



US Department
of Transportation

**Federal Highway
Administration**

DEC 8 1995

400 Seventh St., S.W.
Washington, D.C. 20590

Refer to: HNG-14

Mr. Doug Arnold
President
Arnold Forest Products Corporation
10818 Providence Road
Shreveport, Louisiana 71129

Dear Mr. Arnold:

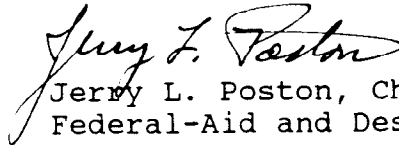
Your November 24 letter to Mr. Richard Powers of my office requesting the Federal Highway Administration's (FHWA) acceptance of a round timber post w-beam guardrail system has been reviewed. This design consisted of 184-mm diameter Southern Pine posts, 1900-mm long, and set 1905 mm apart. The embedment depth was 1100 mm. The w-beam rail element was fastened to these posts using chamfered wooden spacer blocks measuring 146-mm by 146-mm square and 356-mm long and having one concave surface to match the curvature of the posts. These blocks provide an effective rail-to-post offset distance of approximately 127 mm. The 16-mm diameter guardrail bolts were used to attach the rail. These details and the specifications for the posts and spacer blocks are shown in Enclosure 1.

To support your request, you sent copies of TTI Research Study Number 405391 report, dated October 1995, and a videotape detailing the results of the National Cooperative Highway Research Program Report 350 test designation 3-11. This is the standard test level 3 impact with a 2000-kg pickup truck at 100 km/h and 25 degrees. We agree with the researchers assessment that the test results were acceptable in spite of the higher than recommended exit angle. The maximum dynamic deflection was higher than that seen with a comparable standard timber post test (1100 mm vs. 800 mm), a factor that should be considered whenever this barrier is used to shield rigid objects located closely behind the guardrail.

We also agree that an earlier test (TTI Research Report 1147-1F, dated November 1988) with an 820-kg vehicle on a similar round post system is adequate to confirm satisfactory performance with the small car, and that this test need not be repeated. Summary information on both tests is shown in Enclosure 2.

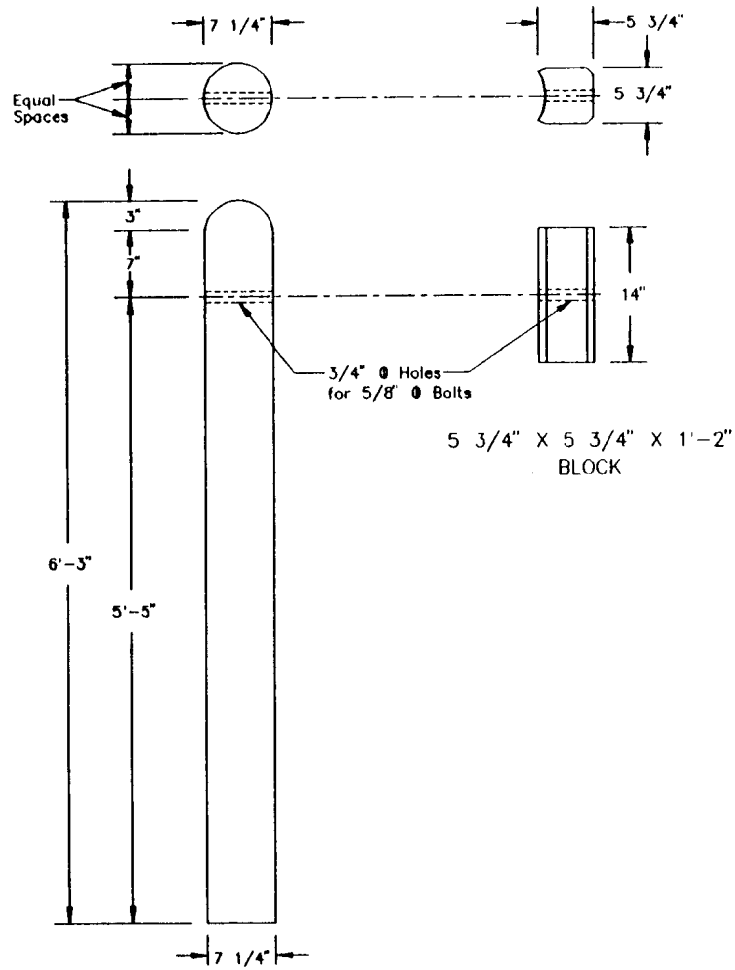
Based on our review of the above information, we find that the tested round post guardrail defined herein is acceptable for use on projects on the National Highway System when selected by a State highway agency. By a copy of this letter, we will inform FHWA field offices of this action.

