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Multimodal Aspects of Statewide Transportation Planning

A Synthesis of Highway Practice

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Synthesis of Highway Practice 286

Multimodal Aspects of Statewide Transportation Planning

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Systematic, well-designed research provides the most effective approach to the solution of many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. However, the accelerating growth of highway transportation develops increasingly complex problems of wide interest to highway authorities. These problems are best studied through a coordinated program of cooperative research.

In recognition of these needs, the highway administrators of the American Association of State Highway and Transportation Officials initiated in 1962 an objective national highway research program employing modern scientific techniques. This program is supported on a continuing basis by funds from participating member states of the Association and it receives the full cooperation and support of the Federal Highway Administration, United States Department of Transportation.

The Transportation Research Board of the National Research Council was requested by the Association to administer the research program because of the Board's recognized objectivity and understanding of modern research practices. The Board is uniquely suited for this purpose as it maintains an extensive committee structure from which authorities on any highway transportation subject may be drawn; it possesses avenues of communication and cooperation with federal, state, and local governmental agencies, universities, and industry; its relationship to the National Research Council is an insurance of objectivity; it maintains a full-time research correlation staff of specialists in highway transportation matters to bring the findings of research directly to those who are in a position to use them.

The program is developed on the basis of research needs identified by chief administrators of the highway and transportation departments and by committees of AASHTO. Each year, specific areas of research needs to be included in the program are proposed to the National Research Council and the Board by the American Association of State Highway and Transportation Officials. Research projects to fulfill these needs are defined by the Board, and qualified research agencies are selected from those that have submitted proposals. Administration and surveillance of research contracts are the responsibilities of the National Research Council and the Transportation Research Board.

The needs for highway research are many, and the National Cooperative Highway Research Program can make significant contributions to the solution of highway transportation problems of mutual concern to many responsible groups. The program, however, is intended to complement rather than to substitute for or duplicate other highway research programs.

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NOTICE

The project that is the subject of this report was a part of the National Cooperative Highway Research Program conducted by the Transportation Research Board with the approval of the Governing Board of the National Research Council. Such approval reflects the Governing Board's judgment that the program concerned is of national importance and appropriate with respect to both the purposes and resources of the National Research Council.

The members of the technical committee selected to monitor this project and to review this report were chosen for recognized scholarly competence and with due consideration for the balance of disciplines appropriate to the project. The opinions and conclusions expressed or implied are those of the research agency that performed the research, and, while they have been accepted as appropriate by the technical committee, they are not necessarily those of the Transportation Research Board, the National Research Council, the American Association of State Highway and Transportation Officials, or the Federal Highway Administration of the U.S. Department of Transportation.

Each report is reviewed and accepted for publication by the technical committee according to procedures established and monitored by the Transportation Research Board Executive Committee and the Governing Board of the National Research Council.

The National Research Council was established by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and of advising the Federal Government. The Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in the conduct of their services to the government, the public, and the scientific and engineering communities. It is administered jointly by both Academies and the Institute of Medicine. The National Academy of Engineering and the Institute of Medicine were established in 1964 and 1970, respectively, under the charter of the National Academy of Sciences.

The Transportation Research Board evolved in 1974 from the Highway Research Board, which was established in 1920. The TRB incorporates all former HRB activities and also performs additional functions under a broader scope involving all modes of transportation and the interactions of transportation with society.

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PREFACE

A vast storehouse of information exists on nearly every subject of concern to highway administrators and engineers. Much of this information has resulted from both research and the successful application of solutions to the problems faced by practitioners in their daily work. Because previously there has been no systematic means for compiling such useful information and making it available to the entire community, the American Association of State Highway and Transportation Officials has, through the mechanism of the National Cooperative Highway Research Program, authorized the Transportation Research Board to undertake a continuing project to search out and synthesize useful knowledge from all available sources and to prepare documented reports on current practices in the subject areas of concern.

This synthesis series reports on various practices, making specific recommendations where appropriate but without the detailed directions usually found in handbooks or design manuals. Nonetheless, these documents can serve similar purposes, for each is a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems. The extent to which these reports are useful will be tempered by the user's knowledge and experience in the particular problem area.

FOREWORD

*By Staff
Transportation
Research Board*

This synthesis report will be of interest to department of transportation (DOT) administrators, planning supervisors, managers, and staffs, as well as to planning consultants that work with them. It provides information for practitioners interested in the results of attempts to apply multimodal considerations at the statewide level and identifies key research findings. It covers post-ISTEA processes and projects and both passenger and freight activities. The report examines the application of three multimodal aspects: alternatives, modal mix, and integration into three statewide planning functions, which include state planning, corridor studies, and financing, budgeting, and programming. The emphasis is on implementation.

Administrators, engineers, and researchers are continually faced with highway problems on which much information exists, either in the form of reports or in terms of undocumented experience and practice. Unfortunately, this information often is scattered and unevaluated and, as a consequence, in seeking solutions, full information on what has been learned about a problem frequently is not assembled. Costly research findings may go unused, valuable experience may be overlooked, and full consideration may not be given to available practices for solving or alleviating the problem. In an effort to correct this situation, a continuing NCHRP project has the objective of reporting on common highway problems and synthesizing available information. The synthesis reports from this endeavor constitute an NCHRP publication series in which various forms of relevant information are assembled into single, concise documents pertaining to specific highway problems or sets of closely related problems.


This report of the Transportation Research Board documents processes and research currently under development, using three approaches: a literature review, results of a survey of state DOTs, and five case studies. It cites the following states with exemplary practices in multimodal/intermodal transportation based on a 1998 report by the policy

research project at the University of Texas on Multimodal/Intermodal Transportation: Florida, Minnesota, Oregon, Pennsylvania, Virginia, Washington, and Wisconsin.

To develop this synthesis in a comprehensive manner and to ensure inclusion of significant knowledge, the available information was assembled from numerous sources, including a large number of state highway and transportation departments. A topic panel of experts in the subject area was established to guide the author's research in organizing and evaluating the collected data, and to review the final synthesis report.

This synthesis is an immediately useful document that records the practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As the processes of advancement continue, new knowledge can be expected to be added to that now at hand.

