# ROADSIDE PROBLEMS on the INTERSTATE HIGHWAY SYSTEM: PLANNING and DESIGN ASPECTS

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At the opening of the 36th Annual Meeting of the Highway Research Board Douglas Haskell spoke on "The Highway Program and Our Cities." He emphasized the fact that the new highways would set a pattern for the future development of suburbs and would "make or break" the cities themselves. He also spoke of the effects of new highway location upon some millions of acres of the finest agricultural lands in the open country beyond the built-up suburbs. A large percentage of the new rights-of-way will be roadside area.

Roadside planning has been the subject of discussion at recent meetings of the AASHO Subcommittee on Policy, in joint sessions with the Committee on Roadside Development. Among the topics discussed at these meetings are the following:

1. Typical features of an Interstate highway.
2. Location and alignment of Interstate highways.
3. Aerial surveys and roadside planning.
4. The highway and adjoining land.
5. Selection and design of sites for rest areas.
6. Special planting problems on Interstate highways.

## TYPICAL FEATURES OF AN INTERSTATE HIGHWAY

Highways on the Interstate System will range from a divided four- or six-lane facility, such as the New York State Thruway, to a well-located well-designed, two-lane highway in remote rural areas. As now authorized, 5,500 miles of the 40,000-mile system are classified as urban, and 34,500 miles as rural highways. Although only parts of the Interstate System are located at this time, it appears that at least two miles of every three will be on new location.

The typical Interstate highway will be provided with wide rights-of-way with controlled access. Controlled access means that roadside development on Interstate highways will be a relatively permanent improvement, as there will be few of the encroachments so common in past years on graded and planted areas. New driveways to residential or business developments will not be permitted from the main traffic lanes.

Geometric design of these Interstate highways will be controlled by standards adopted by the American Association of State Highway Officials in July 1956, now available in printed form.

## LOCATION AND ALIGNMENT OF INTERSTATE HIGHWAYS

In the "New York Times" for December 16, 1956, Bertram D. Tallamy said:

> In the design and construction of the Thruway we profited enormously from the experience of other turnpikes . . . . Instead of building a divided highway on the Erie and Berkshire sections, we are, in effect, providing two roads which appear to bear little physical relation to each other.

Each makes its own easy adjustment to the natural topography. . . .

You may have seen a little booklet titled "Expressway or Parkway," reprinted in 1956, by the Highway Research Board from "Landscape Architecture". As brought out in this reprint, which is a discussion of some of the best features of current expressway design, care in relationship of the highway to topography is the very heart of the general problem of highway landscape development. Where an Interstate highway can be properly fitted to the natural topography by an alignment with long easy curvature, typical of certain sections of the Thruway, many roadside problems are readily solvable. The extent of cuts and fills requiring erosion control will be reduced as far as design speeds and existing topography permit. Good highway drainage and low-cost erosion control will be combined with fine highway appearance. Over the long mileage of an Interstate highway route, aerial survey methods have great advantages in obtaining this kind of location.

## AERIAL SURVEYS AND ROADSIDE PLANNING

Experience on the New York Thruway, the Garden State Parkway (New Jersey), and other express highways has demonstrated the many advantages of aerial survey methods, which combine paired photographic coverage with accurate photogrammetric mapping to the scale and contour interval desired. All landscape features are clearly visible on such photographs and can be located on the map made from them.

New housing, business development, and changes in land use are shown, up to the day that aerial photographs are taken. Sources of stone, topsoil, gravel, or other desirable materials are shown. Most important, perhaps, is that it is possible, from the complete contour information available, to prepare grading plans, special area development plans, and planting plans* in the drafting room during winter and rainy periods when field surveying is out of the question.

## THE HIGHWAY AND ADJOINING LAND

Expressways and turnpikes with controlled access affect land-use patterns on all adjacent lands. In open country, away from the influence of cities, these effects may be particularly important and far-reaching. For example, location and construction of a new highway tend to interrupt the natural drainage pattern and to concentrate surface water in ditches and culverts. When this concentrated water emerges from highway drainage structures, it may have very harmful effects in the form of surface erosion or siltation of lands below the highway.**

One of the most important of these land and highway interrelationships is that between the highway and adjacent streams and shorelines. Over past years, recurrent shortages of water have been experienced by many eastern cities, emphasizing the need to conserve potable water and to avoid pollution of streams. Then, for several years, storms of hurricane intensity were sources of serious flood-water damage to highway structures and embankments. These storms demonstrated the fact that relocation of stream channels, particularly in hill country, should be done with extreme caution. It was also demonstrated that riprap and willow planting to protect highway embankments paralleling streams should be installed immediately

*Reference regarding such working plans is made to page 406 of the AASHO "Policy on Geometric Design of Rural Highways," where the many advantages of contoured grading plans are described.

**A number of land-use relationships are clearly described in a recent publication titled "Policies and Design Criteria, Interrelated Highway and Agricultural Drainage, Erosion Control and Other Conservation Purposes," available from the American Society of Agricultural Engineers, St. Joseph, Mich. Price, $1.00.

following the grading of such slopes, and that the best and simplest way to avoid stream erosion is to leave a strip of undisturbed woodland or brush growth between the stream and the traveled way. These and many other stream and highway relationships will merit continued study in connection with Interstate highway location and alignment.

