (DI-DIRECTIONAL)
S-ITEM	PIER PROTECTION SYSTEM
S-ITEM	SPECIAL ANCHOR SECTION

GENERAL NOTES

1. LENGTH OF NEED (X) AND OFFSETS "Y" & "Z" SHALL BE COMPUTED IN ACCORDANCE WITH THE EQUATION ON SHEETS 2 OF 10. (X) DIMENSIONS TO BE USED SHALL BE A MULTIPLE OF 6'-3". TO FIND THE REQUIRED LENGTH OF NEED (X) WHEN OFFSET "Y" HAS TO BE SET, USE THE EQUATION X = 6.4(Y-"Y") L1/(Y-"Y").
2. MINIMUM LENGTH OF GUARD RAIL IN ANY CASE SHALL BE 75'-0" (LENGTH OF NEED X= 62'-6"), FOR END TREATMENT SYSTEMS LESS THAN 50'-0", THE REMAINING LENGTH TO MEET THE 75'-0" MIN. WILL BE BASED ON USING ADDITIONAL W-BEAM BLOCKED OUT GUARD RAIL 704-03 PLACED BETWEEN THE TRANSITION AND END TREATMENT. THE COST OF ADDITIONAL W-BEAM GUARD RAIL SHALL BE PAID FOR UNDER THE END TREATMENT PAY ITEM.
3. SEE TYPICAL INSTALLATION ELSEWHERE IN THESE PLANS.
4. GUARDRAIL WIDENING TO PROVIDE SLOPES NOT STEEPER THAN 10:1 IS REQUIRED TO MAINTAIN PROPER RAIL TO VEHICLES POSITION. WIDENING MAY BE ACCOMPLISHED AS DETERMINED BY THE DESIGNER OR PROJECT ENGINEER.
5. SEE OPPOSING TRAFFIC GUARD RAIL REQUIREMENTS ON SHEET 2 OF 10 FOR METHOD OF CALCULATING LENGTH OF NEED (X) AND OFFSET (Y) OF RAIL LEFT SIDE WHEN TRAFFIC IS TWO WAY.
6. PAY ITEMS FOR ALL GUARD RAIL COMPONENTS ARE TO BE IN ACCORDANCE WITH LAYOUT DETAILS AND/OR QUANTITY TABLES FURNISHED WITH PROJECT PLANS. GUARD RAIL PAY ITEMS SHALL INCLUDE ALL MATERIALS, LABOR AND EQUIPMENT REQUIRED TO COMPLETE THE GUARD RAIL INSTALLATION AS SHOWN ON THE PLANS.
7. LONGITUDINAL DIMENSIONS FOR GUARD RAIL ARE MEASURED ALONG THE FACE OF RAILING
8. THE QUANTITY FOR THE EMBANKMENT WIDENING AT BRIDGE ENDS IS INCLUDED IN THE EMBANKMENT QUANTITY OF THE ROADWAY.
9. FOR BRIDGES WITH GUARD RAILS IN URBAN AREAS WITH DESIGN SPEED OF 45 mph OR LESS, SEE DOTD EDSM NO. II. 3.1.4 FOR DESIGN INFORMATION.
10. FOR GUARD RAIL INFORMATION FOR EXISTING HIGHWAYS, SEE DOTD EDSM No. II. 3.1.3 FOR DESIGN INFORMATION.
11. A TANGENT END TREATMENT (704-11-B) MAY BE USED AS AN ALTERNATE TO THE FLARED END TREATMENT. A ZERO END TREATMENT OFFSET AND A ZERO FLARE RATE (704-11-C) MAY BE USED AS AN ALTERNATE. WHEN A ZERO END TREATMENT OFFSET IS USED AND THE LENGTH OF NEED "X" SHALL BE CALCULATED BASED ON A "ZERO" FLARE RATE.
12. THE PIER PROTECTION WITHIN THE GUARD RAIL TREATMENT WHERE LENGTH OF NEED TERMINATES MAY VARY WITH EACH TYPE OF GUARD RAIL END TREATMENT. THE 12'-6" LENGTH APPLIES TO MOST END TREATMENTS. HOWEVER, REGARDLESS OF THE TYPE OF END TREATMENT USED, THIS POINT SHALL BE LOCATED AT THE SAME STATION ON THE ROADWAY.
13. THE RETROREFLECTIVE ADHESIVE SHEETING (12" X 2"-8") (TYPE II HIGH INTENSITY OBJECT MARKER PATTERN) SHALL BE APPLIED TO NOSE AFTER CURVE. SEE SECTION 1015 OF THE LATEST L.A. STD. SPECS. FOR ROADS AND BRIDGES FOR SPECIFICATIONS AND THE SHEETING MANUFACTURERS RECOMMENDATIONS FOR INSTALLATION. (NO DIRECT PAY). FOR PATTERN DETAIL, SEE OBJECT MARKER DETAILS.
14. UNLESS OTHERWISE NOTED, ALL GUARD RAIL COMPONENTS SHALL CONFORM TO THE REQUIREMENTS OF THE AASHTO-AGC-ARTBA JOINT COOPERATIVE COMMITTEE, "A GUIDE TO STANDARDIZED HIGHWAY BARRIER RAIL HARDWARE", CURRENT EDITION.
15. 704-01-A IS USED IN LIEU OF 704-08-B FOR BRIDGES WITH FLEXIBLE BRIDGE RAILING (REINFORCED CONCRETE BRIDGE RAILING IS CONSIDERED TO BE RIGID.)
16. GUARD RAIL INSTALLATIONS MAY BE PAVED BY USING INCIDENTAL CONCRETE (4"THICK) (706-03-A) OR 4" MIN. ASPHALTIC CONCRETE. THE INCIDENTAL CONCRETE OR ASPHALT WILL BE USED IF A LAYOUT DETAIL, PAY ITEM AND QUANTITY IS INDICATED IN THE PLANS. SEE SHEET 10 FOR REQUIRED POST DETAILS WHEN PAVING IS USED AROUND POSTS.

