

TWENTY-FIRST ANNUAL (1941) MEETING OF THE HIGHWAY RESEARCH  
BOARD AT JOHNS HOPKINS UNIVERSITY, BALTIMORE, MARYLAND.

DECEMBER 2-5

ROADSIDE DEVELOPMENT

A SUMMARY OF GENERAL DISCUSSION AT DECEMBER 2, 1941 SESSION

The discussion on "Highway Types and Roadside Areas" opened with a question concerning the increased width of right-of-way suggested in the Committee's report. It was stated that the cost of maintenance in Indiana was increasing on roads with wider rights-of-way, particularly mowing costs; therefore, an attempt should be made to design for as narrow rights-of-way as possible, considering widths of right-of-way essential to provide for machine methods of mowing. Costs of machine mowing are about one-fifth as much as hand methods per unit of area. Streamlined graded cross sections have eliminated much snow removal in States where snow is a major maintenance problem. Also on this type of cross section machine grading and seeding methods can be used.

We must also look ahead and have ample right-of-way to provide for future requirements. Experience has shown that we have been consistently short-sighted in acquiring right-of-way insufficient for our traffic needs. Studies will show the trend for future increases in traffic.

It is necessary to have a certain width of roadbed to provide for adequate pavement and shoulders. We know the best type of gutters and the most suitable slope ratios to use. The required right-of-way for adequate roadbed, gutters, and slope ratios does not have to be owned. In many States grading easements are used as an alternate to outright ownership in which the land area covered by the grading easement is returned to the owner after it has served its purpose. Fences can be put back in place after slopes have been graded beyond the right-of-way limits. A satisfactory cross-section foundation is needed to blend the road into the surrounding country and to reduce maintenance costs. Extra width is only necessary at certain places of deep cut and fill. Secondary or less important roads with smaller amounts of traffic would tend to use the minimum widths indicated in these flexible patterns. The basic pattern is similar in all cases, but the degree to which it is carried out is determined by the traffic and topographic requirements in each case. The cross section is thus adjusted to fit the particular situations.

On parkways, such as the Blue Ridge, 1,000 feet of the right-of-way were asked for at first, which was later changed to 100 acres per mile or about an average width of 800 feet. Also scenic easements were obtained which have not always proved satisfactory. The owner prefers to sell his land rather than being restricted in its use.

The cross section is based on earth cuts and fills. The worst scars are located on rock cut and fill slopes. Rock is tossed down fill slopes indiscriminately which makes for a very unsightly condition.

Practical variation in land widths to fit varying cross-section needs may be summarized:

Start with minimum width and acquire extra width for special purposes, such as at points of heavy cuts and fills, safety turn-outs, overlooks, snow-drift control, special requirements for drainage and drainage structures as in the vicinity of culverts and bridges and reduction in hand labor operations both during construction and in subsequent maintenance.

*Right-of-way and roadside control:* The five questions as presented in the report of the subcommittee on right-of-way and roadside control were then discussed.

In a recent survey made by Mrs. Lawton of the National Roadside Council, varying conditions of zoning on U S 1 from Maine to Florida were cited. Driving over this road, she noted that zoning varied in different States and also in different counties in the same State. Discussion brought out the fact that all counties cannot be zoned because there is no machinery to carry it out. Will wide right-of-way control zoning? Is it the answer? As cited on a road in Westchester County, N. Y., it was found cheaper to buy 250 feet of right-of-way on new location than to acquire very narrow 10- to 15-foot strips of additional right-of-way on an established road. Set-back lines are necessary anyhow. If there had been a set-back line along US 1 through Virginia when the road was built, acquiring additional right-of-way would have been simplified.

It was reported that most counties in Wisconsin were zoned. The general tendency is to keep away from strip zoning, although experience shows strip zoning seems to be necessary. State investments should be protected by strip zoning. State roadside councils and community clubs should be contacted to back up county zoning. Also impress highway departments with the necessity of it. After public opinion is aroused, legislation will follow. It was suggested that strip zoning be handled by highway departments along with State land boards or equivalent land planning commissions.

*Slope protection:* Any research work on soils should be tied in with stabilization work. A uniform classification of raw soils should be studied in relation to plant growth as it occurs on various portions of the highway shoulders, gutters, and slopes. It was agreed that these relationships in classification should be determined by the Committee.

Further discussion emphasized the importance of incorporating into contracts topsoiling on shoulders, slopes, and other roadside areas. Investigation is needed in the establishment of turf on stabilized earth shoulders where subgrade stabilization of the roadbed includes the shoulder area.



*Plant ecology:* Dr. Aamodt of the Bureau of Plant Industry of the U. S. Department of Agriculture discussed plant ecology as follows: Plant ecology is the process of fitting plants into environment. The plant most suited to a particular environment will crowd out less suited types and eventually will take over the area. Where conditions change, plants change. Highway conditions are equivalent to those in so-called "subsoil farming" and not too much is known about such conditions. Five factors influence plants - temperature, light, nutrients, pests, and the plant itself. A plant is a machine. The most efficient machine is the one best suited to a definite location. Adapt plants to conditions if possible. Sometimes conditions must be adapted to the plant, which has been the usual process on highways. It is possible to develop a grass for the roadside which is tough, grows on poor soil, and requires little mowing. The low-growing Japanese zoysia was cited as an example. On the roadside where several mowings a year are necessary, one species of grass of the several which may be growing there may be causing this heavy mowing by growing much faster than the others. Research has been interested so far in developing grasses with leafy tops. Many promising strains for the roadside have probably been thrown away, such as strains with heavy root growth and scanty tops. Strains which are suited for highway purposes will probably be developed when the demand for this type of grass is recognized.

