EXPERIMENTAL USE OF FLEXIBLE GUIDEPOSTS IN OREGON

PPM 20-6.3, Category 2 Project

F I N A L R E P O R T

Conducted by

Oregon State Highway Division

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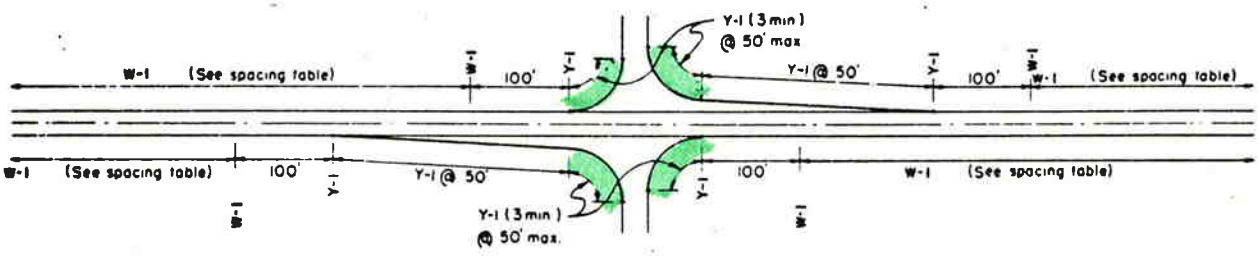
During the early months of 1971 the Oregon State Highway Division requested and received FHWA approval to install flexible guideposts in locations where sight post losses from collisions would be expected to be high. The request was to install the flexible posts as an experimental feature under the provisions of PPM 20-6.3 as a Category 2 Project. Limited use of the posts was initiated in contracts let during the spring of 1971. When used, they were installed in exit gore areas and on interchange ramps having curvature of 11 degrees or more. Also, at flared and channelized intersections having heavy turning movements, flexible guideposts have been used to delineate the turning radii in each quadrant. Details of placement are shown in Figure 1. In total, their use has been specified on 25 contracts during the ensuing period up to and including early 1974.

Post Type and Use

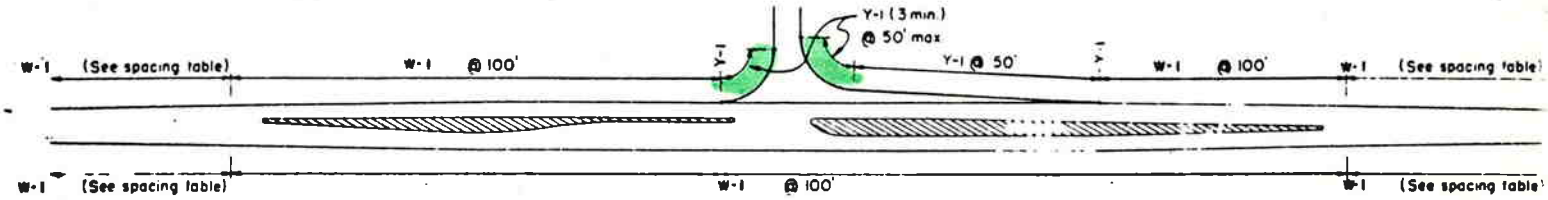
The experimental post used on the Oregon projects is marketed as "Flexopost". Constructed from polyethylene, it has a wall thickness of 5/32 in. and is formed in a generally triangular shape with rounded corners. Details of the post and its installation are shown in Figure 2. The post is white and a black polyethylene cap is specified. Panels of reflective sheeting 3-in.-by-5-in. are cemented near the top facing traffic.

A total of 836 posts have been included in the construction contracts; 482 in 1971, 174 in 1972, 110 in 1973 and 70 in 1974. Unit bid prices for the installed posts ranged from $7.00 to $30.00 with an average unit cost of

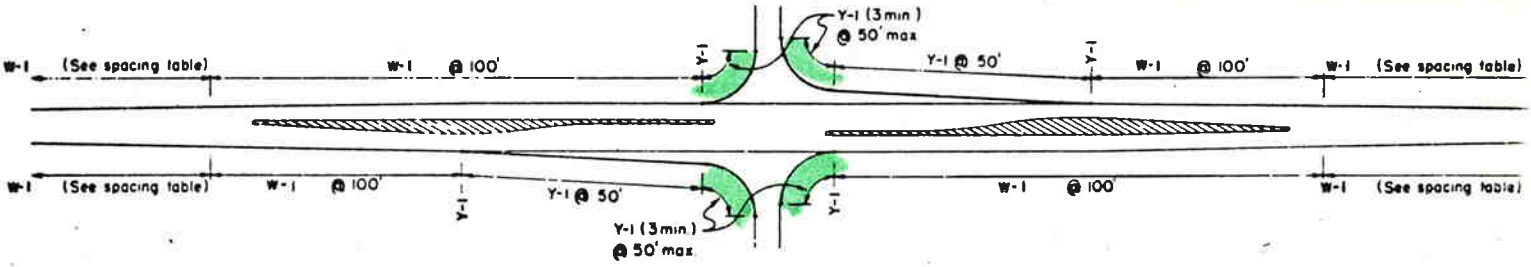
GUIDE POST TYPES & SPACINGS AT INTERSECTIONS



