# Design of Shoulders for Flexible Pavements

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●SHOULDERS for heavy duty flexible pavements should be paved with high type surfacing. Shoulder pavement for these highways should consist of either hot plant-mix, asphaltic concrete or penetration macadam. Thickness should be determined by the adequacy of the base course, but it should certainly not be less than 2½ in. The width of the paved shoulder should be a minimum of 5 ft or more in the case of heavily traveled roadways, and possibly of a sufficient width to provide for parking of disabled vehicles.

When the pavement on the traveled roadway is designed for light to medium traffic, the shoulders may be paved with a type of pavement that is commensurate with that used on the main portion of the highway. In other words, if the pavement proper consists of a road-mix, the shoulder should probably be the same type, or a bituminous surface treatment could be used.

No problem exists in delineating for the motorist which is the traffic lane and which is the shoulder. The two can be distinguished by one of a number of ways; a painted stripe can be used to separate them, or the shoulder can be distinguished from the pavement by the use of a different texture or surface, even such a coarse texture that a drumming sound will result when traffic uses the paved shoulder. Complete color distinction can be made by the use of light or dark aggregates, as the supply of local materials may dictate. Some highway departments have even gone so far as to make an improvised traffic line on the pavement edge by using ¾ aggregate in a thin ridge or line; the aggregate is fastened to the surface as in a surface treatment using bituminous material as the adhesive.

The beneficial effect of paved shoulders has been demonstrated and reported by the Highway Research Board. Positive statements on the benefit of shoulder paving are found in Highway Research Board Special Report 22 and the WASHO Road Test, Part 2: Test Data, Analysis, Findings (published 1955).

Perhaps it is needless to say that the durability and adequacy of the shoulder pavement will depend on the kind of support that it has. A subcommittee of the flexible pavement committee has made a report at this meeting. The subcommittee found, through a survey of the state highway departments, that there is a tendency toward the employment of foundation layers extending from ditch line to ditch line. This survey was conducted on primary highways only. The report is much too long and detailed for presentation here. However, there are certain interesting aspects that will be briefly mentioned.

With respect to the base course width on primary two-lane highways, 18 out of the 43 states reporting use base courses extending the full width of section, or from ditch line to ditch line. Most of the remainder, or 17 states, widen the base course beyond the width of the traffic lane by amounts ranging from ¼ to 1½ ft. The report also shows that 27 out of the 40 reporting states use full-width subbases. In a table listing the shoulder widths for primary two-lane highways it is indicated that 43 states use from 8- to 10-ft shoulders, 29 states using these widths only. Twenty-five states reported the use of a bituminous surface course on the shoulders. Nineteen of these states place this course, the thickness of which varies from ½ to 3 in., on the full-width of shoulder. The report also shows that 13 states of the 25 reporting use a bituminous surface treatment on the material in place, while 9 use the same type and thickness of surfacing on the shoulder as they use on the traffic lanes.

It was stated that shoulder pavement for heavy-duty highways should consist of hot-mix asphaltic concrete or penetration macadam, and that for secondary roads the shoulder pavement should consist of surface treatment or mixed-in-place surface courses. There are adequate specifications covering these types of pavement and it is needless to repeat them here. It appears that the money spent for paving shoulders is a good investment and it is usually returned many-fold through savings in maintenance costs.