Sincerely yours,


Jerry L. Poston, Chief
Federal-Aid and Design Division

2 Enclosures

Geometric and Roadside Design Acceptance Letter B-32



DETAIL F
STANDARD LINE POST FOR W-BEAM GUARDRAIL

Figure 5. Details of standard line post and blockout for round post w-beam guardrail

TREATED TIMBER GUARD RAIL POST
STANDARD SPECIFICATIONS FOR ROUND POST
REVISED 12-7-95

SPECIES: All Timber Post shall be Southern Pine (including minor species) as defined by ASTM D1165.

DIMENSIONS: Post shall be seven and one quarter (7 1/4) inches in diameter plus or minus one eighth (1/8) inch at any point, as determined by a circumference-diameter tape. The length of the post shall be six foot three (6'-3") inches for W-Beam and six foot nine (6'-9") inches for Thrie Beam Guard Rail and shall not vary more than One (1) inch in length.

MANUFACTURER: Post Top will be domed approximately Hemispherical in shape and the radius of the dome shall be four (4) inches. The dome shall be smooth, and the distance from the top of the dome to the base of the dome shall not vary more than three quarter (3/4) inch at any location.

All Post shall be smooth shaved by machine. No "ringing" of the post as caused by an improperly adjusted peeling machine is permitted. All outer and inner bark shall be removed during the shaving process. All knots and knobs shall be trimmed smooth and flush with the surface of the post. Each post shall have minimum sapwood depth of one (1) inch measured at any location within the circumference. Compliance to be determined by examination at the top and butt of each post.

Holes shall be drilled as shown on the plans for the type of post being manufactured, with a location tolerance of (1/4) of an inch in any direction. All manufacturing shall be completed prior to Preservative Treatment.

KNOTS: The maximum diameter of any single knot shall not exceed three (3) inches. The sum of the diameters of all knots greater than 0.5 inch in any one (1)-foot section shall not exceed eight (8) inches.

SHAPE AND STRAIGHTNESS: All timber post shall be nominally round in cross section. A straight line drawn from the center of the top to the center of the butt of any post shall not deviate from the centerline of the post more than one-fourth (1/4) inch at any point.

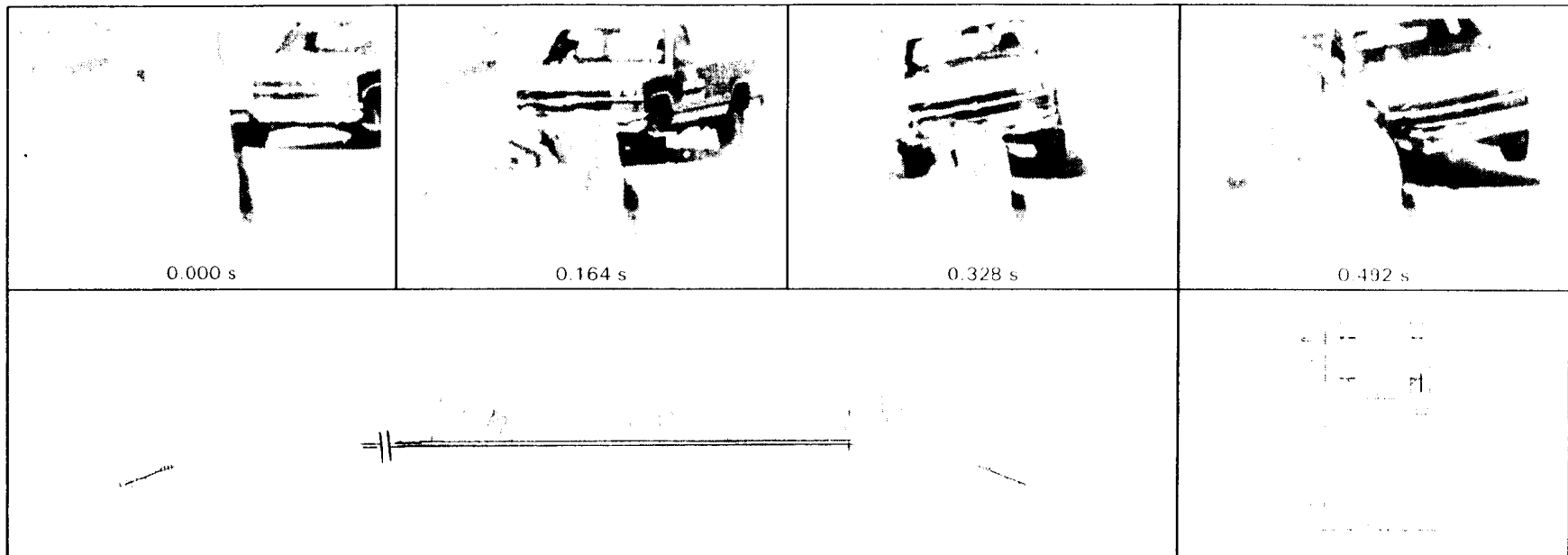
SPLITS AND SHAKES: Splits or ring shakes are not permitted in the top. Splits are not permitted in the butt. A single shake is permitted in the butt, provided it is not wider than one-half (1/2) the-butt diameter.

