

# Transportation Asset Management Guide

---

November 2002

---

prepared for  
**National Cooperative Highway Research Program  
(NCHRP) Project 20-24(11)**



**American Association of State Highway and Transportation Officials**  
444 North Capitol Street, NW  
Suite 249  
Washington, DC 20001

Pub Code: RP-TAMG-1

# Transportation Asset Management Guide

---

**November 2002**

---

prepared for

**National Cooperative Highway Research Program  
(NCHRP) Program 20-24(11)**

prepared by

**Cambridge Systematics, Inc.**

with

**Parsons Brinckerhoff Quade & Douglas, Inc.  
Roy Jorgensen Associates, Inc.  
Paul D. Thompson, Consultant**

## **Acknowledgement of Sponsorship**

This work was sponsored by the American Association of State Highway and Transportation Officials, in cooperation with the Federal Highway Administration, and was conducted in the National Cooperative Highway Research Program, which is administered by the Transportation Research Board of the National Academies.

## **Disclaimer**

The opinions and conclusions expressed or implied are not necessarily those of the Transportation Research Board, the National Academies, the Federal Highway Administration, the American Association of State Highway and Transportation Officials, or the individual states participating in the National Cooperative Highway Research Program.



**American Association of State Highway and Transportation Officials**  
444 North Capitol Street, NW, Suite 249  
Washington, DC 20001

Pub Code: RP-TAMG-1

# American Association of State Highway and Transportation Officials

Executive Committee  
2003-2004

**President:** John Njord, Utah  
**Vice President:** J. Bryan Nicol, Indiana  
**Secretary/Treasurer:** Larry King, Pennsylvania

## Regional Representatives:

Region I	James Byrnes, Connecticut Allen Biehler, Pennsylvania
Region II	Whittington Clement, Virginia Fernando Fagundo, Puerto Rico
Region III	Mark Wandro, Iowa Gloria Jeff, Michigan
Region IV	Mike Behrens, Texas Tom Norton, Colorado

**Immediate Past President:** Dan Flowers, Arkansas  
**Executive Director:** John C. Horsley, Washington, DC

# American Association of State Highway and Transportation Officials

## Task Force on Transportation Asset Management

**Officers:** **Chairman:** John Craig, Nebraska  
**Vice Chairman:** Greg Rosine, Michigan  
**Liaison:** Dave Ekern, AASHTO

### State Member

#### Arizona (AZ)

Frank McCullagh  
Research Engineer  
Arizona Department of Transportation  
206 S. 17<sup>th</sup> Ave, MD 075R  
Phoenix, AZ 85007

**Phone Number** (602) 712-3132

**Fax Number** (602) 712-3400

**Email Address** fmccullagh@dot.state.az.us

#### California (CA)

Steve Takigawa  
California Department of Transportation  
P.O. Box 942874, 1120 N Street  
Sacramento, CA 94274-0001

**Phone Number** (916) 323-7806

**Fax Number**

**Email Address** steve\_takigawa@dot.ca.gov

#### Georgia (GA)

Frank L. Danchetz P.E.  
Chief Engineer  
Georgia Department of Transportation  
Room 122  
#2 Capitol Square, S.W.  
Atlanta, GA 30334-1002

**Phone Number** (404) 656-5277

**Fax Number** (404) 463-7991

**Email Address** frank.danchetz@dot.state.ga.us

#### Idaho (ID)

David S. Ekern P.E.  
Director  
Idaho Transportation Department  
P.O. Box 7129  
Boise, ID 83707-1129

**Phone Number** (208) 334-8807

**Fax Number** (208) 334-8195

**Email Address** dekern@itd.state.id.us

#### Maryland (MD)

Peter Stephanos  
Deputy Chief Engineer, Office of Materials and Technology  
Maryland Department of Transportation  
State Highway Administration  
2323 West Joppa Road  
Brooklandville, MD 21022

**Phone Number** (410) 321-3100

**Fax Number** (410) 321-3099

**Email Address** pstephanos@sha.state.md.us

*Montana (MT)*

Sandra S. Straehl  
Program and Policy Analysis  
Montana Department of Transportation  
P.O. Box 201001  
Helena, MT 59620-1001

**Phone Number** (406) 444-7692  
**Fax Number** (406) 444-7671

**Email Address** sstraehl@state.mt.us

*Nebraska (NE)*

John L. Craig  
Director  
Nebraska Department of Roads  
P.O. Box 94759  
Lincoln, NE 68509-4759

**Phone Number** (402) 479-4615  
**Fax Number** (402) 479-3758

**Email Address** jcraig@dor.state.ne.us

*New York (NY)*

Thomas Clash  
Director, Statewide Planning Section  
New York Department of Transportation  
Statewide Planning  
Building 5, State Office Campus  
1220 Washington Avenue  
Albany, NY 12232

