

# OFFICE MEMORANDUM



MICHIGAN  
STATE HIGHWAY DEPARTMENT

August 5, 1965

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To: E. A. Finney, Director  
Research Laboratory Division

From: H. C. Brunke

Subject: Aluminum Delineator Posts (Reynolds Metals Co.). Research Project  
65 NM-145. Research Report No. R-540.

In response to R. L. Greenman's request of May 21, 1965, for information of the New Materials Committee, two 6-in. long samples of 6063-T6 aluminum hat-shaped delineator post have been evaluated, in comparison with a typical 1.33-lb per ft steel delineator post meeting current Department Specifications and Standard Plan S 12.10. The aluminum samples were manufactured by the Reynolds Metals Co., which designates them as Section No. 20130. A cross-section drawing is attached.

Tensile yield strengths, measured cross-section properties, and maximum allowable bending moments for the two post types are as follows:

Post Type	Tensile Yield Strength, psi	Cross-Sectional Properties		Maximum Allowable Bending Moment, in-lb
		Moment of Inertia x-x, in. <sup>4</sup>	Section Modulus x-x, in. <sup>3</sup>	
Aluminum	25,000	0.046	0.089	2,225
Steel	50,000	0.049	0.093	4,650

According to this tabulation, the maximum allowable bending moment of the aluminum alloy section would be 47.8 percent of that of the steel post. However, it should be noted that the Department's current specification is based specifically on this particular steel post, which was the lightest acceptable steel post readily available, rather than on any particular design considerations. Thus, the fact that the aluminum post does not meet rail steel strength requirements should not preclude its use as a delineator support.

Using a wind pressure of 35 psf, as recommended in the 1961 AASHO "Specifications for the Design and Construction of Structural Supports for Highway Signs," the design bending moment for a delineator post of this cross-section and height would be 1,165 in-lb, if subjected to normal wind load conditions. Thus, the aluminum alloy posts could resist approximately 90-percent more bending moment than required under AASHO specifications, and should withstand any snow thrown against them by maintenance plows.

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A field test was also conducted to determine aluminum post driving performance. Using a driving hammer, four samples were embedded a minimum depth of 2 ft into a clay soil. In all cases, driving caused an insignificant amount of flattening of the post head. Since some posts used by the Department are driven into frozen ground, a winter test installation is advisable.

In a Departmental purchase order for 3800 steel posts, dated November 25, 1964, the unit price was \$1.27. On the basis of manufacturer's maximum unit price, one aluminum post would cost \$1.37. Then, by using average salvage values (January 1 through June 30, 1965), approximately \$0.11 and \$0.39 would be realized for salvage of individual rail steel and aluminum alloy posts, respectively. Thus, final cost per post after salvage would be \$0.98 for aluminum and \$1.16 for steel. Greater ease of handling and reduced shipping costs would also be realized, in that the aluminum post (0.409 lb per ft) weighs only about one-third as much as the steel post.

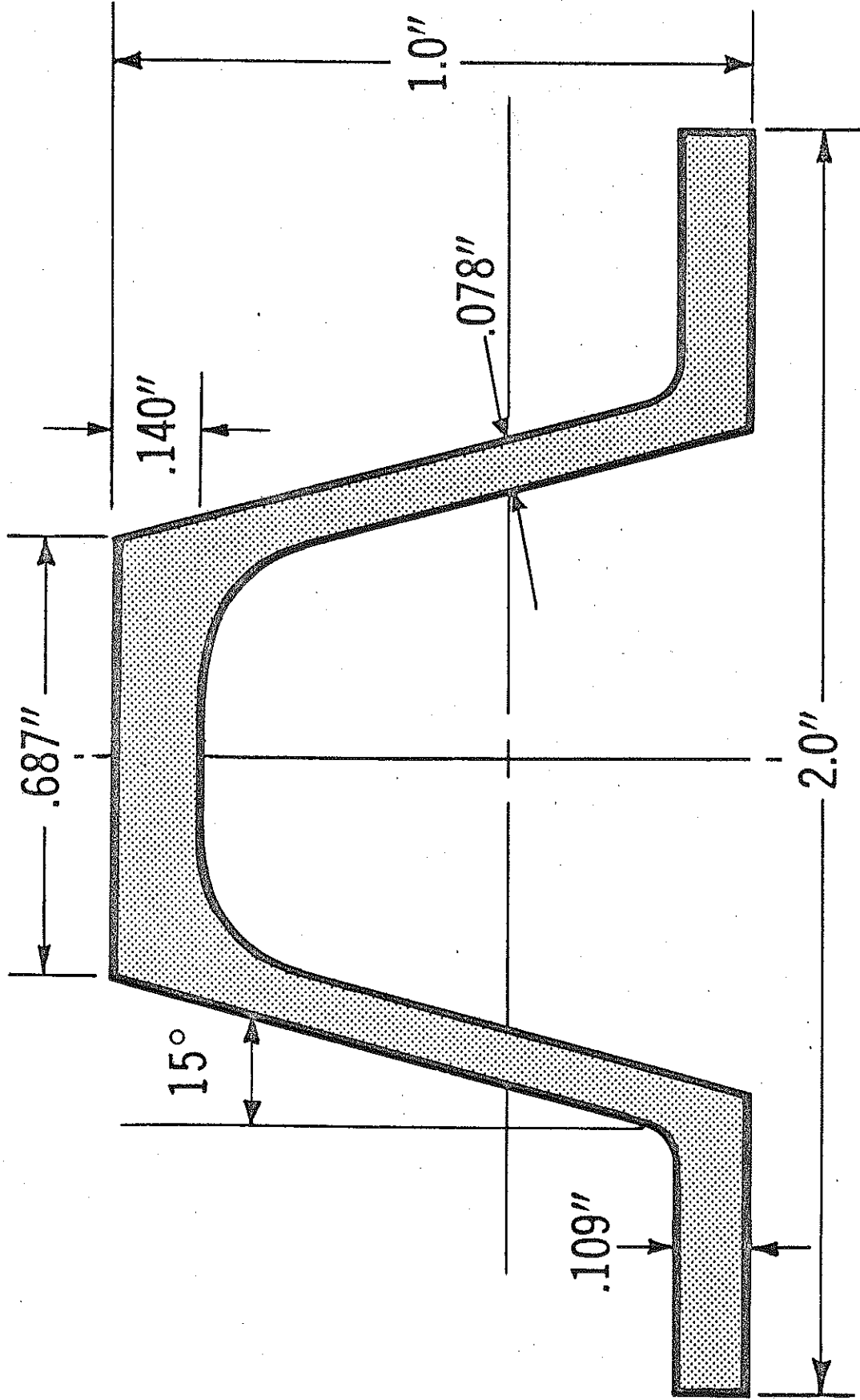
In conclusion, use of the aluminum alloy section as a delineator post would be acceptable, based on evaluation in terms of AASHO specifications (rather than Department specifications), on performance in driving tests under summer soil conditions, and relative costs. A change in MSHD Standard Specifications and in Standard Plan S 12.10 would be required to permit their use. Also, it is recommended that aluminum fasteners be used exclusively with these posts, if accepted for delineators. The Office of Maintenance is understood to be using such fasteners now for steel posts. Purchase of a substantial number of aluminum alloy posts for installation on a trial basis is recommended, provided there is sufficient interest in the Department.

## OFFICE OF TESTING AND RESEARCH



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HCB:nw



Manufacturer's cross-section drawing of aluminum alloy delineator post, with varying wall thickness (not to scale).