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Crawford F. Jencks, Manager, National Cooperative Highway Research Program, assisted the NCHRP 20-5 Committee and the Synthesis staff.

Information on current practice was provided by many highway and transportation agencies. Their cooperation and assistance are appreciated.

MULTIMODAL ASPECTS OF STATEWIDE TRANSPORTATION PLANNING

SUMMARY

The state of the practice in the consideration of multimodal aspects in statewide planning has evolved rapidly since the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1992. In addition, a significant research program focusing on developing improved tools and methods for multimodal planning was undertaken following ISTEA. The results of these efforts, which are now becoming available, will enable multimodal planning to evolve during the era of the Transportation Equity Act for the 21st Century (TEA-21).

Comparing the three synthesis/research studies on this topic—the first in 1991/1992, the second in 1995, and this report based on 1999 data—one can see that the technical tools for multimodal considerations have greatly advanced as has the application of multimodal considerations to policies, programs, and projects. Early multimodal activities were generally project-focused and relied on a “champion or entrepreneur” rather than a multimodal planning process for initiation and success. The early round of state transportation plans that were required under ISTEA yield a first look at multimodal issues for some states. These plans are now being updated and refined, with more emphasis on intermodal and multimodal concerns. Almost all states that responded to this study survey reported that they were involved in multimodal planning at least to some degree.

This synthesis report presents information on the practice of multimodal statewide planning. In particular, the report examines the application of three multimodal aspects: alternatives, modal mix, and integration in three statewide planning functions, including state planning, corridor studies, and financing, budgeting, and programming. The emphasis of the report is on the implementation of policies, programs, and projects that have resulted from the consideration of multimodal aspects in the statewide planning process. In addition, the report documents processes and research that are currently under development. This report uses three approaches to document the state of the practice: a literature search, results of a survey of state departments of transportation (DOTs), and five case studies.

The evolution of multimodal aspects has proceeded rapidly since the passage of ISTEA. In one sense, this is surprising, given that there are still many institutional and organizational factors working against the practice of multimodalism. These factors include a modal federal DOT administering modal programs, Congressional authorizing and appropriations committees organized around modes, Congressional earmarking of projects, modal constituency organizations, prohibitions in state trust fund legislation, federal funding prohibitions, and organizational fragmentation.

Against this unfavorable backdrop, there are three major interrelated concepts that make the development of multimodal considerations (at the appropriate scale) mandatory.

The first concept is that the planning process is becoming more and more focused on dealing with the needs of the customer, or user, with less emphasis on facility-based planning. When looking at the transportation needs from a customer/user basis, multimodal considerations are essential. Individuals routinely make transportation decisions on the basis of multimodal considerations and many of the trips are intermodal. For example, a person desiring to travel from point A to point B for a specific purpose views the full spectrum of transportation possibilities and, based on his or her priorities (such as minimizing travel time, cost, and trip reliability), chooses the mode or the combination of modes that meet his or her objectives.

The movement of goods is increasingly based on multimodal considerations from logistics managers who view the total realm of modal possibilities and intermodal opportunities to satisfy customer demands for dependability and cost-effectiveness. Travelers and logistics managers are not concerned with institutional, jurisdictional, and financial prohibitions and constraints. They expect transportation officials to solve these problems and provide systems and services that meet their needs.

The second concept is government accountability and the use of performance measures to meet customer and user needs. Some states are required to present performance information as part of a budget process or other statutory government accountability requirement. Other states have adopted performance measurement or performance-based planning as a “good government practice.” At the national level, the Government Performance and Results Act requires all federal agencies to report performance measures. When accountability is linked to customer or user expectations, multimodal considerations become more evident and important.

The third concept that leads to multimodal considerations is the reemergence of the notion that transportation serves a larger purpose. Policies articulated at the highest level—under such terms as *growth management*, *livable communities*, *economic development*, and *sustainability*—all focus on issues of modal choice and the efficient use of limited resources.

These three concepts make the movement toward multimodal considerations imperative at a scale that is appropriate to the conditions in each particular state. The lead for these considerations may not even be with the state DOT, depending on the roles and responsibilities assigned by the “authorizing environment.”

The DOT may be the sole transportation agency in the state or it may be one transportation agency among several involved in establishing state transportation policy. However, there is a need somewhere within the state structure to have a coordinated focus on multimodal and intermodal issues.

Although the consideration of multimodal aspects has evolved rapidly over the previous 7 years under ISTEA, under the provisions of TEA-21 the evolution should be even more rapid in the next 6 years for a number of reasons:

- Advances in the availability of technical methods, such as those resulting from eight multimodal research studies under the National Cooperative Highway Research Program (discussed in chapter 2), and national databases from the Bureau of Transportation Statistics and the modal administrations will provide improved technical tools and information for use in statewide and regional planning.

- There has been much experimentation with management systems, including intermodal management systems; some ideas have worked, others have not. States are developing a set of performance management systems that include the content, scope, and scale of systems that make sense for their state, not because of a federal mandate.
- The initial round of state transportation plans required under ISTEA is largely complete. The survey showed that many states are updating these plans and that the consideration of multimodal aspects is increasing.
- TEA-21 has removed some of the impediments to intermodal and multimodal projects. The “One U.S.DOT” initiative is also facilitating the implementation of these projects.
- The initial efforts to involve additional stakeholders in the planning process have created a greater understanding of the needs of different groups. The initial dialogues should continue to present opportunities for intermodal and multimodal projects and programs.