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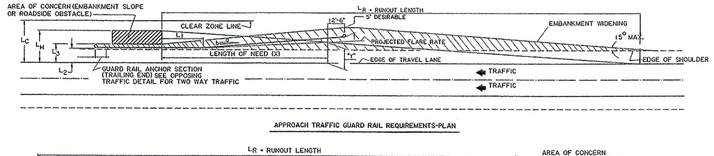
11-2-06

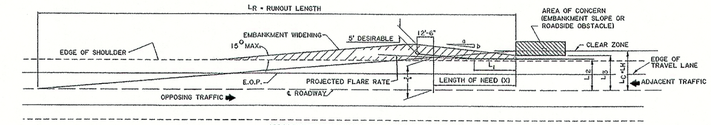
HIGHWAY GUARD RAILS BRIDGE APPLICATION

GR-200

BRIDGE AND STRUCTURAL DESIGN



APPROACH TRAFFIC GUARD RAIL REQUIREMENTS-PLAN



OPPOSING TRAFFIC GUARD RAIL REQUIREMENTS-PLAN

NOTES:

1. ON TWO-WAY TRAFFIC "Y" IS MEASURED FROM THE ℄ OF THE ROADWAY TO THE GUARD RAIL FOR THE OPPOSITE TRAFFIC. THEREFORE, "Y" FOR GUARD RAIL ON THE RIGHT SIDE OF A BRIDGE WITH TWO-WAY TRAFFIC IS MEASURED TO THE CENTERLINE OF THE ROADWAY.
2. EQUATIONS FOR COMPUTING LENGTH OF NEED (X) AND OFFSETS (Y&Z). (ALL DIMENSIONS ARE IN FEET)

$$X = L_3 + \left(\frac{L_2}{L_1}\right)(L_1 - L_2) \qquad \text{"Y"} = L_H - \left(\frac{L_H}{L_R}\right)(X)$$

$$\left(\frac{L_2}{L_1}\right) = \frac{L_H}{L_R} \qquad \text{"Z"} = \text{"Y"} + \frac{9}{8}(12.5') + 9'$$

L_1 = LENGTH OF TANGENT SECTION OF RAIL IN ADVANCE OF HAZARD.

L_2 = DISTANCE FROM EDGE OF TRAVEL LANE TO TANGENT SECTION OF RAIL.

L_3 = DISTANCE FROM EDGE OF TRAVEL LANE TO OBSTACLE. IF $L_3 > L_C$ NO GUARD RAIL IS REQUIRED FOR ONCOMING TRAFFIC.

