Implementing HERS-ST in Iowa

tech transfer summary

PRINCIPAL INVESTIGATOR
Tom Maze, Professor of Civil, Construction, and Environmental Engineering
Iowa State University
515-294-9459
tmaze@iastate.edu

CO-PRINCIPAL INVESTIGATOR
Omar Smadi, Research Scientist, Center for Transportation Research and Education
Iowa State University
515-294-7110
smadi@iastate.edu

MORE INFORMATION
www.ctre.iastate.edu/mtc/

MTC
Iowa State University
2711 S. Loop Drive, Suite 4700
Ames, IA 50010-8664
515-294-8103

The Midwest Transportation Consortium (MTC) is part of the Center for Transportation Research and Education (CTRE) at Iowa State University. The MTC is the University Transportation Centers Program regional center for Iowa, Kansas, Missouri, and Nebraska.

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> HERS-ST software can show state transportation agencies how alternative investments can impact a highway system's performance.

Objectives

- Customize the parameters of the Highway Economic Requirements System state version (HERS-ST) software for the Iowa primary network
- Train Iowa Department of Transportation (Iowa DOT) employees to use HERS-ST

Problem Statement

Using engineering and economic parameters and data, HERS-ST software determines how alternative investments will impact a highway system's condition, performance, and users. Because the default HERS-ST data is based on nation-wide averages, the defaults must be customized to properly represent the highway infrastructure that the Iowa DOT maintains. Moreover, Iowa DOT employees must be trained to use the software effectively.

Overview of HERS-ST

HERS-ST software projects a highway system's future condition and determines how alternative highway investments will impact the system's condition, performance, and users. The Federal Highway Administration (FHWA) and several state departments of transportation (DOTs) currently use the software.

The software's projections rely on three types of engineering and economic data: highway performance data, parameter data, and control data. The highway performance data include the Highway Performance Monitoring System (HPMS) data that are entered into the software's user interface. The parameter data include the pavement specifications, improvement costs, and deficiency thresholds that the software uses to compare alternative investments. The control data, including analysis objectives, analysis methods, cost units, and output information, are used to modify the system analysis.

The software can perform several run analyses to examine a variety of funding situations. Every run produces a table with roadway deficiencies, funding by improvement type, and changes between each funding period. A "section conditions" spreadsheet file is also created that contains performance metrics and improvement types for each road segment included in the analysis. A suite of report tools provide chart, table, and report generation programs, as well as a rudimentary geographical information systems (GIS) function.

Customizing and Testing HERS-ST

The highway performance data, parameter data, and control data that HERS-ST uses were modified to represent the Iowa primary network. A sample run analysis was then conducted, using the Iowa Interstate system under several constrained funding scenarios, to validate the software's functions.

Pilot Training Seminar

Ten employees from the Iowa DOT and the FHWA Iowa Division attended a day-long training seminar held in June 2005. Participants were introduced to the capabilities and limitations of HERS-ST, as well as current uses for the software. Participants also learned how to run analyses, view results, and create reports using the run analyses' outputs. The seminar was capped off by a three-hour hands-on training session.

Key Findings

- According to the sample run analyses, using a 100% Iowa primary road dataset for the highway performance data, rather than an HPMS dataset from the Iowa DOT, yielded a more accurate analysis.
- The HERS-ST report functions are useful for identifying the distribution of capital between funding periods or quantifying changes in performance metrics when programmed improvements have been implemented.
- The training seminar successfully introduced Iowa DOT employees to HERS-ST and conveyed how the software can be integrated into the long-range planning process.

Implementation Benefits

- HERS-ST can be a useful planning tool in forecasting performance and maintenance needs.
- At the end of the training seminar, participants understand what HERS-ST is and how the software can enhance long-term planning at a state DOT.

Implementation Readiness

- Users should recognize that HERS-ST has limitations. It is not a network model, so HERS-ST does not consider improvements to parallel corridors when selecting projects for one corridor. It is not a spatial model, so traffic volumes cannot be assigned to specific links. Moreover, bridge reconstruction or replacement costs are not considered.

Funding scenario 1

Funding scenario 2

Funding scenario 3

Funding scenario 4

HERS-ST display showing improvement types for a constrained budget scenario

Do nothing

Resurface

Resurface and add normal-cost lanes

Reconstruct