The following conclusions are offered from the information gathered and analyzed for this report:

- The consideration of multimodal aspects, as defined for this study, is a policy decision. The decision to enter the world of assessing transportation programs multimodally needs to be made at the highest decision level in the state and involves changing the mindset of an organization from modal facility planning to a customer/performance-based process that considers the movement of people and goods.
- Successful multimodal planning processes operate best under the umbrella of some higher state or regional vision, land-use and/or economic development policy, or sustainability consideration. These broader policy objectives tend to drive the transportation planning process toward a more multimodal focus.
- The multimodal planning process should be appropriate to the conditions and issues of each state, but there is a minimum level of multimodal planning and the consideration of multimodal aspects that are appropriate for each state. The state DOT may be the appropriate agency for this process or the consideration can occur at some other administrative level, for example, at a transportation commission or in the governor’s office, if the state DOT is not chartered to take the lead in multimodal issues. Even for states primarily involved in the operation of the state highway system, the state highways are major multimodal facilities handling single-occupant vehicles, multiple-occupant vehicles, public transit vehicles, car- and vanpools, goods movement vehicles, and communications systems.
- To increase effectiveness, the consideration of multimodal aspects could be institutionalized throughout the agency (DOT). Institutionalization means that the multimodal considerations are part of the daily business of all the functional areas, including design, construction, maintenance, operations, and modal divisions. They must also be present in planning and, where appropriate, the field structure and main office. To be effective, the consideration of multimodal aspects needs to be more than a planning responsibility.

- The impediments to effective multimodal planning most often cited—funding restrictions, organization and institutional fragmentation, and the lack of technical tools—are real; however, they have been successfully overcome in some states. Again, the consideration of multimodal aspects is a policy decision.
- The initial step for the successful consideration of multimodal aspects is not data collection and the development of technical processes; rather it is the creation of a dialogue with the customers and stakeholders of the transportation system. Technical tools and data requirements will follow.
- Data collection and the application of technical processes should be appropriate to the scale of the multimodal considerations. If multimodal concerns are at the margin, that is, plus or minus 1 to 2 percent of travel, it does not make sense to invest in detailed technical processes. Sketch planning tools and focus groups may be more appropriate, at least initially, to set the scale of the consideration.
- The focus of statewide multimodal planning activities has shifted from meeting federal requirements under ISTEA to developing processes that are appropriate to the conditions within the state, while still meeting the requirements.
- States are struggling with the notion of whether to provide a choice of modes when they look at a mix of different modes in a planning process. Providing a choice has fiscal implications that can affect the entire transportation program and budget. More information and analysis is needed in this area.

INTRODUCTION

Multimodal Aspects of Statewide Transportation Planning was proposed and selected as a synthesis topic by the states, because there has not been a recent review of the state of the practice, technical procedures, and research needs for either passenger or goods movement.

The last synthesis on multimodal practices, *NCHRP Synthesis of Highway Practice 201: Multimodal Evaluation in Passenger Transport (1)* was based on information gathered during 1991 and 1992, prior to the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA). ISTEA set forth policies and programs that encouraged the consideration of multimodal and intermodal projects.

This synthesis will document the current state of the practice on the consideration of multimodal aspects during the ISTEA era. With the passage of the Transportation Equity Act (TEA-21) in 1998, where the basic framework for the consideration of multimodal considerations remained intact, the research generated during the ISTEA era will continue to be refined and applied to the various planning processes. This synthesis will provide the practitioner with the state of the practice, results of attempts to apply multimodal considerations at the statewide level, and will identify additional research needs.

PURPOSE AND APPROACH

The purpose of the synthesis, articulated in the project scope statement prepared by the topic panel, is to document the state of the practice, provide examples of successful practices, and identify key research needs.

The approach used in this synthesis required the development of a set of definitions in order to achieve some consistency throughout the report. Many of the terms required for this project are used with different meanings in the literature and are sometimes used interchangeably. The definitions put forth in this report may not be universally accepted, but they were used to achieve a necessary consistency.

Statewide Transportation Planning Activities

The scope of the synthesis is the statewide transportation planning process. Statewide transportation planning can be described as a number of activities generally accomplished

by the planning function within a state department of transportation (DOT). Figure 1 shows the types of statewide planning activities and their characteristics as described at the recent Conference on Statewide Planning (2).

Statewide Planning Today	
Type of Plan	Characteristics
Policy Plan (Multimodal)	<ul style="list-style-type: none"> • Sets policy/strategic direction through participatory process • Includes goal statements • Specifies implementation actions • Specifies desired outcomes
Statewide System Plans (Modal)	<ul style="list-style-type: none"> • Includes system-level needs/finance analysis • Some list 20 years of improvements • Few set program-level priorities (preservation, safety, capacity)
Sub-State Plans	<ul style="list-style-type: none"> • Typically identify capacity/modernization projects
Corridor Plans (Modal and Multimodal)	<ul style="list-style-type: none"> • Detailed implementing plans • Tied to project development
Long-Range (5+ Year) Programs	<ul style="list-style-type: none"> • List of projects as pipeline into STIP • Usually capacity/modernization • Frequently overcommits the state

FIGURE 1 Statewide planning activities and characteristics from a statewide planning conference, 1999 (David Rose, Dye Management Group, Inc.) (2).

For the purpose of this synthesis, these types of planning activities were combined into the following three statewide planning activities:

1. *Statewide Transportation Plan, Including Strategic or Policy Planning*—Under this process the establishment of a vision, goals and objectives, and strategic planning activities are included. Section 135 of Title 23 requires development of a statewide transportation plan. All the activities leading up to the preparation and periodic update of the plan are included in this process.
2. *Corridor Planning Studies*—Included in this process are planning studies that look at alternatives in a sub-state, intercity, regional, multistate, or international corridor where the state is the lead agency.

3. *Statewide Financing, Budgeting, and Programming*—All the activities that culminate in the establishment of a multiyear program for the expenditure of federal, state, and other funds are included in this process.

Multimodal Aspects

The terms multimodal and intermodal are often used interchangeably in the literature, but in fact are defining different aspects or levels for considering more than one mode during the planning activities. Rather than develop traditional definitions for these two terms, this synthesis combines the two concepts (multimodal and intermodal) into three aspects and asks if one or more of these three aspects are being considered in the planning processes. For this synthesis, the above statewide planning processes were considered multimodal if they included one or more of the following aspects.