L_R = RUNOUT LENGTH

L_C = REQUIRED CLEAR ZONE (TABLE 1)

L_H = IS THE DISTANCE FROM THE EDGE OF THE TRAVELED WAY (EOP) TO THE LATERAL EXTENT OF THE HAZARD.

$L_H = L_C$ FOR BRIDGE APPLICATION, EXCEPT IN SPECIAL CASES SEE SHEET 1 OF 10 FOR DETAILS.

#3. FLARE RATES SHOWN FOR BARRIERS INSIDE THE SHY LINE ARE DESIRABLE RATES AND MAY BE WAIVED IF THE GUARD RAIL LENGTH BECOMES TOO LONG FOR A GIVEN SITUATION.

#4. SEE SHT. NO. 5 OF 10 FOR FORMULAS FOR COMPUTING GUARD RAIL IN A CURVE.

5. FOR FURTHER INFORMATION CONCERNING TABLES 1-4, REFERENCE LATEST EDITION OF AASHTO ROADSIDE DESIGN GUIDE.

TABLE 1
CLEAR ZONE DISTANCE (L_C)
(IN FEET FROM EDGE OF TRAVELED LANE)

SPEED (MPH)	DESIGN ADT	⊕ FORESLOPE 6:1 OR FLATTER	5:1 TO 4:1	⊕ BACKSLOPE 3:1	4:1 TO 5:1	6:1 OR FLATTER
40 OR LESS	UNDER 750	7 - 10	7 - 10	7 - 10	7 - 10	7 - 10
	750-1500	10 - 12	12 - 14	10 - 12	10 - 12	10 - 12
	1500-6000	12 - 14	14 - 16	12 - 14	12 - 14	12 - 14
	OVER 6000	14 - 16	16 - 18	14 - 16	14 - 16	14 - 16
45 TO 50	UNDER 750	10 - 12	12 - 14	8 - 10	8 - 10	10 - 12
	750-1500	12 - 14	16 - 20	10 - 12	12 - 14	14 - 16
	1500-6000	16 - 18	20 - 26	12 - 14	14 - 16	16 - 18
	OVER 6000	18 - 20	24 - 28	14 - 16	18 - 20	20 - 22
55	UNDER 750	12 - 14	14 - 18	8 - 10	10 - 12	10 - 12
	750-1500	16 - 18	20 - 24	10 - 12	14 - 16	16 - 18
	1500-6000	20 - 22	24 - 30	14 - 16	16 - 18	20 - 22
	OVER 6000	22 - 24	*26 - 32	16 - 18	20 - 22	22 - 24
60	UNDER 750	16 - 18	20 - 24	10 - 12	12 - 14	14 - 16
	750-1500	20 - 24	*26 - 32	12 - 14	16 - 18	20 - 22
	1500-6000	26 - 30	*32 - 40	14 - 18	18 - 22	24 - 26
	OVER 6000	*30 - 32	*36 - 44	20 - 22	24 - 26	26 - 28
65 TO 70	UNDER 750	18 - 20	20 - 26	10 - 12	14 - 16	14 - 16
	750-1500	24 - 26	*28 - 36	12 - 16	18 - 20	20 - 22
	1500-6000	*28 - 32	*34 - 42	16 - 20	22 - 24	24 - 28
	OVER 6000	*30 - 34	*38 - 48	22 - 24	26 - 30	28 - 30

* WHERE A SITES SPECIFIC INVESTIGATION INDICATES A HIGH PROBABILITY OF CONTINUING ACCIDENTS OR HIGH OCCURRENCES ARE INDICATED BY ACCIDENT HISTORY, THE DESIGNER MAY PROVIDE CLEAR ZONE DISTANCES GREATER THAN SHOWN IN TABLE 1. CLEAR ZONES MAY BE LIMITED TO 30 FEET FOR PRACTICALITY AND TO PROVIDE A CONSISTENT ROADWAY TEMPLATE. PREVIOUS EXPERIENCE WITH SIMILAR PROJECTS OR DESIGNS INDICATES SATISFACTORY PERFORMANCE.

⊕ BACKSLOPE MAY ALSO BE REFERRED TO AS A CUT SLOPE AND FORESLOPE AS A FILL SLOPE.