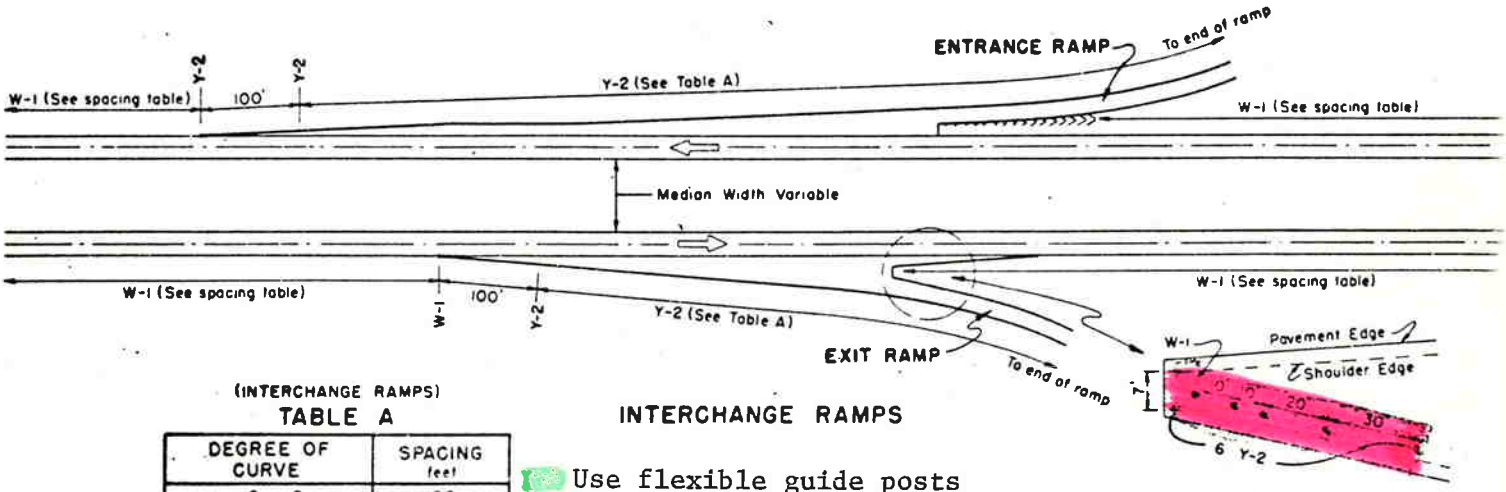
FLARED



THREE-LEG CHANNELIZED



FOUR-LEG CHANNELIZED



(INTERCHANGE RAMPS)

TABLE A

DEGREE OF CURVE	SPACING feet
0 - 8	100
9 - 10	90
11 - 12	80
13 - 18	70
19 - 25	60
26 - Up	50

1. On curves exceeding 8 degrees to the right in direction of traffic, guide posts shall also be installed on the left for the length of the curve.
2. Spacing shall be measured along the shoulder.

INTERCHANGE RAMPS

Use flexible guide posts if heavy turning movement is anticipated.

Use flexible guide posts.

NOTE:
All material and workmanship shall be in accordance with the current Oregon State Highway Department Specifications

OREGON STATE HIGHWAY DEPARTMENT
STANDARD

GUIDE POSTS

DATE	APPROVED	REVISIONS DATE	DESCRIPTION
7/58	[illegible]	12/66	Redrawn
7/68	[illegible]	5/69	Removed bracket note
		1/71	Added Flexible Guide Post

APPROVED [illegible]

DRG. NO. 210

Figure 1. Location of flexible guide posts.