- *Consideration of Modal Alternatives*—For each of the processes, the consideration of modal alternatives means that the process starts with a broad set of goals and objectives and analyzes different modes or combinations of modes for meeting the process objectives. For passenger transportation, alternatives to the single-occupant vehicle (SOV) will be considered multimodal. This includes high-occupant vehicle (HOV) lanes, ride sharing, and vanpooling as well as transit, rail, and other passenger modal options. For freight, multimodal alternatives would include policies, regulations, and logistics as well as rail, truck, air, water, and other freight modes.
- *Modal Mix*—Modal mix means the consideration of the appropriate role of each modal alternative within the process and the development of the most appropriate mix of modes to meet the objectives. For example, for a corridor study this means looking at total person travel demand initially and developing a plan that includes several modal solutions to handle the demand. Mix also can imply giving the traveler a choice of modes, although providing a choice of modes may not be affordable in many circumstances.
- *Modal Integration and Connection*—Modal integration and connection includes the consideration of a trip from the origin to the ultimate destination that involves several modes, including modal connections and the effective integration of the modes.

Flexibility was afforded to states to report on multimodal activities that did not meet these definitions; however, the definitions are used to define the state of the practice.

Other Important Definitions and Distinctions

In addition to the two basic definitions, several other important distinctions were made for this synthesis. The synthesis is on statewide activities. Metropolitan Planning Organization (MPO) activities that occur within these statewide planning activities are also included. The synthesis is concerned with processes and projects that have been implemented. There is a separate section for processes under research or development. A distinction is made between one-time multimodal considerations and considerations that are part of a continuing planning process. This synthesis covers both passenger and freight activities. The time frame for the inquiry is post-ISTEA. Additional information was requested on financial, institutional, and organizational issues related to multimodal considerations to establish the setting within a state for multimodal planning and implementation.

ORGANIZATION OF INQUIRY AND REPORT

The inquiry and the report are organized around four basic tasks. The results are presented to provide different audiences with the option to use different parts of the report as relevant to their individual needs. For example, officials at a high level in the organization will be more interested in the summary, conclusions, and research needs. The practitioner looking for a quick reference in current literature to assess the state of the practice will be interested in the literature review section. Officials conducting state planning activities who want to compare their multimodal planning activities with those of other states will be more interested in the results of the state surveys and case studies. The four tasks are as follows:

Task 1—Review of Literature and Pending Research

Chapter 2 presents a summary of the recent national literature (post-ISTEA) concerning multimodal aspects. In addition to the references and summary of the documents, a catalog of case studies included in the literature is presented and sorted by state. This chapter serves several purposes: to provide a handy summary for the practitioner, trace the evolution of multimodal considerations and research, supply a catalog of case studies for practitioner use, and present a summary of findings from previous research for use in this report.

Task 2—Survey of State DOTs

A survey form was developed and sent to all states. The survey first established the setting in each state for the consideration of multimodal aspects. Next, the survey established

if the three multimodal aspects (alternatives, mix, and integration) were being used in the three statewide processes (state transportation plans, corridor plans and financing, budgeting and programming). Finally, the survey asked a number of questions relevant to the consideration of multimodal aspects and requested examples of the application of multimodal aspects. Responses were received from 38 states (see Appendix A).

The purpose of the survey was twofold: first, to document the state of the practice and provide preliminary answers to some of the questions in the scope; second, to identify potential case studies that would provide more detailed information. The results of the survey, a copy of which is included in Appendix B, are discussed in chapter 3.

Task 3—Case Studies

Five case studies were identified from the survey to illustrate in more detail various multimodal aspects of statewide planning. More detailed information was obtained from reports and conversations with state officials. The case studies are included in chapter 4.

Task 4—Conclusions and Additional Research Needs

The Executive Summary includes a summary and such conclusions that can be drawn from the inquiry and in addition presents a number of additional research needs.

REVIEW OF LITERATURE, CURRENT RESEARCH, AND CATALOG OF CASE STUDIES

The purpose of the literature search is to provide a quick summary to the practitioner of the results of national research, and conferences and activities, which have occurred at the national level, since the passage of ISTEA. A more complete literature search was done recently as part of NCHRP Project 8-32(1), *Innovative Practices for Multimodal Planning for Freight and Passengers* (3), and is available as NCHRP Web Document 9. In addition, chapters 3 and 4 contain references to documents obtained from the states responding to this synthesis.

There has been much written about multimodal considerations in transportation planning; however, review of the literature indicated that there were only two fairly complete reviews on the subject of the state of the practice in multimodal planning. The first, *NCHRP Synthesis 201* (1), was conducted in 1991/1992, prior to the enactment of ISTEA. The second, *NCHRP Report 404* (3), was based on 1995 information as part of NCHRP Project 8-32(1). In most references, multimodal aspects are mentioned as parts of a detailed look at a particular function or program within the overall transportation planning process.

In the summer of 1999, a Conference on Statewide Transportation Planning was held in Girdwood, Alaska, July 21–24. There was considerable discussion on multimodal planning techniques and practices and a number of resource presentations were made. The proceedings of that conference will be available in 2000 (4).

Many of the previous efforts have also used case studies to illustrate techniques and processes associated with the use of multimodal considerations. In some cases, a particular application was the subject of multiple case studies.

There was a large-scale research effort initiated after the passage of ISTEA and the initial series of conferences that followed ISTEA. Projects related to this effort, when completed and/or implemented, will greatly enhance the understanding and practice of multimodal planning. The following eight interrelated topics, studied under NCHRP Projects 8-31, 8-32, 8-34, and 20-29, are reviewed as part of the literature summary.

- 8-31—*Multimodal Corridor and Capacity Analysis Manual*, published as *NCHRP Report 399*, 1998 (5).

- 8-32(1)—*Innovative Practices for Multimodal Planning for Freight and Passengers*, published as *NCHRP Report 404*, 1998 (3).
- 8-32(2) and (2a)—*Multimodal Transportation: Development of a Performance-Based Planning Process* (publication pending; Phase 1 summarized in *NCHRP Research Results Digest 226*) (6).
- 8-32(3)—*Integration of Land Use Planning with Multimodal Transportation Planning*. Part 1, *Land Use Impacts of Transportation: a Guidebook*, published as *NCHRP Report 423A*, 1999 (7). Part 2, *UrbanSim*, is scheduled to be published as *NCHRP Report 423B*.
- 8-32(4)—*Developing and Maintaining Partnerships for Multimodal Transportation Planning*, published as *NCHRP Report 433*, 1999 (8).
- 8-32(5)—*Multimodal Transportation Planning Data: Guidance Manual for Managing Transportation Planning Data*, published as *NCHRP Report 401: Guidance Manual for Managing Transportation Planning Data*, 1997 (9).
- 20-29(1) and (2)—*Development of a Computer Model for Multimodal, Multicriteria Transportation Investment Analysis* (publication pending) (10).
- 8-34—*Guidebook for Transportation Corridor Studies: A Process for Effective Decision-Making*, published as *NCHRP Report 435*, 1999 (11).

