LOUISIANA TRANSPORTATION RESEARCH CENTER

LTRC

## Assessment of Structural Capacity Indicators from Rolling Wheel Deflectometer Data Collection in Louisiana

### POINTS OF INTEREST:

*Problem Addressed / Objective of Research / Methodology Used / Implementation Potential*

### PROBLEM

The use of the rolling wheel deflectometer (RWD), which measures deflections at highway speeds, offers the potential to characterize the structural capacity of the road network without major delays and in a cost-effective way. In 2009, the Louisiana Department of Transportation and Development (DOTD) conducted a comprehensive testing program of the RWD in District 05. Measurements were used to assess the repeatability of RWD measurements, the effect of truck speeds, and the relationship between RWD and the falling weight deflectometer (FWD) deflection measurements and pavement conditions. Based on the results of the experimental program, the following structural capacity indicators were developed: the RWD Index (RI), defined in terms of the average RWD deflection and the standard deviation of the measurements based on a 1.5 mile segment; the pavement Structural Number (SN) in terms of the average RWD deflection and RI based on a 1.5-mile segment; use of multivariate statistical methods and fuzzy logic in combination with the RI index; and the Zone RWD Index (ZRI) in terms of the average RWD deflection variance based on a 0.1-mile segment.

Conceptually, the ZRI offers the advantage of screening and identifying structurally deficient locations in pavements based on a 0.1-mile segment. On the other hand, the RI, statistical methods, and SN parameters would serve to identify pavement segments that are structurally deficient at the network level and to recommend a treatment method suitable for structurally deficient pavements. Based on the RWD evaluation conducted in District 05, the study recommended extending the use of RWD to the other districts in Louisiana and to validate the proposed structural capacity indicators. Further, the validity and accuracy of the proposed structural capacity indicators should be evaluated in light of the PMS data collected in 2011 and 2013 and the performance of the sections analyzed in the original testing program conducted in 2009.

### OBJECTIVE

The objective of this follow-up project is twofold. First, this project will evaluate the aforementioned structural capacity indicators in predicting pavement structural deficiency based on RWD measurements. Based on this evaluation, the research team will introduce modifications to improve prediction of pavement structural deficiency. Second, this project will

develop a methodology to integrate the most promising structural capacity indicators into the Louisiana Pavement Management System (PMS) via the recently developed TCBA software developed in LTRC Project 10-4P.  In addition, this project will assess the cost-efficiency of RWD testing in identifying and repairing structurally deficient sections prior to reaching very poor conditions.

## METHODOLOGY

To achieve the aforementioned objectives, the proposed research activities are divided in two phases.  In the first phase, a comprehensive review of treatment selection processes in Louisiana will be conducted and reported.  In addition, a critical evaluation of the structural capacity indicators developed for RWD will be performed based on the original RWD and FWD data sets collected in 2009 and the new PMS data collected in 2011 and 2013.  Based on this evaluation, modifications will be suggested for the most promising structural capacity indicators in order to improve identification of structurally deficient sections.  In the second phase, a methodology will be developed to incorporate the most accurate structural capacity indicators into Louisiana PMS as well as the recently developed TCBA software. Further, the cost-efficiency and added values of RWD testing in identifying and repairing structurally deficient sections will be conducted.

## IMPLEMENTATION POTENTIAL

The research results from this project will be ready for implementation and can be used by the Department to update current practices used in pavement management and in the selection of cost-effective treatments in rehabilitated pavements.  To encourage implementation of the results, the research team presented the findings at the Louisiana Transportation Conference and at national meetings.