

JOINT TRANSPORTATION RESEARCH PROGRAM

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Performance Measure That Indicates Geometry Sufficiency of State Highways

Volume I—Network Screening and Project Evaluation

Introduction

The Indiana Department of Transportation uses a point-based method of scoring projects. The evaluated components include alignment, cross-section, safety, compliance with ADA guidelines, and drainage. High-scoring projects are selected for implementation. The scoring method is simple and measures the geometry improvements at only two levels: (1) the improved geometry partly satisfies the design standards and (2) the improved geometry fully satisfies the design standards. The current scoring method disregards the initial and final geometry parameters.

In this study we replaced the geometry-scoring component with a more precise method that estimates the safety (reduced crashes) and mobility (increased speed) benefits of improving cross-sectional and alignment elements. The new component was integrated with other method components without changing the relative importance of the other scoring criteria. One of the important considerations was data availability—using data currently available in Indiana.

Another important component of the research was conducting a feasibility study to determine whether the current information technology and data processing techniques would allow additional data elements to be extracted from existing high-resolution maps and ortho-images in a practical manner to better support asset management in Indiana. This component is presented in a separate Volume II of this report.

Findings

The developed methodology for evaluating geometry improvements to score and rank projects relies on safety performance functions and average speed equations. Crash modification factors and speed adjustments derived from these equations were used to evaluate various geometry treatments. The safety performance functions were estimated in the current study based on Indiana data. These functions were then supplemented with results obtained from previous studies to develop the project scoring methodology. The proposed evaluation methodology is for improvements carried out on rural two-lane, rural multi-lane, urban two-lane, and urban multi-lane roads in the state of Indiana.

The method has been developed to facilitate a two-step scoring process: (1) screening the Indiana road network for segments that have the highest needs for geometry improvement and (2) scoring projects developed for the roads selected in the first step.

Implementation

The project scoring method developed was implemented with the help of an Excel-based application. The application allows the user to enter various data corresponding to estimated geometry improvements on different road segments in the scope of a project. The output from the spreadsheet application includes the safety and mobility benefits corresponding to every segment

for which data has been provided to the application. Furthermore, the total project benefit is calculated and the benefit-cost ratio obtained. The re-scaled benefit-cost ratio is added to the ADA and drainage point to obtain an output on the desired 0–10 scale, which can

be further used in the project scoring process utilized by the INDOT roadway asset management team.

The method was implemented in Excel VB. The project documentation includes a user manual to support the method application.

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