ENGINEERING ECONOMIC ANALYSIS TOOLS

Highway Economic Requirements System for State Use

HERS-ST uses engineering standards to identify highway deficiencies and applies economic criteria to select the most cost-effective mix of highway system improvements.

The Highway Economic Requirements System–State Version (HERS-ST) is a software package that predicts the investment required to achieve certain highway system performance levels. Alternatively, the software can be used to estimate the highway system performance that would result given various investment levels. HERS-ST considers capital improvement projects directed at correcting pavement and capacity deficiencies.

The HERS-ST model is a direct extension of the national-level HERS model. This model was developed by the Federal Highway Administration (FHWA) to examine the relationship between national investment levels and the condition and performance of the Nation's highways. FHWA uses the model to estimate future investment required to either maintain or improve the Nation's highway system. FHWA provides this information to the U.S. Congress on a biennial basis.

The HERS concept has been extensively and favorably reviewed over the past decade. Most recently the U.S. General Accounting Office evaluated the HERS approach and found it reasonable and appropriate for application at both the Federal and State levels.

Potential Uses

HERS-ST has many practical applications in a State transportation agency. Following are some of the software's potential uses:

- Long-range planning
- "What if" analysis
- Programming
- Complying with GASB Statement 34
- Performance measures
- Congestion management
- Needs assessment
- Data management
- Legislative decision support

Software Description

The HERS-ST software is an easy-to-use, Microsoft Windows based application. Interview screens, or "wizards," are used to facilitate the entry and editing of input data. For example, importing the highway data is as straightforward as clicking a couple of buttons, HERS-ST will even check the data and warn the user of any possible data errors.

HERS-ST is also flexible. When it is time to run the HERS-ST analysis, the user selects the type of scenario to be performed and clicks a button. There are a number of different ways that the user can choose to view the analysis results.

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Various summary reports allow the user to quickly determine how the system as a whole responds, while the section-specific output allows the user to view the impacts on each individual highway section.

Users of all skill levels can create a wide variety of maps, charts, tables, and reports. With HERS-ST's built-in graphical information system, the user can spatially view the HERS-ST input and analysis output. There are built-in charts and reports for the novice user, "wizards" and queries for the intermediate user, and the ability to create ad hoc charts and reports for the experienced user.

How the HERS-ST Model Works

The HERS-ST software simulates the selection and implementation of highway capital improvements consistent with the principles of incremental benefit-cost analysis. The analysis considers travel time, safety, vehicle operating, emissions, and highway agency costs. The model optimizes highway investment given funding constraints or performance objectives specified by the analyst.

As input, HERS-ST accepts highway-section records in the Highway Performance Monitoring System format. For each highway section, the model predicts future condition and capacity deficiencies based on section-specific information. The model identifies a set of alternative improvements to correct each deficiency and determines a benefit-cost ratio for each potential improvement. The most economically attractive improvement for each facility is identified. Projects to be implemented are determined by comparing the relative merit (e.g., benefit-cost ratios) of each candidate improvement.

When funding is available, HERS-ST simulates implementation of all projects with benefits in excess of costs. Given funding constraints or user-specified performance objectives, HERS-ST selects those projects with the highest benefit/cost ratios until the public agency funds are exhausted, therefore maximizing the combined highway user and highway agency benefits.

The Future of HERS-ST

FHWA is committed to the long-term support and enhancement of HERS-ST. To accommodate users and solicit their feedback, a user's group has been established. Users are encouraged to register through the HERS-ST Web site listed below. Registered users will be notified via e-mail of future events and software revisions. The Web site also contains a community of practice, where users can post HERS-ST related comments and questions. Updated versions of the software are routinely posted at this Web site; CDs containing the software and documents are also available upon request.

Examples of Questions That HERS-ST Will Answer

- How will a reduction (or increase) of *x* percent in highway investment levels affect the condition and performance of the State's highway system over the next 20 years?
- What level of future investment is required in a State's highway system to ensure that average effective travel speeds on the system are maintained?
- What level of investment is required to make all economically beneficial improvements on the system (that is, those projects where benefits exceed costs)?
- What are reasonable performance targets given funding, policy, and customer satisfaction objectives?

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