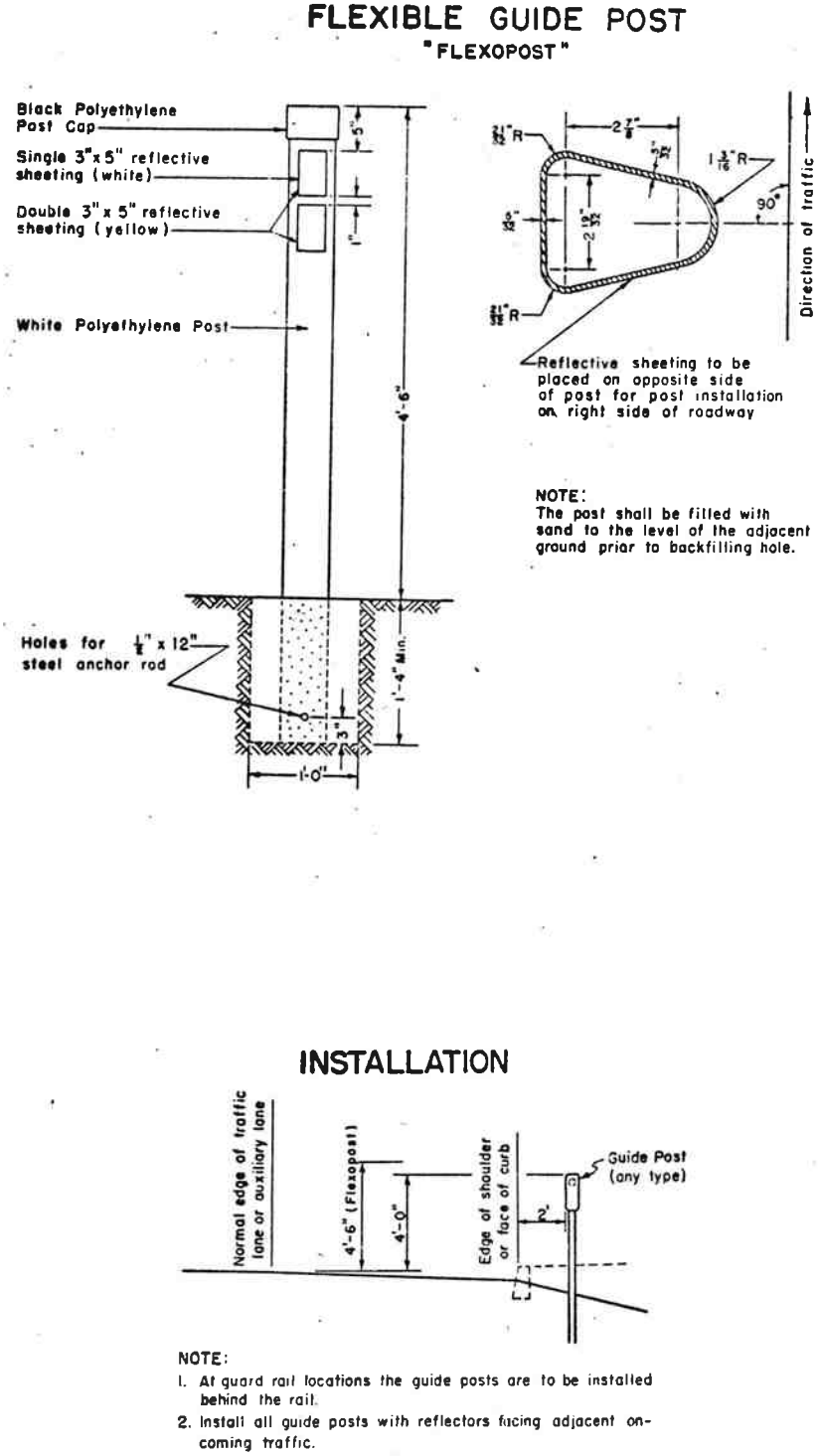


Figure 2. Dimensions and installation details for flexible guideposts.

$14.82. The average unit bid price on the three contracts during 1974 was $24.29. A number of the projects are under construction at the time of this writing so not all of the flexible posts are installed.

For a comparison of costs, the average unit bid price during the same period to furnish and install the conventional galvanized steel posts has been about $8.80. During the early part of 1974 the average unit bid price for the standard post was $9.34.

Service Evaluation

A rigorous evaluation of the service provided by flexible posts compared to conventional steel posts was not attempted since the flexible posts are only used in locations where they are expected to be hit rather frequently by errant vehicles. However, comments were solicited from the District Engineers concerning service, appearance and cost of replacement. These comments are summarized in the following paragraphs.

During warm and moderate temperatures, the posts withstand hits quite well. Some evidence of hits usually remain in the form of marks or loss of scotchlite reflectors and the posts often fail to resume a vertical position. The ductility, or the ability to rebound completely, lessens with age so that after a period of time the different posts in a cluster take on varying slopes which results in an unattractive appearance. Comments from the western portion of the State indicate the flexible posts do last longer since they do sustain hits well.

The flexible guideposts become brittle when cold and will shatter when hit. This characteristic is a major concern in the central and eastern districts where low temperatures are common. It is a factor in the western

portion of the State as well, but not to the same extent since low temperatures are less frequent. In some cases, a contributing factor in the loss of posts during cold weather is the accumulation of water inside the post which freezes and thus prevents the post from buckling when hit.

Response from one metropolitan district expressed the opinion that for a like amount of exposure, the flexible posts do not seem to be hit as often as the standard galvanized post with target and reflectors. The white color and greater surface area are credited with improved effectiveness. Others concurred the posts are more visible than the standard.