This summary of the literature and research has several purposes. (1) The summary of the literature will provide the practitioner with a brief guide if there is interest in exploring the subject in greater detail. (2) A summary of current research is presented to indicate which areas in the consideration of multimodal aspects will have additional information and techniques available in the near future. (3) A catalog and summary of the case studies contained in the literature will serve as a guide for the practitioner if additional information is desired. This catalog was also used in this study to avoid duplication of case studies with previous efforts. (4) Observations drawn from the various sources and research studies are also presented.

SUMMARY OF LITERATURE

General Review on Multimodal Considerations

Rutherford, G.S., *NCHRP Synthesis of Highway Practice 201: Multimodal Evaluation in Passenger Transportation*, Transportation Research Board, 1994 (1)

This document presents information on the state of the art in multimodal evaluation for planning and programming. Because this report predates ISTEA (the synthesis is based on 1991/1992 information), only a few examples of multimodal planning and evaluation were found. The 18 examples described include both statewide and MPO activities. These examples are divided into three categories: intercity corridor, regional urban corridor, and regional programming. Five case studies were documented.

The report concludes with four recommendations: comprehensive guidance on evaluation methods, criteria, measurements, and impacts; a multimodal measure of mobility; documentation and training; and additional information exchange.

TransManagement, Inc., *NCHRP Report 404: Innovative Practices for Multimodal Transportation Planning for Freight and Passengers*, Transportation Research Board, 1998 (3)

This report provided the most comprehensive review of multimodal considerations found in the literature search. This study was part of NCHRP Project 8-32 on multimodal transportation planning and is one of six research topics reviewed under the broader topic heading. The information is based on research conducted from 1994 to 1996. Six processes or topics are examined: organization/institutional arrangements, methods, management systems/performance measures, public involvement, rural areas, and financial constraints. Twenty case studies are included. Alternative future directions and research needs are also presented in the report.

Boske, L.B., *Multimodal/Intermodal Transportation in the United States, Western Europe and Latin America: Government Policies, Plans and Programs*, Lyndon B. Johnson School of Public Affairs, University of Texas at Austin, 1998 (12)

This report contains seven state case studies on the practice of multimodal planning. Background information on changing global economy and trade and public sector involvement in transportation in the United States is presented. Additional case studies include a number of European and Latin American countries. For each case study,

the following information is presented: an overview of the state or country; a description of the transportation infrastructure; state or country policies, issues, and goals; a description of the agencies involved in transportation; a description of the status of the various planning programs, transportation funding and programs; and exemplary practices in multimodal/intermodal transportation.

***Conference on Statewide Transportation Planning*, Transportation Research Board (publication pending) (4)**

The conference was the sixth in a series on statewide transportation planning. Following the passage of TEA-21, the conference reviewed the statewide planning practices conducted under ISTEA and identified the issues and directions for statewide planning activities in the next century. Presentations were made on the following topics: land use and environmental considerations in statewide planning; performance-based planning; asset management; management systems; statewide goods movement; intermodal planning issues; relationships of substate, regional, rural, tribal nation, and multistate planning; integration of management and operations into statewide planning; environmental justice; improving the business of statewide planning; and future challenges. Issues, questions, and research needs in these areas were also developed.

***Refocusing Transportation Planning for the 21st Century*, Transportation Research Board, 2000 (13)**

Two conferences were held in early 1999. The first, in Washington, D.C., focused on identifying the planning issues and research areas for the 21st century in transportation planning. At the second conference, held in Irvine, California, the participants prepared 106 research statements related to the issues raised at the first conference. The research statements have been assembled to create a National Agenda for Planning Research, which can be used, by federal, state, regional, academic, and private institutions to develop research programs. Many of the research statement topics involve multimodal planning. One important recommendation is to create a better mechanism for tracking and coordinating current research and sharing the results of the research.

Freight Transportation

Coogan, M.A., *NCHRP Synthesis of Highway Practice 230: Freight Transportation Planning Practices in the Public Sector*, Transportation Research Board, 1996 (14)

This report documents the state of freight transportation planning practices based on information from 1993/1994.

Many states were wrestling with the development of freight-based performance measures, using Intermodal Management Systems (IMS) and Congestion Management Systems (CMS) as the platforms for these analyses. Concerns identified included institutional arrangements, procedures used, forecasting tools, and mechanisms for issue resolution. Five case studies are presented on state freight planning as well as a number of MPO case studies on freight planning in metropolitan areas.

Institutional

Crain & Associates, *TCRP Report 14: Institutional Barriers to Intermodal Transportation Policies and Planning in Metropolitan Areas*, Transportation Research Board, 1996 (15)

The study identified barriers to planning, decision making, funding, operating, and implementation. Institutional barriers at all levels of government were assessed. Three planning sessions were conducted and strategies to improve institutional relationships are proposed.

Performance Measurement

Poister, T.H., *NCHRP Synthesis of Highway Practice 238: Performance Measurement in State Departments of Transportation*, Transportation Research Board, 1997 (16)

Regarding multimodal and intermodal performance measurement, the report concludes that:

Relatively few states reported tracking measures regarding multimodal or intermodal performance . . . measures that were reported tend to relate either to program inputs and outputs, to access or to utilization.... As state DOTs engage more systematically in true intermodal systems planning, they need to undertake cross-modal analyses on an objective basis. This requires 'modally blind' performance measures and comparable data across different modes.

Programming, Budgeting, and Financing

Transportation Research Circular 406: *Transportation Planning, Programming, and Finance*, Transportation Research Board, 1993 (17)

The report presents the proceedings of a conference held in 1992 after the passage of ISTEA. There is extensive discussion on characteristics and definitions of a multimodal planning and programming process. The report recommends a number of actions and research needs to implement multimodal planning, programming, and financing.

