

FHWA Operations Benefit/Cost Analysis Desk Reference

Providing Guidance to Practitioners in the Analysis of Benefits and Costs of Management and Operations Projects

Project Purpose

The FHWA Office of Operations developed the Benefit/Cost Analysis for Operations Planning Desk Reference to provide practitioners with practical guidance, tools, and information for conducting benefit/cost analysis for a wide range of Transportation System Management and Operations (TSM&O) strategies and projects.

Project Need

Due to an increasingly competitive fiscal environment, state, regional, and local transportation planning organizations around the country are being asked more than ever to justify their programs and expenditures. Transportation System Management and Operations (TSM&O) programs have not escaped this scrutiny and are routinely asked to rank their projects against traditional expansion projects, as well as conduct other “value”-related exercises.

This requirement can put TSM&O projects at a disadvantage since many specialists in the operations arena have limited experience in performing benefit-cost analysis and many of the established tools available for conducting benefit-cost analysis for more traditional infrastructure projects are poorly suited to analyzing the specific performance measures, project timelines, benefits, and life-cycle costs associated with operational improvements.

FHWA Operations Benefit/Cost Analysis Desk Reference

The FHWA Office of Operations initiated this project in recognition that practitioners were in need of relevant and practical guidance in how to effectively conduct benefit/cost analysis of a wide spectrum of transportation system management and operations strategies. The Operations Benefit/Cost Analysis Desk Reference project is intended to provide practitioners with relevant guidance on how to effectively and reliably estimate the benefits and costs of operations strategies.

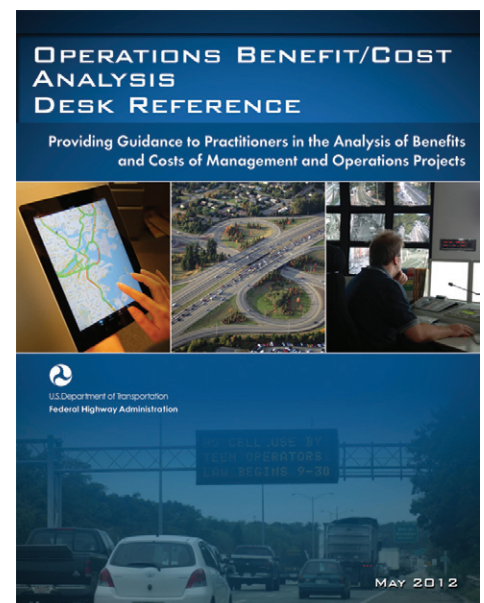
Two primary products were developed in the project: the Operations Benefit/Cost Analysis Desk Reference document (<http://www.ops.fhwa.dot.gov/publications/fhwahop12028/index.htm>), and a supporting spreadsheet-based decision support tool named the Tool for Operations Benefit/Cost (TOPS-BC). The Desk Reference document is intended to provide pragmatic information answering the likely questions of a wide range of practitioners, ranging from the simple overview questions, such as “What is B/C analysis and what role does it play in the Operations planning process?” To more focused questions on the actual conduct of B/C analysis for specific TSM&O strategies, for example:

- What are the appropriate performance measures to consider for particular strategies, and how can these outputs be quantified and monetized?
- Where can performance data be obtained to support the analysis?
- How can life-cycle costs for the full-span of the project/strategy be estimated?

To complex questions related to many of the difficult to quantify benefits related to TSM&O, including:

- What are the impacts of combining different TSM&O strategies or combining TSM&O with other non-TSM&O strategies, or how can the benefits of strategies, such as improved inter-agency coordination, be assessed?
- How can strategies targeted at nonrecurring conditions be analyzed?

The Desk Reference document includes an introduction to B/C analysis, including a primer on the general process and a description of common B/C terminology, for those practitioners just getting started with B/C analysis. For planners who may be familiar with B/C analysis, but less familiar with TSM&O strategies, the Desk Reference provides an introduction to the strategies and highlights their likely benefits.



Source: Federal Highway Administration.

TOPS-BC

This Desk Reference is supported by an Operations B/C decision support tool, called the Tool for Operations Benefit/Cost (TOPS-BC). This spreadsheet-based tool is designed to assist practitioners in conducting benefit/cost analysis by providing several key capabilities.