It was found, said Dr. Aamodt that the Soil Conservation Service and the Bureau of Plant Industry were overlapping in the development of grasses respectively for erosion control and for the improvement of poor pastures. The work now is coordinated by agreement between these two operating agencies.

Later discussion pointed out the difficulty of seeding at the proper season by contract because the contractor starts work in spring at about the proper time for spring seeding and generally finishes up in the fall too late for fall seeding. A suggestion was made that seeding might be done in fall when too late for seed to germinate, the seed remaining dormant till spring.

*Economics:* The report on "Roadside Economics" should evaluate various grass types and strains, and make recommendations as to penalties for seedmen not meeting specifications.

A suggestion was made that seedmen be informed that the States are testing their products to see that they conform with the new Federal Seed Act and the State specifications.

It was thought that the tolerance clause should be left out of specifications in order to avoid any possible duplication or conflict with seed test regulations already covered by Federal or State seed laws.

Purity test takes only a few days which helps if seed is needed badly although it requires a month or more to obtain results of the germination test.

## DISCUSSION AT DECEMBER 3, 1941 SESSION

Topsoil was discussed from the standpoint of different types and uses as: (a) relatively clean topsoil for spreading over areas to be seeded, (b) topsoil containing roots and seeds of ground cover as in California, to be spread on slopes, (c) topsoil containing sweet fern, blueberry, golden rod, etc., for slopes. It was thought that the last type of topsoiling may work for honey-suckle.

A typical topsoil specification was outlined with emphasis on salvaging topsoil on contracts. It is important that the designation and description of "so-called" topsoil for saving be clarified in the specifications.

*Sod specifications:* The practical advantages of a thin sod were discussed. The thickness of sod to be used depends on the quality of the turf. Turf on putting surfaces is cut  $\frac{3}{4}$  to 1 inch thick. Thin sod starts quicker but also dries out quicker. One and one-half inches or two inches at the most should be sufficient for bluegrass sod.

*Cross sections:* Mr. Carpenter of the National Park Service showed designs for slopes used along some of the western park roads. The slope design includes liberal rounding at both top and toe of a cut slope. The top of slope is rounded for one-third its width or length up the slope, and is also rounded beyond the top of slope, the amount depending on how the land slopes beyond the top of the cut. A set-back or offset from the gutter line is adopted to obtain extra width for rounding at the toe of slope. This offset allowance in cross-section lay-out is comparable to the offset distance used in laying out spiral easements in highway alinement. This set-back varies from 2 feet for a 2:1 slope to 8 feet for a 1:1 slope. On the flatter slope area at the toe where this rounding takes place, planting of trees and shrubs is undertaken to help screen the bare slopes behind. Increased grading costs computed on three projects were 4, 6, and 8 percent respectively, over ordinary slope grading. The "S" form or "O-G" form of slope is the best looking and is worthy of consideration in ordinary highway construction where differences in cost are negligible. It has been used in regular park road construction. There is need to get it into a simplified set of tables for more convenient use. The development of the cross section from a flat plane to an "O-G" curve is simply the process of absorbing the plane by rounding just as is done in highway alinement when spiral easements are introduced at the ends of circular curves.

Discussion indicated that 1:1 slope with good rounding is better than a  $\frac{1\frac{1}{2}}{1}$  slope without rounding. It was thought that this type of design was favorable to the use of a grass gutter in lieu of a paved gutter.

*District meetings:* The secretary reported briefly on problems discussed at coordinating meetings during the past year. The reports made by the district coordinators will be found summarized in another part of the Appendix of this annual report.



The coordinators' meetings were generally attended by Public Roads Administration officials, design, construction, and maintenance engineers of the various States, and in one case the Chief Engineer of a State. The presence of these men showed increased interest in roadside work.

It was the expression of the meeting that all coordinators and subcommittees focus attention during 1942 on the assembly of all known material relative to turfing and associated problems on highway shoulders, flight strips, camouflage, turn-outs, and other roadside areas. Everybody is to work on this one project only so that such information may be put in pamphlet form at the earliest opportunity in an effort to meet the increasing demand by the war officials for turf data. This concentration of activities will supplement, and need not displace the work of the various committees now under way.

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FERTILIZING - "The fertilizer requirements of grasses for turf purposes are very different from those of most field crops. Grass produces a large amount of foliage for which nitrogen is primarily required. Because of this, together with the fact that nitrogenous salts are readily leached from the soil, nitrogen usually is the element which is likely to be depleted more rapidly from soil under turf. In general, therefore, the fertilizers which are recommended for use on turf are usually high in nitrogen. Fertilizer mixtures containing approximately half as much phosphoric acid as nitrogen and still less potash have been found to give the best results at the minimum cost in tests made under various climatic and soil conditions.

" \* \* \* for most conditions the inorganic mixtures are more satisfactory than the organic from the standpoint of cost as well as quick availability to the grass.

--TURF CULTURE, March 1942