

CURRENT PRACTICES IN SHOULDER DESIGN,
CONSTRUCTION, MAINTENANCE AND OPERATIONS

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Much unreported, in-house State research and development work has been done on shoulder maintenance methods, equipment and requirements, construction equipment and methods, design requirements, traffic control regulations, markings and warrants, and cost effectiveness. This research and development work cuts across many of the disciplines represented in the two HRB committees, "Operational Effects of Geometrics" and "Shoulder Design." There is some concern that variables of greatest concern to each of these individual committees may be improperly appreciated or controlled in the research and development work fostered by the other HRB committees concerned with construction, operations and maintenance. Accordingly, what follows is 1) a survey on shoulder design and operation practices, 2) desirable criteria for the geometric design and operation of shoulders, 3) shoulder structural design and construction considerations, 4) shoulder maintenance considerations and 5) shoulder practices and performance in two States.

SURVEY ON SHOULDER DESIGN AND OPERATION PRACTICES

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In an attempt to determine the extent of technological advances employed in current practices, the Highway Research Board Subcommittee on Primary Stopping and Recovery Area of the Operational Effects of Geometrics Committee, A3E02, conducted a questionnaire survey of the design and operation considerations of highway shoulders. The questions were selected in order to obtain comparable data on shoulder design characteristics relating to warrants and guidelines, natural contrast, use of edgelines, shoulder widths, and structural quality of shoulders as compared with that of the main lanes. From the questionnaire sent to the 50 States and the District of Columbia, 47 responses were received.

Several factors concerning shoulder design criteria and operation practices become evident from this survey and the research background. First, the survey results indicated general agreement on the basic need for good shoulders. In addition, a majority of respondents expressed agreement regarding shoulder criteria for the Interstate Highway System; however, this may simply be due to an adherence to imposed standards.

In other areas of design criteria, dissenting opinions appeared. For example, 13 percent of the respondents indicated that they did not have any design criteria. The reasoning for such lack of warrants requires further study.

The survey also revealed that four States permit slower traffic to use the shoulder area to facilitate a passing maneuver. The reasons for allowing this maneuver should be analyzed, and a basis for allowing or forbidding this maneuver established.

Although all respondents endorsed the use of edgelines, there was very little consistency in the lateral placement of these edgelines. Research is warranted in this area to determine the effect of various placements of edgelines.

Still other areas of design criteria, such as natural contrast, require investigation. The 77 percent of the respondents endorsing natural contrast between the shoulder and the main lanes must have some reason for this action. On the other hand, what is the reason that 23 percent do not strive for natural contrast? Research is needed to determine if the result created by natural contrast is actually beneficial to the driving environment.

Another controversial area is that of shoulder width. Although there is general agreement that shoulders are beneficial, there has been no agreement on the most desirable width for shoulders. This is definitely an area where technology has not only preceded research, but in some instances technology actually contradicts certain research findings.

All of these inconsistencies lead to a very important point. If such concern about the effect of standardization and continuity of design has led to the development of a Manual on Uniform Traffic Control Devices, then why are standards not established for shoulder design? It is true that shoulders form a very real part of the driving environment and, even though technology has apparently outdistanced research in this field, the results of the application of this technology should be studied to determine its effectiveness. If effective criteria have truly evolved from technological experience, then these results should be communicated and applied among the States. In any case, it is imperative that this phase of highway safety be thoroughly investigated and, if at all possible, specific recommendations presented.

DESIRABLE CRITERIA FOR THE GEOMETRIC DESIGN AND OPERATION OF HIGHWAY SHOULDERS

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A shoulder is defined by AASHO as "the portion of the roadway contiguous with the traveled way for accommodation of stopped vehicles, for emergency use, and for lateral support of base and surface courses." It varies in width from only 2 feet or so on minor rural roads where there is no surfacing, or the surfacing is applied over the entire roadbed, to about 12 feet on major roads where the entire shoulder may be stabilized or have an all weather surface treatment. Along divided highways, the median side or left shoulder may differ from that on the outer or right side.

In the highway cross-section, the term "shoulder" applies to the width from the edge of through lane to the intersection of the shoulder slope and the side slope plane. As may be needed, modifying adjectives are used with the term shoulder to describe functional or physical characteristics. The "graded" width is that just described, as distinct from the "surfaced" (or paved) shoulder, the meaning of which is obvious. Also designated is the "usable" width which includes the upper portion of the rounding where the side slope is not steep.