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REPORT OF AD HOC COMMITTEE ON MAINTENANCE CONSIDERATIONS IN HIGHWAY BEAUTIFICATION

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President Johnson, in his 1965 State of the Union Message, has called for a major program to protect and enhance the beauty of America. Included in this program are to be new and substantial efforts to landscape highways as well as to establish more parks and recreation areas.

Following the State of the Union Message, President Johnson directed the Secretary of Commerce to undertake specific programs to achieve the goals of highway beautification including:

- Landscaping be made a part of all Federal-Aid interstate, primary and urban projects.
- Acquire land or easements adjacent to highways to preserve and enhance the beauty.
- Provide more rest areas.
- Broaden study on scenic roads.
- Encourage maintenance organizations to aid and abet growth of wild flowers.

The President placed high priority on landscape projects for screening junkyards, excavation scars and other unsightly areas adjacent to highways. He also directed the Secretary of Commerce to prepare appropriate legislative proposals required to achieve the beautification objectives.

The Bureau of Public Roads immediately established the policy that all Federal Aid interstate and primary projects for new construction and major reconstruction of highway sections are to (a) have an overall geometric design that embodies the features essential for natural, pleasing appearance and (b) contain provisions for practical and appropriate landscape and roadside development. Separate Federal-Aid projects may be necessary on existing highways to accomplish landscape work

needed to restore the highway right-of-way to a pleasing and natural appearance, fitting to the environment.

The AASHO Policy on Landscape Development 1961 and the AASHO Landscape Design Guide 1965 are to be used as the guide for landscape work on all Federal-Aid projects insofar as feasible and practical.

Landscaping is described as a part of roadside development apart from erosion control as follows:

> Erosion control - Spreading of topsoil, seeding, sodding, mulching and other treatment to restore highway construction areas to a natural and nonerosive condition.
>
> Landscaping - Preservation of natural growth, planting of trees, shrubs and ground cover and treatment of minor structures within the right-of-way.

In addition to the inclusion of appropriate landscaping in Federal-Aid interstate and primary objects, the Bureau of Public Roads has placed a high priority on Federal-Aid projects to screen unsightly areas adjacent to the highway and has encouraged doubling the number of safety rest areas identified in the 1965 interstate estimate plus increasing scenic turnouts and rest areas on primary routes.

The Highway Beautification Act of 1965, signed by President Johnson on October 22, 1965, supplements existing legislation and authority in these matters. It provides for reducing of Federal-Aid highway funds apportioned after January 1, 1968, by 10% to any state that has not made provisions for effective control of outdoor junkyards that are within 1,000 feet of the edge of the right-of-way and visible from the main traveled way by screening with natural objects, plantings, fences or other appropriate means. The Federal share of such landscape and screening costs shall be 75% no part of which shall come from the Highway Trust Fund.

The act also provides for costs of landscaping, roadside development and development of rest and recreation areas as part of construction of Federal-Aid highways to come from the general fund without being matched by the state. An amount equivalent to 3% of apportioned Federal-Aid funds for any fiscal year shall be allocated to the state for these purposes. Exceptions from this requirement may be made if such amount is in excess of the needs of the state for such purposes.

A report shall be made to the Congress not later than January 10, 1967 covering estimated cost of carrying out the provision of the Highway Beautification Act plus a study of the economic impact on affected individuals and commercial and industrial enterprises, effectiveness of the program, public and private benefits and alternate or improved methods of accomplishing objectives.

On November 4, 1965, President Johnson announced the first allocation of Federal funds to states to begin implementation of the Highway Beautification Act. Total amounts allocated were $3 million for control of outdoor advertising, $3 million for control of junkyards and $60 million for landscaping and scenic enhancement.

The states will initiate projects, purchase right-of-ways, let contracts and supervise work, subject to review and approval of the Bureau of Public Roads. They will be reimbursed for 75% of the costs for control of outdoor advertising and junkyards and 100% of the costs of landscape work.

