ROADSIDE DEVELOPMENT

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A new epoch in the art and science of highway development is evolving through a blending of the views of the highway engineer and the landscape architect. During the year 1934, two definite phases or trends of development in modern highway design are evident: the recognition of the importance of the subgrade in relation to the adequacy of service and economic life of any type of road surfacing, and the modification of highway design to conform with the principles and technique of landscape architecture. It is a somewhat unusual coincidence that these two stabilizing factors are developing concurrently in highway engineering practice; the one, subgrade treatment, aiming to stabilize the subsurface portion of the roadway, while the other, roadside development, aims to stabilize the surface features of the highway. The problems of erosion control along roadsides and the reasonable regulation of what takes place on private property along the border of the highway are vital considerations. A safer and more useful, efficient, and pleasurable low-cost type of road construction is evolving through the application of these basic principles of modern highway design. The "stream lining" of highways is fast replacing the straight-line horse-and-buggy road with sharp bends and turns.

THE DEMAND FOR IMPROVED APPEARANCE

We are living in a fast-moving age. It is sometimes difficult, however, to recognize the beginning of a new period, even though we may happen to stand in its presence. The reason is the human tendency to resist change from older routine habits. New ideas and new methods are usually under suspicion for a time until they begin to be accepted here and there, and suddenly it becomes apparent that these new principles are supplanting the old. When this is recognized and the inertia of change has been overcome, there follows a sharp, widespread awakening of interest, and a general move forward to participate in it. Such a change in highway thought is now occurring. Does this not indicate that roadside development is passing through a transition period similar to the trial period of the automobile when it was first introduced as a new means of transportation?

Automotive engineers and artists are now combining beauty with utility in the stream-lined motor cars that speed over our highways. Is it not just as essential that the highway engineer and the landscape architect collaborate on the more important and less transitory problem of highway development, and, by blending art with science, improve the

quality of public service rendered by our arteries of travel?

The evidence of traffic records that show the heavy flow of tourist travel to regions of recognized scenic beauty should convince that roadside development has an economic as well as an esthetic value. We are now in the midst of a more stabilized era of artistic appreciation wherein art and science are joined to develop the pleasing quality of appearance in the finished products of today. Roadside development likewise aims to make highway service safer and more complete and fully efficient for modern travel. In the land report submitted to President Roosevelt last month by the National Resources Board and made public on December 17, the following statement is made: "It is estimated that recreational use forms at least 60 per cent of the total use of automobiles, a showing which would seem to justify more attention to the control and preservation of roadside appearance."

On December 6, 1934, the Joint Committee on Roadside Development of the Highway Research Board and the American Association of State Highway Officials reported that it "has found and maintains that practical roadside development when accomplished in accordance with approved principles of landscape engineering contributes to the economy, efficiency, and safety of highway maintenance and operation. In support of this statement, eight factors are presented, to-wit: that stabilization of slopes reduces erosion; that more adequate drainage is provided; that drifting snow, sand, and dust is in part controlled; that traffic hazards are greatly reduced and guard rail costs decreased; that cost of mowing roadsides is reduced; that land and property values are enhanced; that land damage claims are lessened; and that better public relations are promoted."

PROGRESS IN ROADSIDE DEVELOPMENT

Prior to June, 1933, when "the appropriate landscaping of parkways or roadsides on a reasonably extensive mileage" was emphasized in the public works highway program, only a mere handful of states had seriously considered the possibilities of comprehensive roadside improvement. By the end of 1934, however, practically every state had work of this character under way or contemplated, including even the far-distant Territory of Hawaii. In the comparatively short period of one year, the state highway departments have programmed approximately 1,000 miles of roadside improvements, distributed in nearly 300 projects, averaging slightly more than 3.5 miles each in length. This accomplishment is gratifying inasmuch as many of the state highway departments, because of the pressure under which they were operating during the stress of the emergency program, did not really get organized for this relatively newer phase of highway activity until early in 1934.