TABLE 2
⊕HORIZONTAL CURVE ADJUSTMENTS
$CZ_C = L_C(RF_{CZ})$

WHERE:
CZ_C = CLEAR ZONE ON OUTSIDE OF CURVATURE, FEET
L_C = CLEAR ZONE ON TANGENT SECTION, FEET (TABLE 1)
RF_{CZ} = CURVE CORRECTION FACTOR

RADIUS (FT)	K_{CZ} = CURVE CORRECTION FACTOR — DESIGN SPEED (MPH) 40	45	50	55	60	65	70
2860	1.1	1.1	1.1	1.2	1.2	1.2	1.3
2250	1.1	1.1	1.2	1.2	1.2	1.3	1.3
1910	1.1	1.2	1.2	1.2	1.3	1.3	1.4
1640	1.1	1.2	1.2	1.3	1.3	1.4	1.5
1430	1.2	1.2	1.3	1.3	1.4	1.4	
1270	1.2	1.2	1.3	1.3	1.4	1.5	
1150	1.2	1.2	1.3	1.4	1.5		
950	1.2	1.3	1.4	1.5	1.5		
820	1.3	1.3	1.4	1.5			
720	1.3	1.4	1.5				
640	1.3	1.4	1.5				
570	1.4	1.5					
380	1.5						

TABLE 3
L_R = RUNOUT LENGTH

DESIGN SPEED (MPH)	DESIGN TRAFFIC VOLUME (ADT) OVER 6000 VPD — RUNOUT LENGTH L_R (FT.)	2000-6000 VPD — RUNOUT LENGTH L_R (FT.)	800-2000 VPD — RUNOUT LENGTH L_R (FT.)	UNDER 800 VPD — RUNOUT LENGTH L_R (FT.)
70	475	440	395	360
60	425	400	345	320
55	360	345	315	280
50	330	300	260	245
45	260	245	215	200
40	230	200	180	165
30	165	165	150	130

TABLE 4
SHYLINE OFFSET & FLARE RATES

DESIGN SPEED (MPH)	L_S SHYLINE OFFSET (FT.)	#MAXIMUM FLARE RATE (a:b) FOR BARRIER INSIDE SHYLINE — RIGID BARRIERS	⊡ SEMI-RIGID BARRIERS ⊡	MAXIMUM FLARE RATE (a:b) FOR BARRIER BEYOND SHYLINE — RIGID BARRIERS	⊡ SEMI-RIGID BARRIERS ⊡
70	9.2	30:1		20:1	15:1
60	7.9	26:1		18:1	14:1
55	7.2	24:1		16:1	12:1
50	6.6	21:1		14:1	11:1
45	5.6	18:1		12:1	10:1
40	4.6	16:1		10:1	8:1
30	3.6	13:1		8:1	7:1

⊡ SUCH AS CONCRETE BARRIER UNITS
⊡ SUCH AS W BEAM OR THRIE BEAM GUARD RAIL SYSTEMS

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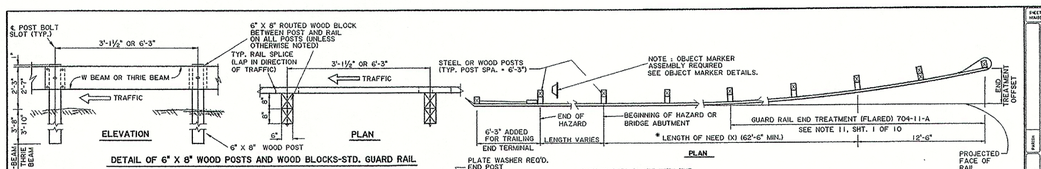
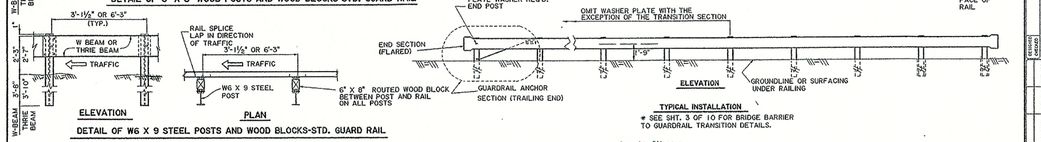
11-6-06