**Phone Number** (518) 457-1716  
**Fax Number** (518) 485-8276

**Email Address** tclash@gw.dot.state.ny.us

Timothy J. Gilchrist  
Director, Planning and Strategy  
New York Department of Transportation  
Building 5, State Office Campus  
1220 Washington Avenue  
Albany, NY 12231-0414

**Phone Number** (518) 457-6700  
**Fax Number** (518) 485-8276

**Email Address** tgilchrist@gw.dot.state.ny.us

*Pennsylvania (PA)*

Gary L. Hoffman  
Deputy Secretary for Highway Administration  
Pennsylvania Department of Transportation  
Keystone Building, 8<sup>th</sup> Floor  
400 North Street  
Harrisburg, PA 17120-0095

**Phone Number** (717) 787-6875  
**Fax Number** (717) 787-5491

**Email Address** gahoffman@state.pa.us

*South Carolina (SC)*

Carl Chase  
Assets Manager  
South Carolina Department of Transportation  
P.O. Box 191  
Columbia, SC 29202-0191

**Phone Number** (803) 737-1960  
**Fax Number** (803) 737-2038

**Email Address** chasec@dot.state.sc.us

*Tennessee (TN)*

Michael R. Shinn  
Chief of Administration  
Tennessee Department of Transportation  
James K. Polk Building, Suite 700  
505 Deaderick Street  
Nashville, TN 37243-0339

**Phone Number** (615) 741-5374  
**Fax Number** (615) 741-0865

**Email Address** mike.shinn@state.tn.us

*Virginia (VA)*

Mary Lynn Tischer Ph.D.  
Advisor to the Governor on Transportation Reauthorization  
Virginia Department of Transportation  
1401 East Broad Street  
Richmond, VA 23219

**Phone Number** (804) 225-2813  
**Fax Number** (804) 786-2940

**Email Address** mary.tischer@virginiadot.org

*Washington (WA)*

John F. Conrad  
Assistant Secretary  
Washington State Department of Transportation  
Engineering and Regional Operations  
P.O. Box 47316  
Olympia, WA 98504

**Phone Number** (360) 705-7032  
**Fax Number** (360) 705-6823

**Email Address** conradj@wsdot.wa.gov

*Wisconsin (WI)*

Mark J. Wolfgram  
Administrator  
Wisconsin Department of Transportation  
Transportation Investment Management  
P.O. Box 7913  
Madison, WI 53707-7913

**Phone Number** (608) 266-5791  
**Fax Number** (608) 267-1856

**Email Address** mark.wolfgram@dot.state.wi.us

**U.S. DOT Member**

*District of Columbia (DC)*

Frank Botello  
Leader, System Mngt and Monitoring Team  
Federal Highway Administration  
System Mngt and Monitoring Team  
400 7<sup>th</sup> Street, S.W., Room 3211  
Washington, DC 20590

**Phone Number** (202) 366-1336  
**Fax Number** (202) 366-9981

**Email Address** frank.botello@fhwa.dot.gov

Regina McElroy  
Leader, Evaluation and Economic Investment Team  
Federal Highway Administration  
Office of Asset Management  
HIAM-33, Room 3211  
400 7<sup>th</sup> Street, S.W.  
Washington, DC 20590

**Phone Number** (202) 366-9216  
**Fax Number** (202) 366-9981

**Email Address** regina.mcelroy@fhwa.dot.gov

David Winter  
Evaluation and Economic Investment Team  
Federal Highway Administration  
Room 3211  
400 7<sup>th</sup> Street, S.W.  
Washington, DC 20590

**Phone Number** (202) 366-4631  
**Fax Number** (202) 366-9981

**Email Address** david.winter@fhwa.dot.gov

*Florida (FL)*

James E. St. John  
Division Administrator, Florida  
Federal Highway Administration  
227 N. Bronough Street, Suite 2015  
Tallahassee, FL 32301-1330

**Phone Number** (850) 942-9650  
**Fax Number** (850) 942-9691

**Email Address** jim.stjohn@fhwa.dot.gov

## **AASHTO**

### *District of Columbia (DC)*

Jim McDonnell P.E.  
Associate Program Director for Engineering  
American Association of State Highway  
and Transportation Officials  
444 North Capitol Street, N.W., Suite 249  
Washington, DC 20001

**Phone Number** (202) 624-5448

**Fax Number** (202) 624-5469

**Email Address** [jimm@ashto.org](mailto:jimm@ashto.org)

## **Affiliate Member**

### *Nova Scotia (NS)*

Kenton Speiran  
Manager, Asset Systems  
Nova Scotia Department of Transportation  
and Public Works  
P.O. Box 186  
Halifax, NS B3J 2N2

**Phone Number** (902) 424-3510

**Fax Number** (902) 424-0571

**Email Address** [speirakd@gov.ns.ca](mailto:speirakd@gov.ns.ca)

# FOREWORD

---

State transportation officials at all levels face the task of managing a wide range of assets to meet public, agency, and legislative expectations. These assets include the physical transportation infrastructure (e.g., guideways, structures, and associated features and appurtenances) as well as other types of assets: e.g., an agency's human resources, financial capacity, equipment and vehicle fleets, materials stocks, real estate, and corporate data and information.