An evaluation was received that indicated the posts may withstand up to 10 hits before they need replacement if cold weather brittleness is not a factor. Another comment indicated a gradual deterioration to brittle fracture occurred during a period of 1 to 4 years depending on exposure to low temperatures.

Comments were generally critical of the effectiveness of the 3-in.-by-5-in. reflective sheeting patches used as reflectors. These patches do not adhere real well and are frequently lost from vandalism and from vehicle hits. Vandalism is a major problem in urban areas where the reflective patches are removed for placing on back-packs or bicycles. In some instances, holes have been drilled and standard plastic reflectors attached to substitute for the reflective sheeting.

Similarly, the black plastic caps are not durable. They are reportedly knocked off at first impact or are removed by itinerant travelers with nothing better to do while awaiting a ride. Loss of the caps creates an appearance of poor maintenance. Also, lack of a cap permits the access of water to the

post. Some reports indicate water accumulation in the posts which, in turn, increases the susceptibility to damage during freezing weather.

A number of comments were directed to the fact a permanent slope resulted in the flexible posts from the pressure of a snow berm being plowed against them. The posts do not recover a vertical position after the snow melts, nor can they be straightened, according to the reports. Steel guideposts are affected less by snow because of a smaller projected area and, in the event they are bent out of plumb, they can be straightened.

Replacement Time and Cost

Installation and maintenance replacement of flexible posts is appreciably more time consuming than for steel posts. Since the posts have an anchor rod, extraction of broken off stubs is difficult. Installation requires a 12-in. diameter hole 16 in. deep and the inside of the post must be sand filled to the level of the surrounding ground. Compared to the standard U-shaped steel post which can be driven, installation is estimated to take from 2 to 3 times as long.

Posts are kept in stock by the Maintenance Section for replacement of damaged guideposts. The current storeroom price is $7.81 for flexible posts and $3.95 for the standard steel post complete with target and reflectors. With this cost differential of approximately 2 to 1 combined with the increased time for installation, the installed cost for maintenance replacement appears to be 4 or more times as much for flexible posts as for standard posts. This does not consider travel time and protective signing costs which would be equal for either type.

On the basis of purchase and installation costs, it is apparent a flexible guidepost would have to sustain several hits to be competitive with the standard post. When they do rebound, the flexible posts provide the additional benefit of being immediately available to guide subsequent vehicles whereas, once hit, the standard post is not effective until it is replaced. A further benefit is the improved visibility of the flexible posts. These latter items prohibit a precise evaluation of overall cost effectiveness.

Summary

Favorable aspects of the use of flexible guideposts are the following:

1. Visibility of the posts is good as long as the reflective patches are intact. The larger projected area of the posts and the white color makes them more readily visible than the standard galvanized steel posts.

2. The fact that the posts rebound when hit provides continuous protection to the motorist.

3. Less damage occurs to a vehicle from striking a flexible guidepost than is sustained from striking a standard U type.

4. In locations subject to frequent hits, replacements are required less frequently except where low temperatures cause them to be brittle.

Aspects of the flexible guideposts that are generally unfavorable are:

1. The reflective patches and the black plastic caps are

subject to frequent vandalism. When the reflective patches are missing, the night effectiveness of the posts is greatly reduced. Loss of the caps creates an appearance of poor maintenance and allows access of water.

2. The patches and caps are also subject to damage and loss from vehicle hits.

3. A permanent tilt results from having a berm of snow plowed against the posts.

4. During cold weather the posts become brittle and break off at the first impact.

5. The shelf cost of the flexible posts is approximately twice that of the standard guideposts.

6. Installation is estimated to require from 2 to 3 times as much time as that needed for standard posts.

7. After being hit, the posts are frequently out of plumb and are marked up. Both characteristics contribute to an unsightly appearance.

Recommendations for Future Use

In weighing the advantages and disadvantages of the use of flexible guideposts, the concensus is that they have an application in high hazard areas such as gore points, but not for general use as replacements for conven-

tional guideposts. In the colder portions of the state, the problems from cold weather brittleness, snow berm deformations and vandalism are thought to outweigh the benefits from their use. With the possible exception of unusually hazardous locations, the use of flexible posts will be discontinued in the colder portions of the State. In areas having less freezing and less snow, the flexible posts will continue to be used on a selective basis where hits are likely to be frequent and where motorist safety would be seriously impaired by a temporary lack of guideposts. Although the potential value is high for flexible posts in a number of urban area installations, the extensive vandalism of removing the reflective patches lessens their effectiveness. The potential vandalism will be an important consideration in selecting the type of guidepost to be used. Obviously, cost is a factor to be considered. Unless the posts can be expected to remain in a useful condition through at least 3 or 4 hits, the costs to the agency would favor the standard posts. The choice will be tempered by driver safety and vehicle damage considerations which would favor the use of flexible posts.