In subsequent explanations and interpretations of the Act by the Bureau of Public Roads, it has been stated that in most cases the cost of landscaping right-of-ways and providing roadside rest areas within the right-of-ways will continue to be a part of the "cost of construction" on the highway project. Recommended priority for use of the 100% Federal landscaping funds are as follows:

1. Acquisition of scenic strips along Interstate.
2. Acquisition of scenic strips along Primary.
3. Improvement of scenic strips along Interstate.
4. Improvement of scenic strips along Primary.
5. Landscaping of Interstate, Primary and Secondary right-of-ways.

REVIEW OF AASHO LANDSCAPE DESIGN GUIDE, 1965

Roadside development and landscape design has in the past primarily served functional roles such as erosion control, screening of headlight glare, crash barrier and drift control; with increasing highway construction and travel, it becomes more important that highway design, construction and maintenance include means of maintaining and improving the economic and aesthetic values of the highway and the adjacent area. Appropriate landscape design can result in an attractive highway that is desirable asset to the environment through which it passes. This type of roadside development, including scenic turnouts, recreation areas and rest stops, can also add to the safety of modern highways by breaking the monotony of rapidly increasing long distance travel.

Location and Design - Careful study of the topography and the area should result in the location of the highway so as to conserve existing features such as wooded areas, streams, ponds and rock formations. In residential sections, adequate space and screen plantings should be provided to reduce the nuisance of noise, dust and fumes. The urban highway may offer the opportunity of being a catalytic agent in the economic and aesthetic upgrading of an area by providing the only open space for trees and grass and thus creating an attractive environment. Plantings in urban areas can be used for special functions and purposes such as screening undesirable views, noise and lights, traffic guidance and improving appearance of interchanges, and structures.

Landscape design problems in rural areas are different from those near cities. Several primary objectives of rural landscape designs should be preservation of natural beauty by obtaining scenic strips adjacent to the right-of-way, development of scenic turnouts, recreation areas and rest stops and screening of all undesirable views.

Embankment slopes should not be steeper than 2:1 where practical. Turf should be established only on areas to be maintained by mowing, other disturbed areas should be protected against erosion by ground cover. Minimum setback distances from the edge of pavement should be 30 ft. to face of trunk for major trees and 20 ft. for shrubs or minor trees. Normally, 90% or more of plantings should be located at a greater distance from the pavement than the minimum clearance.

Construction - Certain considerations during the construction of modern highways on wide right-of-ways can enhance natural beauty and reduce future maintenance. All areas within the right-of-way but beyond the necessary limits of construction should be preserved, protected or restored. Dead trees and shrubs should be removed and others trimmed and thinned to provide a neat, pleasing appearance. The design and construction of slopes as flat as practical will reduce erosion and the need for guard rails and thus reduce future maintenance costs.

Maintenance - Section VIII "Maintenance Considerations in Design" of the 1965 AASHO Landscape Design Guide contains much excellent information that, if put into practice, will be helpful in keeping future maintenance costs of landscaped highways within reasonable limits. This section is reproduced here in its entirety.

"Maintenance of roadside areas in the immediate years following construction is an important consideration in highway roadside design. Such factors will have a decided effect on the design of the highway and the general appearance of the roadsides to the users of the highway and to the environment.

"Costs for the development and management of vegetation on roadside to control erosion and to provide a highway attractive to the public can be determined on an economic basis and should be evaluated in comparison with the services provided. Expenditures for attaining adequate benefits at minimum maintenance costs may be readily justified if the designs are completely appropriate.

"Economical maintenance of the entire right-of-way - i.e., the medians, border areas, interchanges, and rest areas - is largely dependent upon how well the construction has been adapted to the topography. Maintenance cost is a factor in determining the most effective and economical design for roadside grading, drainage, erosion control, and planting appropriate to the local soil, climatic and other conditions. The cost of mowing, fertilizing, and related operations in maintaining grass area, for example, should be weighed against the higher initial cost of planting and establishing long-lived, low-growing types of groundcover plants to eliminate continuous and repeated mowing of turf. The landscape plans for erosion control and planting should show the limits of areas of the right of way that are to be in turf and closely mowed, or on which a selected control of the growth is to be accomplished.

