Joint Transportation Research Program

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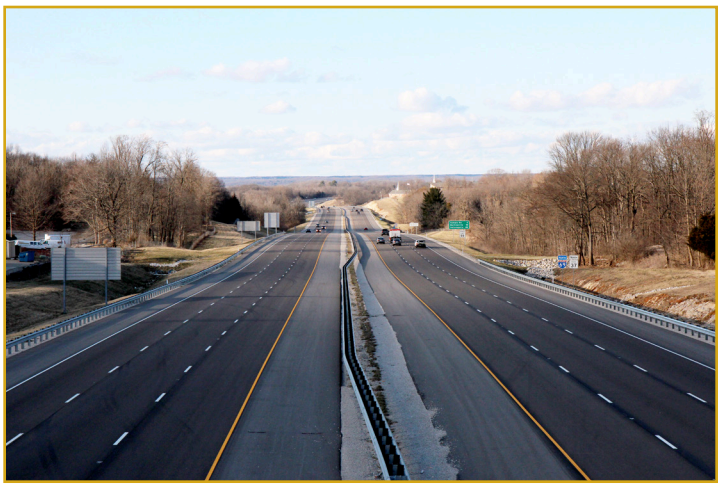
Economic Development Impact of Preservation Projects

Introduction

Preservation and maintenance activities protect pavements and bridges, extending the life of these assets and guaranteeing the safety of users. While preservation and maintenance work have significant overlap, some key differences exist. Preservation is work that is planned and performed to improve or keep a facility in a state of good repair. Usually, these activities do not add capacity or structural value but return the highway to an almost new condition or help keep it that way. Maintenance is work performed to sustain the condition of the facility or to respond to specific conditions or events to restore the highway to functional operation. Because rebuilding a road in poor condition can cost ten times as much as the work needed to keep the road in good condition, these activities also represent significant savings to taxpayers. In addition to these benefits, preservation activities can also have wider economic benefits in the form of reduced user costs related to vehicle operation, travel time, and safety.

This study aims to develop sketch-planning tools for assessing the economic impacts of pavement and bridge preservation projects to meet the needs of INDOT's Division of Asset Planning and Management. To accomplish these objectives, the following tasks were undertaken: (1) a literature review, (2) an evaluation of existing tools that could address some aspect of the study topic or be used as guidance for the development of the project tools, (3) the development of the tool, and (4) the preparation of guidance materials and documentation.



Findings

Following the work of the preceding phase of SPR-3912, which involved the development of a framework to study the economic impacts of corridor improvements, this work adapts the previous framework to account for pavement and bridge preservation interventions. While the specific preservation treatment is not accounted for (because that was beyond the scope of this study), the framework accounts for treatment via changes in conditions as measured in International Roughness Index (IRI) for pavements and in load capacity limits due to structural deficiencies of bridges.

The approach adopted to evaluate the economic impacts of non-capacity transportation projects involved estimating the impacts of changes in pavement and bridge deck conditions on key performance measures. These include vehicle operating costs, travel time costs, and safety outcomes. The key indicators were translated into business cost savings and then into economic impacts through statewide economic multipliers.

Based on the theoretical framework, literature review findings, and existing tools for similar analysis, several different tool development options were considered. From among them, a framework jointly based on Highway Economic Requirements System—State Version (HERS-ST) and Tool for Operations—Economic

Impact Analysis (TOPS-EIA) was chosen. The resulting Pavement and Bridge Preservation—Economic Impact Analysis (EIA) tools are briefly described in the following section.

Pavement and Bridge Preservation EIA Tools

EIA tools are intended to be used at the initial stages of the project development process, where various pavement and bridge preservation project alternatives can be analyzed with a low level of detail. In that sense, these tools calculate the user cost savings in travel time, vehicle operating costs, and safety by mode and trip purpose, using a set of expected impacts adopted from past studies and projects. Similarly, the annual business savings corresponding to trucks and automobiles on work-related purposes are converted into economic impacts through the use of economic multipliers from MCIBAS-SEAT (Major Corridor Investment Benefit Analysis System—Simplified Economic Analysis Tool).

The main inputs of the pavement tool include the first and second conditions of the road, as measured in IRI. The bridge tool asks for inputs on the live load limit for bridges, [detour] length of the segment, the average effective speed of vehicles, and the volume of vehicles for the segment under analysis. The outputs of the tools include three types of economic impacts, measured at the state level: gross regional product (GRP) in millions of dollars, personal income in millions of dollars, and employment in job-years.

Implementation

The Pavement and Bridge Preservation EIA tools can be used for screening projects' impacts, project prioritization, or as part of multi-criteria analysis (MCA). Similarly, intermediate outputs of the tool, such as user benefits (e.g., travel time savings), can be used as part of a benefit-cost analysis (BCA). However, the latter will require the calculation of project costs, which these tools do not perform. For MCA, indicators such as GRP, personal income, employment, and any of the intermediate outputs generated by the tool can be incorporated directly as criteria in the decision-making process. The main advantage of MCA is that it accounts for strengths of other criteria, which can make up for deficiencies in any one criterion. However, it is still possible to double-count benefits with MCA. Furthermore, as part of this study, a set of training sessions, webinars, and presentations will be provided for INDOT and metropolitan planning organizations (MPOs). These sessions will cover both the theoretical background as well as a case study to demonstrate the use of the tools in action.

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