II

TIMBER SPACERS: The timber species shall be the same as those furnished for the timber post. The actual finished size to be five and three quarter (5-3/4) inch square, with a tolerance of one eighth (1/8) inch plus or minus. Each of the four corners of each block shall be machined down to provide a flat one (1) inch surface the entire length of the block with a tolerance of one fourth (1/4) inch plus or minus. Each block shall be machine concaved to a radius of (3-5/8") inch, and to a depth of (3/4") inch. The size and hole location shall be as shown on the plans. For the type of spacers being manufactured, with a location tolerance of (1/4) inch in any direction.

Spacers shall be of medium grain, at least four (4) rings per inch, and free from splits, shakes, compression wood or decay in any form. Individual knots, knot clusters or knots in the same cross section of a face are permitted, provided they are sound or firm, and are limited in cumulative width (When measured between lines parallel to the edges) to no more than one-third the width of the face. Grain deviation is limited to one (1) inch in six (6) inches, the material may be sawn or surfaced.

TREATMENT: Timber Post and Spacers shall be a preservative treatment in accordance with AWPA C-14-94. "WOOD FOR HIGHWAY CONSTRUCTION".



General Information		Impact Conditions		Test Article Deflections (m)	
Test Agency	Texas Transportation Institute	Speed (km/h)	102.2 (63.5 mi/h)	Dynamic	1.1 (3.7 ft)
Test No.	405391-1	Angle (deg)	25.4	Permanent	0.8 (2.6 ft)
Date	04/11/95	Exit Conditions		Vehicle Damage	
Test Article		Speed (km/h)	61.9 (38.5 mi/h)	Exterior	
Type	Round post guardrail	Angle (deg)	26.1	VDS	11RFQ 4
Name or Manufacturer		Occupant Risk Values		CDC	11FREW3
Installation Length (m)	53.4 m (175.0 ft)	Impact Velocity (m/s)		Interior	
Size and/or dimension	184 mm (7.25 in) ϕ std. wood	x direction	6.8 (22.2 ft/s)	OCDI	AS0002000
and material of key	line post & 146 mm (5.75 in)	y direction	4.4 (14.6 ft/s)	Maximum Exterior	
elements	wood blockout	THIV (optional)		Vehicle Crush (mm)	480 (18.9 in)
Soil Type and Condition	Strong soil, dry	Ridedown Accelerations		Max. Occ. Compart.	
Test Vehicle		(g's)		Deformation (mm)	17 (0.7 in)
Type	Production	x direction	10.9	Post Impact Behavior	
Designation	2000P	y direction	11.8	Max. Roll Angle (deg)	37.6
Model	1989 Chevrolet C2500	PHD (optional)		Max. Pitch Angle (deg)	14.7
Mass (kg) Curb	1962 (4325 lb)	ASI (optional)		Max. Yaw Angle (deg)	61.8
Test Inertial	2000 (4409 lb)	Max. 0.050 sec Average			
		(g's)			
		x direction	6.4		
		y direction	6.7		
		z direction	4.5		

Figure 14. Summary of results for test 405391-1.