A. Turfed and Planted Areas

"Areas of mowing may be reduced by planting groups of small flowering trees or shrubs with low groundcover at appropriate locations on high steep slopes. High-headed shade trees, that do not obstruct sight distance in the vicinity of paved ramps, may also be combined with a planting of woody types of groundcover to reduce areas of mowing, especially on the steeper slopes of interchange areas. Where only a small amount of maintenance can be expected, the greatest extent of grass areas should be left unmowed, and only those plants which are readily established and have the most enduring qualities should be used. Along areas of rural highway natural seeding or suckering of vines, shrubs and trees should be encourage to re-vegetate.

"The growth retained or planted should be selected species to favor re-establishment of a natural cover. The planting of easily-grown materials in groups, or as widely-scattered individual plants, will induce local plants to establish

themselves because of favorable seedbed conditions, protection from winds, snow and erosion.

"Single, widely-spaced woody plants require individual mowing. Woody plant material should be planted in groups with the shrub borders underplanted with appropriate groundcover so that there is an uninterrupted mowing pattern. However, litter may tend to collect in such locations, thus requiring additional maintenance that must be considered against the cost of additional mowing among widely-spaced plants.

B. Environmental Conditions Affecting Planting

"Problems in maintenance should be anticipated when the planting plans are prepared. For example, changes in environmental conditions should be anticipated. Hardy plants should be selected that are suitable for the planting requirements and adaptable to roadside conditions. They should be tolerant of dry or wet conditions and exposures to shade, hot sun and drying winds. Species of plants that outgrow their usefulness requiring replacement or renewal should not be used. Maintenance costs involved in the use of budded or grafted stock should be considered, although exceptions may be justified for obtaining desired effects. The use of plants with showy flowers or fruits that might cause objectionable parking or vandalism, with a possible hazard to traffic, should be avoided.

"A long-range maintenance consideration in design is to avoid the use of plants that will not grow to an ultimate size without requiring removal, topping, or frequent pruning in the location planted. This applies to such considerations as sight distance, views, existing and anticipated utility lines, and future widening of pavements. This includes removal of small trees which will ultimately require expensive pruning or removal because they are too near the pavement, in the line of sight distance or encroaching on overhead or underground utility lines.

"Lack of moisture and reflected heat are injurious to plantings in narrow medians and often necessitate excessive replacements, particularly in semi-arid regions of the country.

"In undeveloped arid and semi-arid regions, the planting of woody growth is normally limited to stream banks, along irrigation channels, or at stream crossing where no irrigation is required. The cost of irrigation to establish and maintain planting may be justified however, on certain portions of urban projects, especially in the vicinity of interchanges and intensive city development, such plantings will improve the appearance of the highway and they will benefit adjacent land values.

C. Selection of Plants

"Native plant materials are generally preferable to exotic species. Avoid the use of plants that will require undue maintenance to preserve the desired soil conditions. Remove and do not plant materials that require special care to prevent or control the ravages of insects or diseases. Avoid plants that are weak, brittle or easily broken by wind or snow load.

"The cost of maintenance may be kept to a minimum by the proper selection and use of plants that are tolerant to normal abuse.

"Considerations of maintenance have a high priority in the urban planting design of plantings because of the adverse factors affecting growing conditions in a city environment. More care is required in the selection of plant materials and the planting operations in suburban than in rural surroundings. These factors include the possibility of poor soils, poor or excessive drainage, shade from buildings, reflected heat from pavements and buildings, air drafts, fumes and smoke. In the selection of plants, requirements as to longevity, insect and disease resistance, strength of wood and fruit characteristics are intensified because of these adversities. The normal requirements of tree structure, height of branching, plant size and root growth habits affecting pavements and underground utilities become more important factors under city conditions. Various species of trees and shrubs with conspicuous flowers, or horticultural types having gardenesque qualities (such as magnolias, flowering cherries and forsythia which would not ordinarily be appropriate in the open country) are often acceptable in urban situations.

D. Size and Arrangement of Plants

"Avoid using large or mature sizes of plants. Costs for plants and plantings increase in a high ratio as the plant sizes increase; plants in small sizes can be transplanted with fewer losses, and the smaller plants normally recover from the shock of transplanting and grow faster than larger sizes.

"Avoid hedges that will require pruning except where costs are justified, such as plantings for windbreaks, snow fences, screens and headlight glare control.