TOPS-BC provides the following capabilities:

- Provides the ability for users to investigate the expected range of impacts associated with previous deployments and analyses of many TSM&O strategies.
- Provides a screening mechanism to help users identify appropriate tools and methodologies for conducting a B/C analysis based on their analysis needs.
- Provides a framework and default cost data to estimate the life-cycle costs of various TSM&O strategies, including capital, replacement, and continuing operations and maintenance (O&M) costs.
- Provides a framework and suggested impact values for conduct simple B/C analysis for selected TSM&O strategies.

The first two primary capabilities of TOPS-BC are centered on providing practitioners access to information that may be used to structure their analysis approach. The last two capabilities – the capability to estimate life-cycle cost estimates and the capability to estimate benefits for various strategies – provide the opportunity for the user to enter data regarding their projects and traffic conditions in order to conduct a simple sketch planning level benefit/cost analysis within the tool. In addition to these capabilities, TOPS-BC is also intended to serve as a repository of relevant parameters and values appropriate for use in benefit/cost analyses.

While the sketch planning level analysis provided by TOPS-BC may be suitable for many planning studies, TOPS-BC was not intended to serve as a single analysis tool to be used for all situations. As discussed in the Desk Reference, analyses requiring detailed analysis and high-levels of confidence in the accuracy of the results may require more advanced analysis capabilities than provided directly within TOPS-BC. Even in these situations, however, TOPS-BC may provide value in serving as a framework for monetizing benefits and comparing with costs. Outputs from more advance simulation or dynamic traffic assignment tools may be used as inputs to TOPS-BC, overriding the performance impacts normally calculated internal to the tool.

Project Workshops

In order to inform practitioners on the availability of the guidance materials, as well as provide an opportunity for additional testing and vetting of the material in a real-world analysis situations, the FHWA, as part of the Planning for Operations initiative, has technical workshop opportunities available. These workshops cover both the guidance available in this Desk Reference, as well as an overview of the proper set up and application of the TOPS-BC decision-support capabilities.

Project Contacts

If you have any questions regarding the project, or would like to be considered as a potential workshop delivery location, please contact one of the individuals below:

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U.S. Department of Transportation
Federal Highway Administration

The TOPS-BC tool provides the ability to conduct benefit/cost analysis of a wide range of strategies including deployments such as:

- Arterial Signal Coordination, Ramp Metering, Incident Management, Traveler Information, HOT Lanes, Variable Speed Control, and Travel Demand Management.

FHWA Tool for Operations Benefit/Cost (TOPS-BC)				
PURPOSE: Estimate Lifecycle Costs of TSM&O Strategies				
WORK AREA 1 - ESTIMATE AVERAGE ANNUAL COST				
Strategy: Traveler Information - DMS				
Equipment	Useful Life	Capital / Replacement Costs (Total)	O&M Costs (Annual)	Annualized Costs
Basic Infrastructure Equipment				
TMC Hardware for Information Dissemination	5	\$ 7,500	\$ 375	\$ 1,875
TMC Software for Information Dissemination	5	\$ 20,000	\$ 1,000	\$ 5,000
TMC System Integration	20	\$ 100,000	\$ 5,000	\$ 10,000
Labor			\$ 100,000	\$ 100,000
TOTAL Infrastructure Cost		\$ 127,500	\$ 106,375	\$ 116,875
Incremental Deployment Equipment (Per Sign Location)				
Communication Line	25	\$ 750	\$ 900	\$ 930
Variable Message Sign	25	\$ 92,500	\$ 4,400	\$ 8,100
Variable Message Sign Tower	25	\$ 125,000	\$ 275	\$ 5,275
TOTAL Incremental Cost		\$ 218,250	\$ 5,675	\$ 14,305
INPUT	Enter Number of Infrastructure Deployments		<input type="text" value="1"/>	\$ 116,875
INPUT	Enter Number of Incremental Deployments (# of Signs)		<input type="text" value="10"/>	\$ 143,050
INPUT	Enter Year of Deployment		<input type="text" value="2010"/>	
Average Annual Cost				\$259,925

Source: Federal Highway Administration.

Additional guidance and research is also provided in the tool and the Desk Reference document covering:

- Supporting strategies such as Traffic Surveillance, Traffic Management Centers, and Communications; and
- Nonphysical strategies such as System Integration and Interagency Coordination.