The amount of landscape work undertaken during the first year of operation under Section 204 of the Recovery Act is very encouraging. The estimated cost of the work on the approved projects in 42 states is $1,590,057, or an average estimated cost of approximately $1,600 per mile. The majority of the specially selected projects are located on main arteries of travel, generally adjacent to the corporate limits of the more important communities, where sufficient right of way is available to undertake satisfactory landscape work.

Contrary to a somewhat general belief, the cost of comprehensive roadside improvement is not absorbed largely in the purchase and planting of trees and shrubs, for only about one-third of the estimated cost of the improvement is spent for the purchase of plants and seeds and the actual planting operations. On this basis, it may be assumed that approximately one-half million dollars has been or will be expended on the actual planting and seeding of the 275 projects already approved, for a total of considerably more than one million plants (1,133,202), consisting of 116,262 trees, 538,147 shrubs, 478,793 vines, and a large number of acres of seeding and sodding. Roughly, this would approximate $500 per mile average cost for the actual planting and seeding operations, not including the requisite advance preparations or after-care of the projects.

Mr. Thomas H. MacDonald, Chief of the U. S. Bureau of Public Roads, says:

> "Measured in dollars and miles, the venture into the landscape field can hardly be characterized as other than conservative. It is not, however, the cost of the undertakings that carries conviction of worthwhile future progress, but the general effective provision that has been made for work of this character by many of the highway departments and the evidence of thoughtful consideration that we find in the majority of plans submitted.
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> "The work of highway improvement cannot be regarded as finished until the natural beauty marred in the process of construction has been fully restored and reasonably enhanced. While the work is well begun, there is much to be learned that only experience can teach; there are organizations to be perfected and methods to be tried; and for these reasons a present program somewhat smaller than the more enthusiastic would desire is perhaps the part of wisdom.

Mr. MacDonald further continues:

> "Among other safety provisions specially listed as desirable objects of expenditure in the National Industrial Recovery Act is the construction of footpaths. There can be no question of the great hazard involved when pedestrians are forced to use the vehicular roadways or crowded highways in the environs of cities; nor can it be denied that such a condition exists at the approaches to practically all cities. In view of these facts, the emphasis placed upon

the provision of footpaths by the act itself, and the rules and regulations, is fully justified. The response has been far too meagre, necessitating the adoption of a policy by the Bureau of insisting upon the inclusion of footpaths and sidewalks in future projects where justified. No bridge in or near a city or town should be designed without a sidewalk. Yet there have been lately submitted several such designs."

LANDSCAPE ORGANIZATION

The necessity for properly trained and experienced guidance cannot be overemphasized, as the quality of the completed work depends upon the staff organization in charge of development work of this character.

The majority of the state highway departments have found it advisable to employ landscape architects and landscape engineers to plan and direct their roadside improvement programs. Some idea of the character of the organizations that are being developed may be supplied by the kind of men that have been put in charge of the work; either in the design or plans and surveys division or in the maintenance and/or construction divisions of the department.

In twenty-five states these men bear the title of landscape engineer, but there are technically trained landscape architects among the incumbents. In six states the roadside men are known as landscape foresters; in four they are landscape architects; three states employ arboriculturists; two depend upon State University specialists; two have delegated the job to their maintenance engineers; two have made it the function of assistant engineers with the advice of specialists; and one state highway department has the co-operation of the State Park Engineer—clearly a diversity of experimental supervision.

The attractive appearance of the surface features of a highway is dependent upon basic landscape principles. In practically all of these states notable progress has been made in placing this phase of highway work on a scientific footing. Especially encouraging is the evidence that the highway engineers are "landscape conscious" and are rapidly becoming familiar with the fundamental objectives of roadside development through collaboration with the landscape men in the preparation of plans and specifications.