HIGHWAY GUARD RAILS GUARD RAIL TABLES AND LAYOUTS

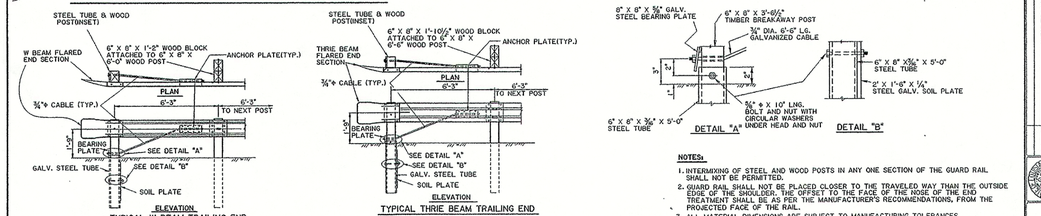
GR-200

BRIDGE AND STRUCTURAL DESIGN



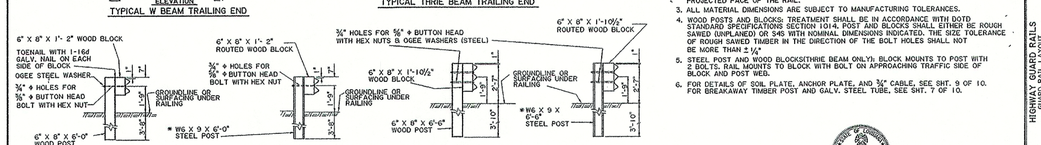


TYPICAL INSTALLATION
* SEE SHT. 3 OF 10 FOR BRIDGE BARRIER TO GUARDRAIL TRANSITION DETAILS.



NOTES:

1. INTERMIXING OF STEEL AND WOOD POSTS IN ANY ONE SECTION OF THE GUARD RAIL SHALL NOT BE PERMITTED.
2. GUARD RAIL SHALL NOT BE PLACED CLOSER TO THE TRAVELED WAY THAN THE OUTSIDE EDGE OF THE SHOULDER. THE OFFSET TO THE FACE OF THE HOSE OF THE END TREATMENT SHALL BE AS PER THE MANUFACTURER'S RECOMMENDATIONS, FROM THE PROJECTED FACE OF THE RAIL.
3. ALL MATERIAL DIMENSIONS ARE SUBJECT TO MANUFACTURING TOLERANCES.
4. WOOD POSTS AND BLOCKS: TREATMENT SHALL BE IN ACCORDANCE WITH DOTD STANDARD SPECIFICATIONS SECTION 1014. POST AND BLOCKS SHALL EITHER BE ROUGH SAWED (UNPLANED) OR S4S WITH NOMINAL DIMENSIONS INDICATED. THE SIZE TOLERANCE OF ROUGH SAWED TIMBER IN THE DIRECTION OF THE BOLT HOLES SHALL NOT BE MORE THAN ± ¼".
5. STEEL POST AND WOOD BLOCKS(THRIE BEAM ONLY): BLOCK MOUNTS TO POST WITH 2 BOLTS. RAIL MOUNTS TO BLOCK WITH BOLT ON APPROACHING TRAFFIC SIDE OF BLOCK AND POST WEB.
6. FOR DETAILS OF SOIL PLATE, ANCHOR PLATE, AND ¾" CABLE, SEE SHT. 9 OF 10. FOR BREAKAWAY TIMBER POST AND GALV. STEEL TUBE, SEE SHT. 7 OF 10.



*W6x8.5 MAY BE USED AS AN ALTERNATE

*W6x8.5 MAY BE USED AS AN ALTERNATE FOR STEEL POST ATTACHED TO CONCRETE, SEE SHT. 10 OF 10.