## SELECTION AND DESIGN OF SITES FOR REST AREAS

A number of the most important aspects of this roadside problem are very clearly defined in the following quotation from an interdepartmental memorandum to the staff of a western state highway department dated June 29, 1956:

> The improvement of the Interstate System to full interstate standards will result in the construction of long stretches of controlled access highways, denying highway users direct access to comfort facilities and denying motorists the opportunity to leave the highway except at interchanges spaced miles apart. It is, therefore, concluded that a systematic provision for roadside rest areas is necessary for a complete highway, and the following policy governing their establishment shall therefore be in effect:
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> 1. The selection and acquisition of sites will be made concurrently with the highway location and the purchase of right-of-way.
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> 2. The spacing of rest areas will be approximately 40 miles, or not to exceed a normal hour's driving time.
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> 3. They should not be located within a minimum distance of 2 miles from a municipality, the distance to increase as the size of the municipality increases, to a maximum of 10 miles.
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> 4. Sites in or adjacent to interchanges will not normally be considered because of conflicts with signing and divergent traffic movements.
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> 5. On four-lane divided controlled-access highways, roadside rest areas shall be constructed in pairs.
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> 6. On two-lane controlled-access highways with right-of-way provided for future additional two lanes divided, the right-of-way shall be . . . acquired for both rest areas, even if present construction is limited to one side.
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> 7. A minimum area of 3 acres will be provided per unit with the following site factors considered:
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> Favorable topography, preferably at road grade, to permit easy access and reduce development costs to a minimum;
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> Sites having scenic values such as trees, streams, lake shores, or providing views of unusual scenery;
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> Existence or possibility of obtaining a pure water supply;
>
> Volume of traffic at certain portions of the route;
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> Value of land to be acquired.
>
> 8. These same principles will govern on controlled-access highways other than the Interstate System.
>
> The selection of sites and the planning of their development will be the responsibility of the landscape engineer.

Roadside rest areas are an adjunct to the modern highway, popular with motorists. They promote highway safety, furnish necessary services for rest and relaxation, and are a convenience that increases the pleasure of road users. These considerations are important in our endeavor to retain and increase the monetary benefits accruing to the department and to the economic life of the state from highway travel.

## SPECIAL PLANTING PROBLEMS ON INTERSTATE HIGHWAYS

In suburban areas, immediately outside major cities, land values are high and traffic volumes great. Here a number of special planting problems will be encountered on typical Interstate highways in humid regions.

In rural areas, at some distance from the suburbs, planting on roadsides of the Interstate System will be largely that required for stream and soil erosion control, under slope conditions where seeded turf grasses will not be effective.

On both suburban and rural highways, the conservation of fine existing trees and other natural growth should be provided for in new centerline location and in construction. Fine, mature trees may be much more valuable than any planting. Existing growth may also determine what types of planting should be done and how the selected plant materials should be arranged.

Too often on housing and highway projects in the past few years, there is an observed tendency to cut every living shrub and tree standing between the property lines. This trend should be avoided in locating and constructing the Interstate highways.

Special Area Planting. Where traffic volumes and land values justify it, planting of the following types should be done, as determined by existing highway conditions.

Screen or buffer planting may be needed to protect residential and school properties from traffic noise and dust.

Planting may be desirable to protect motorists from the noise and dust of commercial activity on lands adjacent to the highway and to screen undesirable views.

At grade separations and interchanges, planting may be advantageous to frame structures, guide traffic movement, block headlight glare, and for other safety purposes.

The importance of slope planting to control stream and soil erosion and the need for such planting without delay following finish grading of slopes and embankments have been mentioned previously.

A detailed discussion of the many aspects of roadside planting will be found in Highway Research Board Special Report 23, titled "Planning and Management of Roadside Vegetation." For example, there are several pages concerning planting for traffic guidance beginning on page 6. Reference is also made to HRB Bulletin 110, "Abatement of Highway Noise and Fumes," page 34.

## CONCLUSION

The late Lawrence Ilsley Hewes, once Chief of the Western Region Office of the Bureau of Public Roads, in his book "American Highway Practices," said: "It is desirable that the landscape architect review preliminary surveys on the ground, and that his ideas be given every consideration before final plans are drawn."

If the landscape engineer is to be successful in planning roadside or land-

scape development on the Interstate System, he must enter the highway location and design picture in its early stages, in collaboration with the location and design engineers and other engineering specialists. It is to be noted that the landscape engineer was on the location and design team on the Garden State Parkway and other outstanding eastern express highways. By such collaboration, the following may be achieved:

1. Outstanding features of the route can be preserved.
2. Alignment can be adjusted to fit the topography and take best advantage of scenic values.
3. Aerial surveys, and contour maps made from them, may be used in preparation of grading and planting plans.
4. Slope protection and soil and water conservation problems, so important to both the highway engineer and the owners of adjoining lands, can be solved in highway location and design.
5. Best sites for roadside rest areas can be selected, acquired, and developed.
6. Planting and erosion control problems can be solved in plan preparation.

Minimum highway design standards have been set up under Interstate highway legislation, but the "know-how" and the vision and imagination required to solve recurrent problems of Interstate highway planning and design cannot be legislated. Here is a field where the landscape engineer, from a background of professional training and some years of highway department experience, can make a solid contribution.

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W. H. Simonson:

I was interested particularly in the reference to a comment on urbanization problems made by Douglas Haskell, Editor of "Architectural Forum," in his address at the opening General Session. I recall that he said: "Future planning must be correlated with land use."

The presentation by Mr. Gordon, emphasizing the relationship between streams and new highways, leads right into the field of the next panel member. He is John G. Sutton, Drainage Engineer of the Soil Conservation Service, who will open discussion on the "Drainage and Erosion Control Aspects of Roadside Development."