ANALYSIS OF A SPECIAL SHOULDER PROBLEM IN MEDIAN STRIP AREAS LIKELY TO RESULT FROM TYPICAL STAGE-CONSTRUCTION OF DIVIDED HIGHWAYS, WITH PARTICULAR REFERENCE TO HEADLIGHT GLARE AND PLANTING TREATMENT

The following is a field inspection analysis of a 5-mile section of divided highway on U S 40, near West Jefferson, Ohio, a few miles west of Columbus.

On this relatively straight stretch of divided highway, the existing 24foot width of old macadam surface was retained to serve the east-bound traffic approaching Columbus. The new 24-foot concrete pavement, with lip-curb, was placed parallel on an offset distance of from 9 to 11 feet for use by westbound traffic leaving Columbus. In general, the newly constructed concrete roadway has a more level and smooth profile than the older macadam surfacing, which lies for the most part from 0 feet to 3 feet above the profile of the new concrete pavement.

The separating median strip varies in width from 9 to 11 feet, and in cross profile from a more or less level graded section to a slope ratio of about one on three (3:1).

Since this project was completed and opened to travel, it has been found that the traffic approaching Columbus over the old surfacing has great difficulty in driving, especially when subjected to the headlight glare from opposing motor vehicles traveling over the lower level of concrete pavement. To reduce this hazardous situation, the State foundit necessary, as an emergency protection, to place high guide posts extending about 4 feet to 5 feet above the grade of the median strip. These were approximately 2 inches π 8 inches in size with the broadface to traffic painted black and white for high visibility. In addition, reflectors were installed on these posts for the benefit of night drivers. This guide-post treatment reduced the driving difficulties at night, but the tall striped posts were not very attractive. Therefore, it was considered as a temporary delineation only to serve until the State highway department was able to improve the visibility of the median strip, end as far as possible, through appropriate planting treatment, further reduce traffic hazards due to headlight glare.

Several factors tended to make the headlight glare more difficult for the east-bound traffic than for the west-bound travel. The median strip along the side of the existing macadam drops away from the surfacing. On those sections where the old macadam is above the new pavement, the sloping surface of the median strip removes the normal width of shoulder support ordinarily provided. The lack of a definite shoulder area thus tends to induce a feeling of inadequate space for high speed traffic. This is not so important in daytime driving, but at night the inadequately defined roadway edge automatically handicaps the driver in the operation of a motor vehicle. There is another factor also which tends to contribute to this tension in driving. The traffic approaching Columbus may be considered the faster moving traffic because it is approaching the city from the country where it has accommodated itself to the higher driving speed over a longer distance of travel than the out-bound traffic from the city. The lack of delineation upon which the traffic depended before it reached the divided section is therefore more serious for the driver approaching Columbus than for the traffic out of the city.

Drivers leaving the city may be considered as operating under less driving strain or tension because, in a relative way, they have just left the more confining and congested city traffic, and the open country is a contrasting form of relief.

For the traffic leaving the city, the type of construction is definitely designed to make driving less hazardous. The lip-curb of the new concrete pavement offers a more definite or sharp edge than the old macadam surfacing. Also, the median strip, as viewed by these drivers, rises to meet the headlamp rays and thus further helps to define the edge. The improved visibility of the new construction thus provides greater ease in driving. On the old macadam surface, on the other hand, the lack of delineation plus driver tension and fatigue tends to handicap the traffic and this makes driving difficult, especially when the headlight glare of opposing traffic accentuates this fundamentally weak cross-section condition.

The usual suggestion to counteract headlight glare is the planting of low-headed trees or a dense hedgerow of shrubs in the median strip to interept the opposing light rays, especially at points of curvature. If it is recognized that traffic, in an emergency is free to leave the traveled way and thus may run into and damage any planting that may be placed within the separation area, it is most important that great care be used in a planting solution.

For instance, an unprotected hedge type of shrub planting would be subject to occasional and sometimes more or less frequent destruction, especially under winter driving conditions when ice and sleet are an added hazard. This means that a good deal of maintenance cost may have to be allowed for such plantings, for unless the damaged material is replaced, it tends to look unsightly. As to trees, these are fixed objects which may be a hazard to traffic forced off the pavement and into them. In the case of low-headed tree types, the branches tend to spread out over several feet and thus may cause undue encroachment on the area reserved for traffic use. In a relatively narrow median strip of but 9-foot to 11-foot width, the placement as well as the maintenance of trees and shrubs is very difficult to be free of hindrance to traffic.

