UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

CIVIL DIVISION

NOV 30 1971

Dear Mr. Turner:

We have completed a limited review of the procurement practices of several States for signs and pavement markers for Federal-aid highways and the material specifications for these signs. There are variations in these practices and specifications which can result in significant cost differences as illustrated below.

Sign	1970 vender prices To California	To Contractors Oregon	Arizona
"STOP"	$ 8.60	$18.75	$21.56
Pavement width transition (lane reduction)	22.90	44.00	55.20
"END DIVIDED ROAD"	15.60	24.75	31.05
"EXIT____MPH"	28.60	55.00	69.00
"SPEED LIMIT____"	33.60	55.00	69.00
"KEEP RIGHT (arrow)"	6.70	13.75	17.25
Interstate Shield	7.20	12.00	13.80

In comparison to the prices at which signs were purchased by California, prices to contractors in Oregon ranged from 58 to 118 percent higher and in Arizona from 91 to 157 percent higher. For example, during 1970 California purchased approximately 2,600 stop signs for about $22,400. At quoted prices, the same number of stop signs would have cost contractors $48,800 in Oregon or $56,100 in Arizona. The major reasons for these differences are discussed below.

PROCUREMENT METHODS

California estimates its annual requirements for signs for all highways, purchases the signs under competitively-awarded contracts for each of the three major types of signs it uses--reflective, porcelain enamel on aluminum and porcelain enamel on steel--and furnishes them for installation as needed to the prime contractor responsible for the highway construction. Both Arizona and Oregon make the prime contractors responsible for purchase and installation of signs. Texas follows the Arizona and Oregon system for larger signs but it purchases materials for smaller signs under competitively awarded contracts and fabricates and installs the signs with State personnel.

California's method permits the State to achieve savings through volume purchasing under competitive conditions and was the most economical method followed by the States we reviewed. The advantage of purchasing to meet total annual requirements is shown by the cost difference between the contrasting methods followed by California for providing reflective pavement markers used as lane separators. The State purchases the markers for maintenance, but requires individual prime contractors to purchase and install them for new construction. During 1970 the State paid an average of $.85 each for the markers it purchased, while the contractors paid an average of $.95 each for smaller quantities. We estimate that the State could have saved about $182,000 during 1969 and 1970 if it had purchased directly all markers required for both its maintenance and construction programs.

Highway department representatives in Arizona and Oregon were not aware of the possible economies that could result from using California's method for purchasing signs. They did not realize that California's costs were even lower than the cost of signs made in their State-operated shops for use in maintenance work and road construction not on the Federal-aid system. FHWA division office and regional office officials in Oregon and Arizona appeared reluctant to examine further into California's method for possible application elsewhere despite the indications of lower costs.

SIGN MATERIAL SPECIFICATIONS

Various States use different thicknesses of the same backing material for similar signs. The extent of the differences is shown on the following table.

Thickness, in inches, of aluminum for warning, regulatory, and marker signs

State	Signs up to 18"	Signs up to 20"	Signs up to 30"	Signs up to 48"	Signs up to 9SF*	Signs over 30"	Signs over 48"	Signs over 9SF*	All signs
Arizona									.125
California				.063			.080		
Colorado				.100			.125		
Georgia					.080			.100	
Illinois					.080			.125	
Minnesota	.063		.080			.100			
New York									.100
Oregon		.063	.080	.100			.125		
Pennsylvania									.080
Texas									.125

*SF-Square feet

The use of thinner materials could have a significant impact on the cost of signs and could result in considerable savings to both the Federal Government and the States. For example, the cost to a sign manufacturer for .125-inch aluminum sheeting is about 50 percent more than for .080-inch sheeting and about 90 percent more than for .063-inch sheeting.

The States also use different materials for different types of signs. The most widely used materials for these signs are aluminum extrusions, laminated aluminum honeycomb panels, sheet aluminum panels, and high density plywood faced with either reflective sheeting or metal panels. Not all of these materials are used in each State and some States specify only a single material. For example, California specifies only porcelainized steel for overhead signs while Oregon authorizes the use of either extruded aluminum or sheet aluminum for these signs. The types of materials used by various States is shown in the appendix.

Little or no documented information is available at the State level as to why specific thicknesses or types of materials are used. One State official told us that current sign specifications in his State evolved through long experience in the field, laboratory testing, and sign manufacturers' suggestions. No documentation was available to support the current specifications.

The FHWA Regional Administrator, Region 8, reviewed this matter within his region and informed us that the use of differing thicknesses of sign materials was justified because of differing wind velocities. However, no specific documentation was given to support the use of specific thicknesses of aluminum and we noted that some States with the same or lower registered wind velocities as other States use thinner materials than the other States for comparable signs.

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In our opinion FHWA leadership is needed to achieve greater economy in signing and marking the Federal-aid highway system. FHWA should examine further into California's annual requirements contracting method for the procurement of signs to determine the possible economy of its broader application. There is also a need for FHWA to determine and issue appropriate standards for the thickness and type of materials used for signs on future Federal-aid highway projects. Such a standardization could be adopted in conjunction with FHWA's program for providing uniformity in the types of messages, lettering, colors, reflectivity, and placement of signs on the highway.

We appreciate the cooperation and courtesies extended to us by both FHWA and State highway officials during our review. We would appreciate your advice as to any considerations which may be given to the broader application of California's method of procuring signs and the development of standards for the thickness and type of materials used for signs.

Sincerely yours,

Richard W. Kelley

Richard W. Kelley
Assistant Director

Mr. Francis C. Turner, Administrator
Federal Highway Administration
Department of Transportation

TABULATION OF TYPES OF MATERIALS USED FOR GROUND-MOUNTED AND OVERHEAD GUIDE SIGNS BY VARIOUS STATES

State	Extruded Aluminum	Laminated Aluminum Honeycomb	Sheet Aluminum	High Density Overlaid Plywood: Reflective Sheeting Face	High Density Overlaid Plywood: Sheet Steel or Aluminum Face and Back	Other
Arizona	G - O	O			G	G - O; Treated steel shapes
California		G	G[1/]			O; Porcelainized steel
Colorado	G - O	G - O	G			
Georgia	G - O	G - O				
Illinois	G - O		G - O	G - O		
Minnesota	G - O		G			G; Sheet steel
New York			G - O	G		
Oregon	G - O		G - O			
Pennsylvania	G - O	G - O				
Texas	O	O	O	G - O		

Legend

G - used for ground-mounted signs
O - used for overhead signs

Notes

1/ Used only for smaller, standard message guide signs and directional signs showing place names.

APPENDIX