One of the tendencies observed as a result of highway and landscape engineers jointly working together on this common development and design problem is that the highway engineer very soon appreciated the fact that landscape architectural considerations in the design and construction of a modern highway are just as important as any other considerations, and that it is fundamental that such considerations be developed with forethought as an integral part of the road construction and not added to it as an afterthought or "decorative

dolling-up" after the road has been completed. The basic ideas should be developed, not in sequence, but simultaneously in the work of design and construction as a dual function of highway planning. The sound economy of such a practical co-operative approach appeals to the engineer who has had an understanding contact with this relatively new phase of highway development. Perhaps the indirect influence of such comprehensive demonstrations upon the basic principles governing highway development may be as effective in an intangible way as the direct value to the public of the tangible demonstrations.

THE HIGHWAY A PART OF THE LANDSCAPE

The progressive improvement of our highway surfaces is paralleled by the progressively broadening concept of the highway as a traffic service unit that includes the sides of the road as an integral part along with the pavement design and construction. The present primary problem is to fit the highway and the details of construction into its natural surroundings through the preservation of the good features of its rural or urban character. Perhaps the chief need is wider right-of-ways to permit expansion and better curvature and alignment The safety factor is the major item in the design of highways, and for a maximum of safety, room is essential. In an effort to remove the raw appearance of new construction, state highway departments are giving more thoughtful consideration to the protection of the existing growth of trees and other native plants along the way. Standard cross-sections are modified so that the resulting cross-section will always be in harmony with the landscape. Earth slopes in cuts and fills are flattened and liberally rounded during grading operation to a more stable and natural appearance. Borrow is designed in the road plans and is not evident as such. Side ditches are being widened and made less hazardous, and more attention is being given to the pleasing appearance of necessary structures. The engineering leadership of the country appreciates the economic value of all these various factors of fundamental highway design as essential elements in the protection of the highway investment. The adoption of these forward-looking policies in some of the states indicates the value of the collaboration of the highway engineer and the landscape architect from the inception of a project. It is vital that the landscape considerations be analyzed before a highway location is made rather than after plans and construction are started. Under this arrangement many pleasing landscape features may be worked into the design and construction at no additional cost.

It is realized that the natural scenic environment along highways is fast becoming one of the most valuable assets of national life. For this reason, the proper design of a highway includes the treatment and regulation of the roadsides as well as the roadway proper. The entire area of the right-of-way,

including the regulation of the entire landscape visible from the highway and the preservation and restoration of the beauty of the natural landscape, should be considered as an integrated and completely unified road section, wherein slopes are flattened to reduce erosion, ditches are made less hazardous, native trees are saved, and a generally neat and clean appearance prevails. It is more economical to include these more permanent features in the initial construction than it is to attempt to do it as a separate operation after a highway is finished. Every effort of this nature is a direct contribution to the necessary preparation for the ultimate planting of a highway, and to that extent simplifies this final part of the work.

There are many places where comprehensive improvements can only follow appropriate legislation. As highway departments go on with improvement work of this character, there will be profit in experience, both as to personnel and as to the method of organization and of operation. Clearly, the improvement of the highway roadside is becoming a problem for intimate study.

APPEARANCE OF ROADSIDE STRUCTURES

Landscape design must be coupled with good engineering in order to obtain the best results. Architectural improvement of roadside structures along highways also forms a part of the whole problem. The distinctive beauties of the individual states or regions should be expressed in appropriate design and local materials to counteract the trend toward standardization. Well-designed gas stations reflecting the craft and materials of the section would be much more suitable than some of the present attempts at all manner of picturesque buildings that show little taste or thought in their planning. The same considerations apply to the roadside tourist lodge and camp structures. There are existing examples of such structures that indicate how knowledge and feeling, rather than cost, determine quality and good taste in architecture.

LANDSCAPE PLANTINGS

Tree groups and ground covers, with some distinctly native wild materials, have proved to be most appropriate as an expression of fine natural development; the trees for skyline interest, and the ground-cover types for erosion control, to allow for a reasonable amount of variety and landscape interest. Simplification in a well-conceived plan and neatness in cleanup after construction will go farther to improve appearances than will most of the efforts toward landscape improvement. Simplicity of treatment is recommended as being economical to prepare and to maintain, as well as generally more satisfactory esthetically. Good practice in roadside improvement aims to work with nature and to work with the

citizens of the community. Highway harmony may be developed in this co-operative way at the lowest expense.