Transportation Research Circular 465: *Conference on Transportation Programming Methods and Issues*, Transportation Research Board, 1996 (18)

The report presents the proceedings of a conference held in December 1995 on transportation programming methods and issues. The report contains resource papers on several applications of programming and performance measurement. The conference conclusion regarding multimodal programming reported that:

Most levels and agencies are on some path toward a multimodal project selection process. No one is at the desired end point and to some extent there is no agreement on what that end point looks like. The disagreement stems from perceptions of the effect that multimodal programming will have when the needs of each mode or type of project are so great.

While theoretically this is the time when a multimodal process is particularly valuable, the perceived reality is that choices are more constrained by the higher level of need. There is also a sense that multimodal programming may only make sense at the regional or local area level.

Neumann, L.A., *NCHRP Synthesis of Highway Practice 243: Methods for Capital Programming and Project Selection*, Transportation Research Board, 1997 (19)

This survey determined that 12 of the responding agencies (31 percent) use multimodal goals to some degree to set program direction. An additional seven DOTs revealed that they were in the process of developing multimodal goals. Among the agencies that use multimodal analysis, the level at which it is used varies. Only seven agencies reported that they specifically use some level of multimodal criteria to compare projects across modes. This synthesis concluded that:

States are improving their ability to consider a wider range of transportation solutions and modal tradeoffs, however, significant barriers to multimodal programming exist. These barriers include institutional and funding constraints at the state level, continued differences in the administration of modal programs at the federal level, and continued need for more effective technical tools and data to support multimodal analysis within reasonable resource constraints.

Transportation Financing for the 21st Century, *Conference Proceedings 15*, Transportation Research Board, 1997 (20)

The report includes descriptions of the experiences of four states (Ohio, Oregon, Florida, and Arizona) in establishing state infrastructure banks, and the use of state infrastructure banks for multimodal and intermodal projects.

Corridor Planning/Project Development

Cook et al., *Transportation Research Circular 463: Conference on Major Investment Studies in Transportation*, Transportation Research Board, 1996 (21)

The conference report contains presentations and workshop summaries on the different aspects of major investment studies, including the consideration of multimodal alternatives.

TransCore, NCHRP Report 435: Guidebook for Transportation Corridor Studies: A Process for Effective Decision-Making, NCHRP Project 8-34, Transportation Research Board, 1999 (11)

The guidebook is designed to help practitioners and decision makers with approaches to transportation investment decisions in corridors and subareas. The organization of the guidebook follows the flow of a typical corridor study. Although the focus of the book is on metropolitan areas, the processes and examples are applicable to statewide planning activities as well. Multimodal considerations are included in all aspects of the process and several examples are contained in each chapter. The overall emphasis, "to employ systematic, effective study procedures in bringing stakeholders together to make transportation decisions," is consistent with the scope and purpose of this synthesis. One case study is included in the report.

Intermodal Planning

Special Report 240: ISTEA and Intermodal Planning: Concept, Practice, Vision, Transportation Research Board, 1993 (22)

This report presents the proceedings of a conference held in December 1992 to review the state of the art in planning and to identify new mechanisms and issues related to implementing ISTEA. Workshops were held on intermodal partnerships, multimodal planning, comparisons across modes, intermodal management systems, and vision and potential for intermodalism.

National Conference on Intermodalism: Making The Case, Making It Happen, Conference Proceedings II, Transportation Research Board, 1996 (23)

The conference focus was on examples of effective intermodal project and plan implementation in order that transportation professionals could better understand the characteristics of successful integration of intermodalism into transportation planning and decision making. A number of case studies are included in the report. In addition, 82 poster sessions and corporate profiles are included in the appendix.

Tools and Techniques

Kinley-Horne and Associates, Inc., NCHRP Report 433: Guidelines for Developing and Maintaining Successful Partnerships for Multimodal Transportation Projects, Transportation Research Board, 1999 (8)

This study is one of a series of research projects developed under NCHRP Project 8-32 on multimodal transportation planning. Many multimodal projects require the use of partnerships because of multiple owners or financial arrangements, or because the benefits of partnerships enhance the final product. The report presents a guide for developing and maintaining partnerships. The research team identified about 60 projects involving partnerships and selected 12 for detailed case studies.

Jack Faucett Associates, NCHRP Report 401: Guidance Manual for Managing Transportation Planning Data: Multimodal Transportation Data, NCHRP Project 8-32(5), Transportation Research Board, 1997 (9)

As part of a series of research projects on multimodal transportation (NCHRP 8-32), this report looks at the data management aspect of multimodal planning. The report provides guidance on strategic assessment of data requirements to support statewide and metropolitan transportation planning, the availability of current data from primary and secondary sources, analytical techniques and the data required, economic assessments of transportation data programs, and integration of data within and among jurisdictions. Several case studies are included in the research. In addition, a supplemental agency report, *Compendium of Data Collection Practices and Sources*, is available through the NCHRP homepage (www2.nas.edu/trbcrp), NCHRP web documents three and four.

Dye Management Group, Statewide Transportation Planning Course Manual, Federal Highway Administration, 1998 (24)

The course and manual is a top-to-bottom presentation on the different steps in statewide transportation planning. The steps covered include policy goal setting, condition analysis, needs analysis, financial analysis, plan development/implementation plans, programming, and budgeting. Multimodal requirements are covered in each step. The manual contains examples of best practices in several states. Specific examples are shown in the "case study catalog" at the end of this chapter.

Cambridge Systematics Inc., NCHRP Report 399: Multimodal Corridor and Capacity Analysis Manual, Transportation Research Board, 1998 (5)

The manual provides a comprehensive framework for dealing with capacity analysis, performance determination needs and options identification, and alternatives evaluation for various elements comprising transportation corridors. The capacity analysis calculates the maximum possible throughput in corridors in terms of person and freight movement, not just vehicle movement.