STANDARD W-BEAM & THRIE BEAM GUARDRAIL SECTIONS

(FOR BRIDGE CONCRETE BARRIER TO GUARDRAIL TRANSITION DETAILS, SEE SHEET 3 OF 10)

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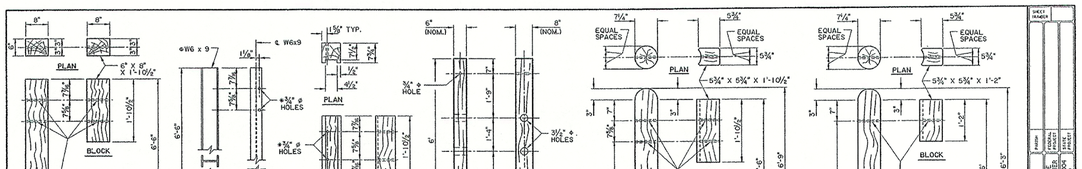
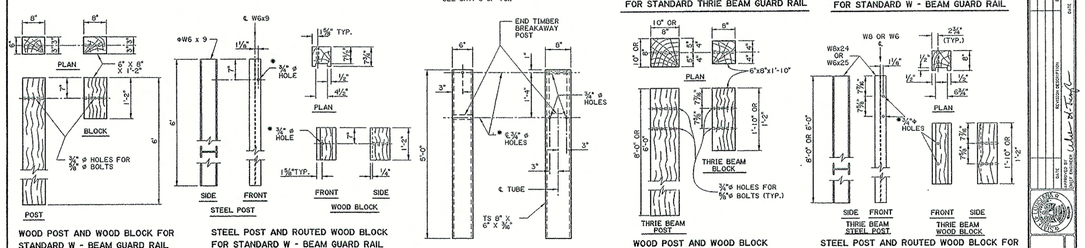
11-6-06

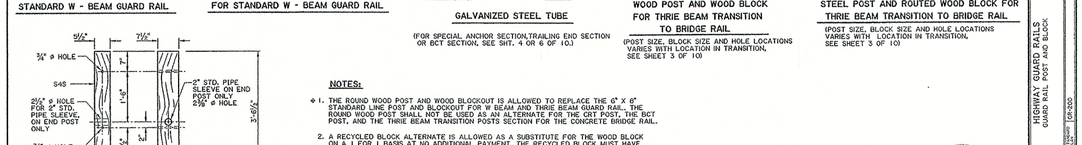
HIGHWAY GUARD RAILS GUARD RAIL DETAIL AND SECTIONS

GR-200

BRIDGE AND STRUCTURAL DESIGN







NOTES:

* 1. THE ROUND WOOD POST AND WOOD BLOCKOUT IS ALLOWED TO REPLACE THE 6" X 8" STANDARD LINE POST AND BLOCKOUT FOR W BEAM AND THRIE BEAM GUARD RAIL. THE ROUND WOOD POST SHALL NOT BE USED AS AN ALTERNATE FOR THE CRT POST, THE BCT POST, AND THE THRIE BEAM TRANSITION POSTS SECTION FOR THE CONCRETE BRIDGE RAIL.
2. A RECYCLED BLOCK ALTERNATE IS ALLOWED AS A SUBSTITUTE FOR THE WOOD BLOCK ON A 1 FOR 1 BASIS AT NO ADDITIONAL PAYMENT. THE RECYCLED BLOCK MUST HAVE FHWA APPROVAL AND MEET NCHRP 350 REQUIREMENTS.
* 3. A W6x8.5 STEEL POST MAY BE USED AS AN ALTERNATE FOR A W6 X 9 POST.
* 4. POST AND BLOCK HOLES SHOULD BE DRILLED ADJACENT TO THE DIRECTION OF TRAFFIC.

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11-6-06

HIGHWAY GUARD RAILS GUARD RAIL POST AND BLOCK

GR-200

BRIDGE AND STRUCTURAL DESIGN

DETAIL SHEET

DATE	DESCRIPTION	BY
	REVISION	

DDG DUPLANTIS DESIGN GROUP, PC
Respect • Integrity • Client Satisfaction • Excellence
THIBODAUX MANDEVILLE HOUSTON
Civil Engineering • Site Development • Land Planning • Public Works Infrastructure
5252 Highway 311 Suite 201 Phone: 985.626.5347
Mandeville, Louisiana 70448 Fax: 985.626.0369

STAMP

SIGNATURE:

DATE:

PROPOSED RETAIL DEVELOPMENT
CITY OF BOUTTE
ST. CHARLES PARISH, LOUISIANA

FOR THE SPECTRA GROUP, INC.
MEMPHIS ,TENNESSEE

DRAWN	NMO
CHECKED	THB
DATE	8-10-07
SCALE	AS SHOWN
PROJECT NO.	07-205
FILE:	07-205 D1
SHEET	C-14