"Evenly spaced rows of trees are the most expensive type of roadside planting to maintain. Where a tree-lined effect is desired in rural situations, space the trees at irregular intervals with offsets from a uniform alignment. The loss or irregular growth of any one tree is not as apparent as it is in evenly spaced rows, and therefore replacements may not be required.

"Encourage existing growth, add shrubs or vines on rough areas and on steep slopes that cannot be mowed by machine.

"Plant beds adjacent to mowed areas should be of a free-flowing outline to favor easier mowing practices.

"Plants should not be allowed to remain in or encroach upon drainage-ways that will impede their functional value or increase maintenance.

"Reduce the cost of maintenance weeding in planted areas by effective and economical applications of mulching materials.

E. Character of Vegetation and Its Maintenance

"Maintenance work should be scheduled for the most effective seasons for each class of work. For example, mowing should be at intervals governed by growth rates to avoid rakings, fertilizing of turf should precede maximum growth periods, and selective thinning and pruning of plants for the control of woody growth should precede the dormant period. Many items of roadside maintenance, such as tree removal and tree care, which are not seasonal, may be scheduled for other periods.

"The character of the vegetation and its maintenance should correspond to that on adjacent public or private lands, insofar as practicable, particularly where highways are adjacent to well-kept properties in parks, cemeteries, schools and institutions. High land values cannot be maintained in either suburban or suburban residential areas without maintaining well-designed planting of street and highway borders. Shade trees and good turf are essential in residential zones in order to preserve the appearance of the neighborhood and to protect the existing land values.

"In order to minimize the maintenance of large areas of land within the loops or islands of interchanges and reduce the amount of mowing normally required, it may be feasible to plant groves of trees as a part of the overall planting scheme. Such groves of trees may be considered as the most economical type of cover over a long period of years.

"Landscape development at the end of construction is no longer considered an embellishment. Landscape design is a basic consideration in the early stages of location and design to provide the optimum of variety and interest for the highway traveler. It results from the working together of those responsible for planning and designing highways, and it must be a continuous group effort from the beginning of design, construction and maintenance. Such collaborative effort contributes to making the complete highway economical to construct and maintain, efficient and safe to travel and visually attractive to the community as well as to the motorist."

MAINTENANCE CONSIDERATIONS

The combined effect of President Johnson's beautification program, the latest Bureau of Public Roads' policy on landscaping and rest areas and recent passage of the Highway Beautification Act is that there will be a tremendous increase in the amount of trees, shrubs and ground cover planted on highway right-of-ways. This is bound to result in an increase in maintenance activities and problems as well well as maintenance costs. However, without close consideration of future maintenance requirements during the design and construction stages, future maintenance costs could become unreasonably high. Mr. Charles R. Anderson, Chief, Landscape Section, Maryland State Roads Commission, stated this position clearly in a recent paper:

> "With good maintenance, the President's Program will be a big success and of infinite benefit to the people and beauty of our country. Without good maintenance, the Program could be a failure and disgrace.
>
> "How can we encourage good maintenance? The first and most important consideration is to design with maintenance in mind. The next is for maintenance to have adequate funds to properly care for and enhance the beauty of our highways."

With this in mind, the committee lists the following items that could be helpful in keeping maintenance costs within reasonable limits. No effort has been made to prepare the list in order of importance.

1. Urge compliance with recommendations contained in 1965 AASHO Landscape Design Guide, particularly those in Section VIII on pages 88-92.

2. Maintenance engineers should take an active part in the evaluation of the program to be submitted to Congress by January 10, 1967.

3. Maintenance Engineers should be consulted during the design phase of landscape work.

4. Landscape plantings should not be made where de-icing chemical solutions may be expected to reach the root area.

5. In some cases it may be desirable to delay landscape plantings until establishment of erosion and weed control.

6. Turf should not be used initially for erosion control if natural ground cover is eventually desired. Turf is more costly to maintain and retards establishment of natural growth.

7. Maintenance organizations should become familiar with care of plantings such as trees, shrubs and ground cover vines to be in a position to protect the investment in landscape work.

8. Reduction in the amount of turf and mowing by landscape planting is a desirable objective.

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