Specifically, the manual provides definitions and terms central to multimodal corridor and capacity analysis; a typology of corridors that helps illuminate the underlying reasons for capacity problems; sample corridor case studies, capacity analysis methods, and performance measures for multimodal corridor analysis; supply-side and demand-side strategies and methods for impact analysis; and methods for performing economic capacity analysis.

Pinkerton, B., *The Integration of Transportation Information, Final Report of the Management Systems Integration Committee, Colorado Department of Transportation, 1998 (25)*

This project was the result of five states, two MPOs, the Federal Highway Administration (FHWA), and the Federal Transit Administration sharing information and providing guidance on the integration of transportation planning information from the various management systems. The report covers the areas of long-range planning, statewide transportation improvement program/transportation improvement program (STIP/TIP) development, project design/construction/maintenance/operations, evaluation of implemented actions performance measures, and several other topics. Examples from Oregon, Colorado, Missouri, and Florida are included.

DeCorla-Souza and Hunt, *Use of STEAM in Evaluating Transportation Alternatives, Federal Highway Administration [Available at www.ota.fhwa.dot.gov/steam], 1998 (26)*

In 1995, the FHWA developed a corridor sketch planning tool, a sketch planning analysis spreadsheet model (SPASM), to assist planners in developing the type of economic efficiency and other evaluative information needed for comparing cross-modal and demand management strategies. To allow for more detailed corridor analysis and facilitate system-wide analysis, the FHWA developed an enhanced version of SPASM called the surface transportation efficiency analysis model (STEAM).

STEAM allows for the development of monetized impact estimates for a wide range of transportation investments and policies. Up to seven modes can be considered. The model uses the output of the four-step travel demand

modeling process or off-model software such as FHWA's Travel Demand Management (TDM) software. The paper describes the application of STEAM in a western city.

Three alternatives are analyzed. To date the model has not been used in a statewide context, but it could be used in those states that have statewide models or travel demand estimation programs.

Parsons, Brinckerhoff, Quade and Douglas, *NCHRP Report 423A: Land Use Impacts of Transportation: A Guidebook, Transportation Research Board, 1999 (7)*

This report is part of the series of research projects developed under NCHRP Project 8-32 on Multimodal Transportation Planning. The role of land-use planning in multimodal transportation planning is discussed. Currently available analytical tools are reviewed. A behavioral framework is presented for considering land-use concerns with transportation planning. Project 8-32(3) will also produce, document, and make available UrbanSim, an integrated land-use model for metropolitan areas. The model is based on the same behavioral framework presented in the guidebook. UrbanSim is currently available on the University of Washington web site. Oregon is currently using the model and will be holding a workshop in the summer of 2000.

Louis Berger and Associates, *NCHRP Report 421: Economic Trends and Multimodal Transportation Requirements, Transportation Research Board, 1999 (27)*

The report approaches multimodal transportation planning from the perspective of identifying economic trends, determining business passenger and freight transportation needs, and applying this perspective to the metropolitan and statewide transportation planning processes. The report illustrates how to obtain information on economic and business trends. The integration of business needs and inputs with the planning process is also described.

CURRENT RESEARCH

Statewide Travel Demand Forecasting

In December 1998, a Transportation Research Board conference was held on statewide travel demand forecasting (28). In conjunction with that conference, there are several products that will be helpful for states dealing with multimodal considerations. The Texas Transportation Institute conducted a survey of states on the status and use of statewide travel demand forecasting. Thirty-seven states responded and the results were tabulated for the conference. The survey found that 16 states reported

having a statewide travel demand forecasting procedure. Of these 16 states, 11 have some consideration of multimodal issues, usually employing a four-step modeling approach. Eight states reported that they were either developing a model or were considering developing a statewide forecasting process.

Twelve states gave presentations on their approach and models for travel demand forecasting. These presentations are included in the proceedings report of the conference.

Draft Guidebook on Statewide Travel Forecasting, Center for Urban Transportation Studies, University of Wisconsin-Milwaukee, 1998 (29)

“The guidebook reviews the state-of-the-practice of statewide travel forecasting. It focuses on those techniques that have been considered essential to good statewide travel forecasting. In addition this guidebook presents specialized or advanced techniques of potential interest to persons involved in statewide travel forecasting.” The guidebook is structured into four parts: time series methods, passenger forecasts, freight forecasts, and specialized methods for passenger forecasting. The appendix presents the state of the art in statewide travel demand forecasting. Examples from four states are included.

Cambridge Systematics Inc., Multimodal Transportation: Development of a Performance-Based Planning Process, NCHRP Project 8-32(02) and (02)A, Transportation Research Board (publication pending) (6)

This project is one of the components of the multiproject NCHRP Project 8-32, Multimodal Transportation Planning. When completed, this project will have produced a performance-based planning manual, which will include definitions, principles, frameworks, guidelines, data resources, and case studies for performance-based planning, plus a performance measures library as an appendix.

A final report will document the research process. It will include the results of 10 case studies from 1997/1998. (Four of the case studies are concerned with state DOTs—Florida, Oregon, Washington, and Vermont.) It will also include results of four workshops, a number of summary findings, and recommendations and suggested topics for further research and product development. The draft final report is being reviewed by the project panel.

Texas Transportation Institute, Development of a Computer Model for Multimodal, Multicriteria Transportation Investment Analysis, NCHRP Project 20-29(02), Transportation Research Board, 2000 (10)

This project presents the development of a multimodal, multicriteria investment framework for use by transportation professionals faced with assessing the tradeoffs inherent in selecting from transportation alternatives. The report describes the use of TransDec, a menu-driven application designed to facilitate multicriteria analyses. It is intended to allow customization by the user and, therefore, be adapted to a wide range of multimodal situations.

The model involves eight steps: identify overall transportation policy goals, identify project evaluation objectives for each goal, assign a measure to each objective, assign a rating scale to each objective’s measure, identify investment alternatives, attach a weight to each of the objectives, normalize the data, and perform sensitivity analysis.

The report describes the testing of the process in a case study in the state of Washington, where alternatives concerning highway-rail crossings were evaluated. Final publication is awaiting the completion of a case study in the state of Maryland.