Recognizing its growing importance to transportation agencies worldwide, the American Association of State Highway and Transportation Officials (AASHTO) in 1998 adopted transportation asset management as a priority initiative. AASHTO created a Task Force, reporting to the Board of Directors, to guide this national initiative and to develop and implement a *Transportation Asset Management Strategic Plan*. To respond to several tasks in this *Strategic Plan*, the National Cooperative Highway Research Program (NCHRP) awarded Project 20-24(11) to a study team headed by Cambridge Systematics, Inc. The goal of this NCHRP project is to develop information on transportation asset management and to apply these findings in producing a *Transportation Asset Management Guide* for use by AASHTO members and other transportation agencies. The *Guide* is designed to help agencies develop and apply the principles, techniques, and tools that can advance the management of their transportation assets.

The overall management framework that has been developed in this study is flexible enough to be adapted and refined for use with, respectively, each type of transportation agency asset listed above. To develop the depth as well as breadth of material needed to build a meaningful first-edition *Transportation Asset Management Guide*, however, the scope of this study has focused on the particular set of assets that constitutes an agency's **transportation infrastructure**. This concentration enables asset management principles, methods, examples, and research recommendations to be developed in a concrete, practical, and understandable way. It facilitates comparisons with corresponding work by transportation agencies overseas and by the private sector, which have for the most part adopted a similar scope in their studies. It provides a specific frame of reference within which differences among state departments of transportation (DOT) can be addressed by particular business management models, approaches, and procedures.

This study therefore interprets transportation asset management as a **strategic approach to managing physical transportation infrastructure**. Transportation asset management in this context promotes more effective resource allocation and utilization based upon quality information. This concept covers a broad array of DOT functions, activities, and decisions: e.g., transportation investment policies; institutional relationships between DOTs and other public and private groups; multimodal transportation planning; program development for capital projects and for maintenance and operations; delivery of agency programs and services; and real-time and periodic system monitoring. All of these management processes have important implications for an agency's attainment of its goals in public policy, financial resource availability, engineering standards and criteria, maintenance and operations levels of service, and overall system performance.

A number of support activities are involved as well. Information technology can inform many of these management processes, and agencies have already expended considerable sums to develop asset management systems, databases, and other analytic tools. These systems must, however, complement the decision-making processes and organizational structures of individual agencies if they are to operate effectively and support good asset management at all organizational levels. Effective communication of information on asset management between an agency and its governing bodies, stakeholders, and customers is likewise critical to success.

The objectives of this study have been to gather information on asset management practices in the United States and overseas, develop a framework for transportation asset management, and apply this framework to produce a *Transportation Asset Management Guide*. The study has been organized in two phases:

- **Phase I** encompassed information gathering, framework development, and recommendation of a research program; and
- **Phase II** has produced this *Guide*.

## Foreword

---

The work in Phase I has been documented in three reports:

1. A comprehensive framework for transportation asset management that established the basis for developing this *Guide*;
2. A synthesis of current information and practices in asset management; and
3. A prioritized program of research in asset management.

This *Guide* builds on this earlier work to provide state DOTs and other transportation agencies guidance on implementing asset management concepts and principles within their business processes. At its core, asset management deals with an agency's decisions in resource allocation and utilization in managing its system of transportation infrastructure. Asset management is a way of looking at an agency's "way of doing business" to see if there are better ways to reach decisions in infrastructure management – e.g., by basing decision methods and criteria on current policy guidance, considering a range of alternatives, focusing on outcomes of decisions, and applying more objective information to decisions.

Asset management therefore relates to existing agency functions – e.g., participating in and informing the development of transportation policies, long-range planning, priority programming and development of the statewide transportation improvement program (STIP), delivering programs and services, and monitoring system condition. It is not a separate function on its own, nor is it a complete departure from current practice. In fact, while all agencies reflect good asset management to some degree in their daily operations, all have room for improvement: "Everyone is doing something, but no one is doing everything." The intent of this *Guide* is to provide individual agencies with the flexibility to tailor and customize their asset management efforts to their particular needs and situations, with an effort as broad or as narrow as they choose to undertake. The *Guide* provides a self-assessment exercise to assist agencies in identifying where they may wish to focus their asset management efforts.

