Highway Shoulders as Viewed by the Soil Engineer

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● THE soil engineer considers the highway shoulder as auxiliary to the adjacent traffic lane. Primarily it is that part of the highway cross-section into which a driver and his vehicle may safely escape the flow of traffic. In addition the shoulder structure also supplies support to the outside pavement edge. The soil engineer, therefore, considers the shoulder as having length, width, and depth, and he also considers the necessity of a service life consistent with that of the traffic lane pavement. To function as an auxiliary to the traffic lane, the shoulder must be surfaced to permit safe deceleration, and it must be built to carry the axle loads permitted in the traffic lane. The technique of obtaining these objectives at least cost varies with the location, type, and importance of the highway and also with locally available construction materials.

In designing to satisfy requirements of strength and safety, there are certain elements of the Michigan shoulder structure which serve a dual purpose. For instance, climatic conditions in Michigan dictate a minimum subbase thickness of 12 in. over clay subgrade soils. Good subgrade drainage requires that the subbase be built of free-draining granular material and also that it be extended through the shoulder. The subbase thus becomes a part of the shoulder structure where it serves the dual purpose of providing a drainage medium for the traffic lane and load bearing strength for the shoulder (Figure 1).

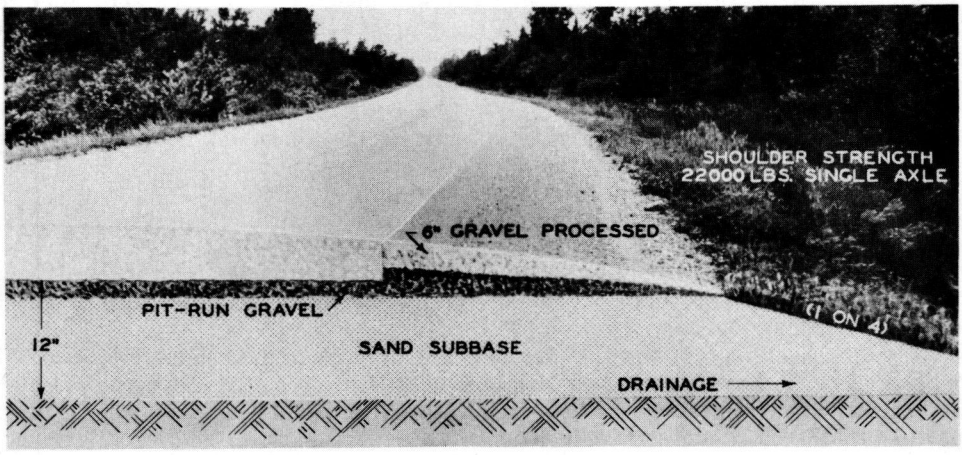

Figure 1.

Some items of shoulder design conflict in their requirements. Good topsoils for vigorous turf development, for instance, are notoriously poor load bearing soils during periods of wet weather. This consideration, plus the destructive effect of traffic on grass, serves to limit the use of turf shoulders to lower traffic roads. The modern trend, especially on the more important industrial routes, is toward an emphasis on shoulder strength and on a wear resisting shoulder surface.

The nature of shoulder traffic does not require the same surfacing or thickness design as is required by the traffic lanes. Reduced traffic abrasion permits the use of materials ranging from turf and gravel to bituminous seals and mats. Also, the repetition of heavy axle loads is low on highway shoulders as compared to that of traffic lanes. Actually the character of shoulder traffic is more nearly that considered normal for airport pavements. Strength design criteria developed for flexible airport pavements may, also be applied to the design of shoulders.

It is recognized that every locality will have special conditions governing the details of shoulder construction. Whatever these may be there is one objective recommended for all areas; namely, that shoulders be built sufficiently strong to permit a low cost surfacing (such as a bituminous seal) to carry the locally normal traffic throughout the year without special seasonal restrictions.