

# Pavement Performance Inventory in Michigan

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● MICHIGAN'S EFFORTS to obtain specific data on the subject of pavement performance started in 1924. The study involved actual field mapping of pavement and foundation conditions. The important objective at that time was to obtain information on pavement performance under climatic, soil and traffic conditions as they occur in Michigan. The study served as an excellent training medium for department engineers, and in addition it served as the background for soil engineering practices as developed in the state. The study did not result in extensive publications, probably because of inadequate facilities for handling the mass of data resulting from the large number of variables involved.

The continuous concern regarding pavement condition and pavement performance over the years since that early survey has stimulated much study of methods for making highway evaluations or sufficiency ratings. During the same time there has been a significant change in the average engineer's attitude toward the highway and its function. Instead of being preoccupied mainly with the wearing course, he has learned that pavement performance is a function of the combined effect of wearing course, base course, subbase and foundation soil. The term pavement, therefore, has come to be defined as consisting of the first 3 of 4 elements listed. The second change in attitude concerns the relationship between highway and vehicle. Instead of building the roads and then requiring that the transportation industry fit its operations to the highway provided, there is a trend in thinking which favors designing the highway to fit some optimum vehicle size and axle load which will best serve the transportation industry.

With this modern outlook in mind the next natural step in Michigan was to determine how the existing trunkline system satisfied modern strength requirements. A strength inventory has, therefore, recently been completed of the entire trunkline system. This study involved a review of design and construction histories along with a study of foundation soil conditions. Almost all information needed for the study was obtained from office records. Every mile of the 9,398 mile state trunkline system has been classified into 4 categories, based on adequacy for 32,000-lb tandem axle loading through the spring breakup season. The results of this study have been summarized on a map of the state in order to better picture the present strength status and in order to make the results more readily usable to maintenance, planning and programming engineers.

The four classification categories used for the study may be briefly described as follows:

1. No Seasonal Restriction — Pavement and subgrade adequate for year-around service. These are roads founded on sand and gravel soils which need only to be properly compacted and confined to carry any weight of axle load.

2. No Seasonal Restriction — Pavement designs which compensate for seasonal loss of strength. These roads involve soils which contain significant quantities of silt and clay and which, therefore, seriously lose strength during the spring breakup season. This loss has been adequately considered and compensated for in building the highway.

3. Spring Load Restriction Required — Pavement designs which do not compensate for seasonal loss of strength. This classification may involve portland cement concrete built without means for controlling mud pumping or it may involve bituminous pavement designs without sufficient thickness of surface, base and subbase to support unlimited repetition of legal loads during the spring break-up season.

4. Spring Load Restrictions Required — Pavement design inadequate for legal axle loads at all times. These roads are made to serve present traffic only by expanding extra maintenance effort and by accepting a shortened pavement life span.

This strength evaluation of the trunkline system has been put to immediate practical use. First, it has served as a basis for extending the system of special loading routes on which Michigan law permits one set of tandem axles in a hauling unit to carry 32,000 lb in place of the normal 26,000-lb maximum. Secondly, it is serving as a basis for selecting a system of roads on which special seasonal load restrictions will not be needed. In the third place, it is anticipated that the study will aid in highway programming by more clear-

ly calling attention to weak links in the highway system. For programming purposes the summary map will also serve as a base map for overlays which will summarize alignment, cross-section and wearing course information. Such information, plus strength and traffic data, should form an excellent background of organized facts needed to develop a trunkline system adequate for year-around service without special spring load restrictions.

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