Mr. O. S. Warden, President of the American Association of State Highway Officials, says:

> "The highway vision opens up to a nicety of building—a complete usefulness—an unconceived and undeveloped beautification that has not yet come into the dreams of the engineer and the builder . . . Within the nicety of building . . . The highways of tomorrow will make each journey pleasant."

We are learning that varying conditions require varying treatment—that local adjustments to the various problems are desirable to obtain worthwhile results. More permanent and satisfactory results are assured where practical common-sense adjustments are made, in the planning and during construction, to fit the needs of each individual highway. The scars of construction have heretofore sprung from the standardized mechanical methods of the recent era of mass production of highway mileage. Fortunately, we are yet in a position to profit from the factory-method experiences of the drafting room, which may be avoided by giving considerably more attention to the varying conditions in the field. More field checking of detail plans would be desirable. Highway safety, utility, and beauty are largely dependent upon the location alignment and grading. One of the best protections against the most frequent source of accidents is a good roadbed surfacing, with an ample width of shoulder, and with gentle easy slopes away from the shoulder. A highway is beautiful largely to the extent that it has the appearance of nature undisturbed.

"Never design what you cannot maintain" is a good thought in highway design. In estimating the economy of any contemplated roadside improvement, the question is, "How much can we afford to invest now to save a determined amount of annual maintenance expenditure?" It can be answered by comparing the additional investment with the saving in cost which it effects. And it is axiomatic that the principles of safety and good appearance are inseparable. Every scientific effort made by the highway engineer to improve traffic safety usually effects an equal or comparable improvement in the appearance of the highway. Steady and constant progress is being made in the development of the highway system of the United States so that the roads may lose their look of newness and be harmonized with the landscape as if they had sprung from the soil.

The public works program has served to make a beginning in roadside improvements in each of the states and to create a popular demand for such improvements. A growing general interest in the comprehensive development of the modern highway is indicated. It is indicative of the need for constant collaboration between the several departments of the highway organization for the effective and proper solution of their com-

mon problems. One of the primary values of the demonstration projects included in the first year of activities of the public works highway program is largely in the opportunity it has presented to develop this requisite co-operation and to prove its results both to the highway builders and to the public. It is the confident expectation of federal authorities that the results will be generally satisfactory and that what is now a national demonstration will very quickly become an accepted policy.

WORK-RELIEF VALUE

Highway building today should have the goal of creating employment, but an objective of equal importance should be the improvement of roads that will constitute an effective answer to the problem of traffic safety. It is of particular interest at the present time that approximately two-thirds of the roadside improvement expenditure goes DIRECTLY to labor on the local job, while a large part of the remaining third goes to labor employed in growing and supplying plant material. Roadside development, being so largely handwork, affords unusual opportunities for state, counties, and cities to distribute and spread work-relief to various classes of labor.

A well-balanced program of roadside operations directly utilizes unskilled labor to a maximum degree. More than 90 per cent of every dollar spent for this kind of constructive work ultimately arrives in the pay envelope of labor. Roadside improvements are productive and useful work. which provide most effectively for the direct employment of local labor and at the same time also create tangible values of a reasonably permanent nature to be shared and enjoyed by every citizen.

Roadside improvements have a definite place in any program planned for the accomplishment of these common objectives for the public good. The development of these principles will assure an American type of highway for America.

WHAT IS NEW IN CONCRETE PAVING PRACTICE

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The history of concrete paving practice in the United States may be summarized by stating that it first went through a period of slow development with relative uncertainty as to the adequacy of various construction practices, then through a period during which some of the most troublesome uncertainties were eliminated by empirical methods, and finally through a period of development and application of scientific principles.