

# Highway Shoulder Design from the Roadside Development Viewpoint

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● THE word "design" in the title of this portion of the discussion includes geometric design and materials used as well as the wearing surface of turf which first comes to the mind of most when roadside development is mentioned. The concern here is not with just a turf wearing surface on any kind of soil, although there are many miles of this type of shoulder where turf is at least serving the useful purpose of preventing erosion.

A turf shoulder may or may not be stable, depending upon the structure resulting by chance, but a "stabilized turf shoulder" is designed and constructed to be stable. During the period 1945 to 1953 the Committee on Roadside Development made a study of stable turf shoulders, and enlisted therein the cooperation of construction, maintenance, soils and traffic engineers and agronomists. Reports were received on investigational projects at 23 locations in 11 central and eastern states.

A concluding report on "Stabilized Turf Shoulders" was made in January 1954, and was published as Highway Research Board Special Report 19, and an extensive bibliography is included. Further study was postponed until there could be an evaluation of the practical value of the study, and because there were several questions which would have to be answered by others than those directly connected with the study. From a panel such as this could come the answers.

Since it is acknowledged that the texture of turf requires a steeper slope to drain off water than a smoother shoulder surface, how steep a shoulder is permissible? Is the recommended 1 in. per ft too steep? Could it be steeper?

The work "stable" was defined as the ability to carry at all seasons of the year the maximum load permitted, without such damage to the shoulder as would require repair; and the recommendations on materials are aimed at this definition of stable. Is such a degree of stability considered necessary 24 hours a day, 365 days a year? Materials well beyond the limits recommended may give satisfactory performance except during occasional critical periods of moisture. Other materials beyond the limits recommended may allow rutting, but only to a small degree, on any day. What definition can be established as to the degree of shoulder rutting that is acceptable?

Also, what width of stability is desired? Must the entire shoulder width be stable enough for parking for maximum loads at all times or would a narrower strip be satisfactory to take the more frequent emergency swerving off from the edge of the surfacing?

If it is definitely determined by research that a shoulder must be completely impermeable to moisture, then turf shoulders cannot be considered. But if such is not the requirement, or if it is true to state that there is a great mileage of highways which cannot afford expensive shoulders, then stabilized turf shoulders can be considered because:

1. Turf can be grown on stabilized soil-aggregate materials where moisture is adequate and, under occasional traffic, will serve as an economical wearing surface having shear value and preventing wind and water erosion.

2. Turf can be established and maintained on soil-aggregate materials compacted to the densities required for stability for highway purposes. Stabilized turf should be constructed with consideration for stability of surface, base, and subgrade. For the surface course, materials within the limits of the specification of AASHTO for "Materials for Soil-Aggregate Surface Courses" should be compacted to at least 95 percent maximum density. Turf should be established directly on the stabilized course by the appropriate procedures for turfing.

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3. Topsoil is not essential for turf and, if used without further definition as a soil material, might adversely affect stability.

4. With proper design, construction, and maintenance, the cost of construction and maintenance of stabilized turf shoulders is less than that of other stable shoulders. Build-up is not a characteristic of all shoulders of this type; when it does occur, it is less costly to correct than the constant erosion of an unsurfaced soil-aggregate material.

Of course, further studies are needed on design, materials, and methods for constructing and maintaining stabilized turf shoulders in other localities and on a more extensive scale than so far reported during the study, but it has been made clear that turf shoulders and stabilized turf shoulders are not the same, and that stabilized turf shoulders do not result from merely scattering a few seed.