In limited widths of median areas it is possible to make use of a more flexible or vine type of plant material as a ground cover. The low-growing

roses, such as the Wichurianas, the Wichuriana hybrids, and the multiflor species, are ideal for such purposes. These roses, unlike the stiff erest types of plants, have a sufficiently adaptable and flexible growth which ables them to recover satisfactorily from the effects of traffic damage.

While required sight distance at intersections may be kept open through the use of this low-growing plant material, it is possible by a careful design and selection of species to get sufficient height and proper placement of material so that headlight glare may be reduced at critical points. With proper advance soil preparation at time of installation and mulching after planting, ground cover growth of this type is very effective in appearance and all seasons of the year and is relatively easy to maintain under average conditions. From the viewpoint of the driver behind the wheel the contrasting planting greatly aids in outlining the edge of the surfacing both day and night.

Painting a white stripe along the outer edge of old mecadam next to the median area will be an additional aid in defining edge of pavement.

Where the graded slope of the median strip falls away sufficiently from the edge of the pavement to lose the effect of a shoulder width, it is generally desirable to protect the planting with some appropriate guardrail installation. This auxiliary construction will delineate the edge of surfacing as well as prevent the high speed traffic on the upper level from running off over the slope down upon the lower level of opposing traffic. Proper and logical design of both guardrail and planting material in suitable combination should be the solution for this kind of driving difficulty. The principles outlined above may be applied with detailed variation to fit each particular local condition that must be met by the designer responsible for the treatments

SUMMARY OF PROBLEM OF HEADLIGHT GLARE IN NARROW MEDIANS

To reduce driving difficulty and traffic hazard on narrow separations of divided highways, it is fundamental that the proposed treatment make the edge of old road surfaces more definite and visible to the driver of the motor vehicle. The use of a painted stripe of highly contrasting color along the edge of the older surfacing adjacent to the median strip may be the first step in the effort to overcome or offset the failure to provide a normal shoulder width during the stage construction period of development of the divided high way. Where the surface of the median strip is below the road surfacing, the installation of a satisfactory type of guardraif may be required. The newly graded surface of the median strip should be protected by the planting of a suitable ground cover which will further aid in defining the edge of the surfacing and serve as an effective aid in reducing headlight glare.

The viewpoint of the driver behind the wheel should be a controlling factor in the design and selection of treatment to be used in median areas. Careful analysis is therefore indicated so that the median strip may reduce driving difficulty and hazard. The width and type of median strip, whether it a raised or depressed center, with or without curbs; the sight distance reis a tintersections in terms of the speed of traffic movement; and other quired at and traffic conditions, all have a bearing on the design treatrelated road and traffic of median areas.

Note: The reference photograph (PRA File No. 35-332) shows a typical ground cover planting of memorial roses (rosa Wichuriana and hybrids) in the median strip area of the 14th Street grade separation over the Mount Vernon Memorial Highway, near Washthe 14th C., after three sensons' growth. Two-year, No. 1 grade or size of plants is used and planted at 4-foot to 5-foot spacing in the 15-foot width of dividing area. These low-growing evergreen roses may be supplemented with higher-growing speiter at critical points where headlight glare is serious.

THE NATURALIZATION OF ROAD-BANKS by C. R. Hursh, Senior Forest Ecologist, Forest Service, U. S. Department of Agriculture, is a reference publication issued February 1, 1942, by the Appalachian Forest Experiment Station as Technical Note No. 51. The author, a member of the Ecology Committee, states that much of the appeal of national forest and national park roads is due to the care given by the road engineers to this phase of construction. * * * road-bank stabilization is a legitimate and essential part of road construction. Once the bank is stabilized, little additional effort is needed to encourage a permanent natural cover of local shrubs and trees.

The cost can be relatively low if the bank is left in such shape as to favor the gradual invasion of local vegetation - so small a fraction of the cost of road construction as to make almost inexcusable the wounds and scars that disfigure the course of many highways. In addition to the inestimable gain in aesthetic values, the naturalized road-bank has a very practical and utilitarian value, determinable in dollars of maintenance costs per mile of roadway saved. * * * A study of experimental stabilization treatments has shown practical results in the working out of certain principles as presented in this publication; first, the chief factors limiting plant growth; and then the naturalization measures, which naturally fall into two classes - those involved in the location and planning of roads, and those concerned with the establishment of the healing and screening vegetation. Instability of surface and suburban soils, lack of moisture, infertility, drainage, rough surfaces, machine techniques, top dressings, fertilizers, and mulches are discussed in this well-illustrated publication on road-bank naturalization.