This edition is the initial version of the *Transportation Asset Management Guide*. It will assist transportation agencies in becoming familiar with the ideas and techniques by which asset management can influence

their resource allocation and utilization processes and decisions. Since transportation asset management is a continually and rapidly evolving field, the AASHTO *Strategic Plan* envisions periodic updates of this *Guide* to reflect changes in transportation policy and to be able to report current DOT experiences and practices. The *Strategic Plan* also recommends a number of tasks and research efforts, results of which will likewise be useful additions to future versions of this *Guide*.

# TABLE OF CONTENTS

---

<b>FORWARD</b> .....	i
<b>SUMMARY</b> .....	S-1
S.1 Strategic Infrastructure Management.....	S-1
S.2 Goals and Benefits of Asset Management.....	S-1
S.3 Principles of Asset Management.....	S-2
S.4 Management Framework and Self-Assessment.....	S-2
S.5 Organization of the Guide .....	S-3
<b>1.0 INTRODUCTION</b> .....	1-1
1.1 Transportation Asset Management.....	1-1
1.2 Benefits and Outcomes .....	1-3
1.3 Building on Previous Work .....	1-4
1.4 Getting Started.....	1-7
<b>2.0 FRAMEWORK AND PRINCIPLES</b> .....	2-1
2.1 Developing the Concept.....	2-1
2.2 Principles of Good Practice .....	2-4
2.3 Management Framework.....	2-8
2.4 Customizing and Asset Management Approach.....	2-13
<b>3.0 SELF-ASSESSMENT</b> .....	3-1
3.1 Introduction to Self-Assessment .....	3-1
3.2 Self-Assessment Exercise.....	3-3
3.3 Where Next?.....	3-8
<b>4.0 DEVELOPING A STRATEGY</b> .....	4-1
4.1 Setting the Stage .....	4-1
4.2 Define the Scope of Asset Management.....	4-6
4.3 Establish Roles and Responsibilities.....	4-8
4.4 Build an Action Plan .....	4-8
<b>5.0 POLICY GOALS AND OBJECTIVES</b> .....	5-1
5.1 Introduction .....	5-1
5.2 Role of Policy Guidance .....	5-1
5.3 Improved Policy-Making .....	5-2
5.4 Relating Policy to Performance .....	5-4
5.5 Playing a Proactive Role in Policy Formulation.....	5-6

## TABLE OF CONTENTS (CONTINUED)

---

<b>6.0</b>	<b>PLANNING AND PROGRAMMING</b> .....	6-1
6.1	Introduction .....	6-1
6.2	Long-Range Planning .....	6-1
6.3	Capital Programming Process .....	6-6
6.4	Program Structure and Definition .....	6-12
6.5	Maintenance and Operations Programming .....	6-15
<b>7.0</b>	<b>PROGRAM DELIVERY</b> .....	7-1
7.1	Overview .....	7-1
7.2	Alternative Delivery Methods .....	7-1
7.3	Program Management .....	7-9
7.4	Cost Tracking .....	7-13
<b>8.0</b>	<b>INFORMATION AND ANALYSIS</b> .....	8-1
8.1	Overview .....	8-1
8.2	Information Needs and Data Quality .....	8-1
8.3	Data Integration and Accessibility .....	8-7
8.4	Decision Support .....	8-10
8.5	Systems Monitoring and Feedback .....	8-17
8.6	Reporting and Documentation .....	8-20
<b>9.0</b>	<b>IMPLEMENTATION</b> .....	9-1
9.1	Introduction .....	9-1
9.2	Example First Steps .....	9-1
9.3	Looking to the Long Term .....	9-3
9.4	Final Thoughts .....	9-8
	<b>GLOSSARY</b> .....	G-1

# LIST OF TABLES

---

2.1 Examples of How Asset Management May Influence Current Business Practices .....	2-6
2.2 Policy Goals and Objectives .....	2-9
2.3 Planning and Programming .....	2-10
2.4 Program Delivery.....	2-11
2.5 Information and Analysis .....	2-11
3.1 Policy Guidance Diagnostic.....	3-10
3.2 Planning and Programming .....	3-11
3.3 Program Delivery Diagnostic.....	3-12
3.4 Information and Analysis Diagnostic .....	3-13
4.1 Sample Implementation Plan Format .....	4-12
6.1 Examples of Potential Tradeoffs Between Types of Program Investments .....	6-10
6.2 Illustration of a Tradeoff Analysis.....	6-11
7.1 Delivery Method Summary .....	7-10
7.2 Examples of Program Delivery Performance Measures.....	7-12
7.3 Cost Data Types and Uses .....	7-13
7.4 FMS versus MMS Cost Tracking Comparisons .....	7-14