Transportation Planning Research Program, NCHRP Project 8-36, Transportation Research Board (continuous)

The amount of \$500,000 per year has been earmarked for quick response transportation planning research. Projects are selected annually by an NCHRP panel with the approval of the American Association of State Highway and Transportation Officials Standing Committee on Planning. Projects selected for fiscal year 1999 include: incorporating market research techniques into the transportation planning process, parking modeling procedures, the use of expert panels in analyzing transportation and land-use alternatives, incorporating systems operations and management practices in transportation planning, management of institutional changes on state transportation planning processes and programs, and product delivery of new and improved travel forecasting procedures.

Intelligent Deployment Assessment System (IDAS), Federal Highway Administration, 1999

The FHWA has a contract with Oak Ridge Labs and Cambridge Systematics to develop IDAS, which will help MPOs assess Intelligent Technology Systems (ITS) impacts and, in particular, facilitate the benefit/cost analysis of ITS investments.

CATALOG OF CASE STUDIES

Appendix C lists case studies that are included in previous syntheses and research studies previously described in the

first two parts of this chapter (Summary of Literature and Current Research). The case studies are listed by state and subject matter, with a reference number for the relevant literature source also cited.

SUMMARY AND OBSERVATIONS FROM LITERATURE REVIEW

The search of the literature shows the evolution of statewide transportation planning and the maturation of the consideration of multimodal aspects in the planning process. In 1972, the conclusion of a synthesis on statewide transportation planning stated:

Although there is interest in multimodal statewide transportation planning, much of the past and present effort has been directed toward highways and airport facilities, with the other modes receiving little or no attention. The movement of goods received little or no attention. Monitoring of system performance is necessary to statewide transportation planning. This effort should include all modes for travel for both goods and people. Any analysis of monitoring data should include an evaluation of the performance and the impact of any system on the environment and other systems (30).

Seventeen states had DOTs in 1972. Many states were involved in operating, funding, and planning for several modes other than highways. One of the research recommendations was for the development of a framework for allocation of investments between alternative modes.

By 1982, a subsequent synthesis (31) found the practice of statewide planning and the consideration of multimodal aspects to have advanced. The synthesis documented a number of best practices in the various steps in the statewide transportation planning process; however, the application of multimodal considerations was not widespread.

NCHRP Synthesis Report 201 (1) concluded that seldom is there an objective and comprehensive comparison of different modes. This synthesis, which was written prior to the implementation of ISTEA, identified 18 state, regional, and corridor projects.

The passage of ISTEA in 1992, with the requirement for the development of a statewide transportation planning process and six management systems (including an intermodal management system), triggered the next flurry of activity on statewide planning and the consideration of multimodal aspects. The review of recent literature conducted for this synthesis shows a large number of syntheses, conferences, and research projects stemming from ISTEA.

The literature spans the time from the passage of ISTEA, reflecting pre-ISTEA activities, to the current year. The results of seven research projects on multimodal planning that were initiated as a response to ISTEA have been

recently published or are pending publication. During this period, we also see the effect of the attempt to implement the management systems in a comprehensive manner in a short period of time and the subsequent dropping of the management system requirements by Congress.

The most recent comprehensive document on multimodal planning, *NCHRP Report 404: Innovative Practices for Multimodal Transportation Planning for Freight and Passengers (3)*, found over 700 references associated with multimodal and intermodal planning. The study team went through a process of narrowing down and setting priorities for the candidates for some 20 case studies.

There are a number of observations that can be drawn from this literature review.

- Multimodal issues have existed and been successfully implemented for many years on specific projects. The formal integration of multimodal aspects (according to the definitions used in this synthesis) in a comprehensive systems planning approach is fairly new and can be considered to be in evolution with many of the activities spurred by the passage of ISTEA.
- Experience with the implementation of the management systems, especially the intermodal management systems, showed that comprehensive approaches were, in some cases, quickly changed to more pragmatic reviews of specific points of intermodal activities. Many successful intermodal projects have resulted from the exchange of information and views among the various stakeholders rather than from extensive data analysis systems.
- Some of the current activities associated with expanding the technical capability to deal with multimodal issues are being driven by state policy issues articulated by the political process; for example, placing transportation planning within the larger context of state policy planning efforts such as state "smart growth initiatives." Dwindling public resources for infrastructure expansion associated with development growth is also a concern.
- The consideration of multimodal aspects occurs at many points in the statewide planning process (see Figure 1). The literature, conferences, and research generally deal with one part of the planning process. Some of the research pending publication is starting to review the entire planning process and the consistent application of multimodal aspects throughout the process.
- The impact of so-called "pipeline" or backlogged projects is cited as an impediment to the consideration of multimodal projects in several references. When

ISTEA passed, the states and MPOs had many projects that were already programmed and in the project development process ready for the next Federal Highway and Transportation legislation. For the most part, these projects have continued through the process and have been built or are ready to be built. In addition, many states recognized the need to preserve existing facilities and invest in infrastructure preservation and preventive maintenance programs. Although ISTEA provided additional funding for transportation, much of the money was not available for new multimodal projects. Some of the new programs, such as CMAQ (Congestion Mitigation Air Quality) and Enhancements, did provide the opportunity for new multimodal projects. The degree to which the pre-ISTEA pipeline is now unclogged and new projects based on multimodal considerations are beginning to flow with TEA-21 funds varies considerably from state to state.

- The way states struggle with performance measures mirrors the struggle to incorporate multimodal considerations into the planning process. The debate over measuring outcomes, as opposed to outputs, is focused on the area of responsibility for the state. The trend is to measure those things that the agency has direct responsibility for and provide indicators for the activities not under its control.
- The application of multimodal considerations to the prioritization of projects has been largely unsuccessful. The prevailing thought expressed in the literature is that prioritization is the purview of the political process and should remain so. Planning should be an input to political decision making, but at this point the lack of information and analysis capability on multimodal issues and trade-offs hinders effective input to the process.
- The successful application of multimodal aspects generally follows with the agency (state DOT) having the responsibility for the facility and/or having available resources that do not have modal restrictions.
- There seems to be a consensus that the state of the practice of multimodal aspects has advanced to the point where the consideration is *not* to substitute one mode for the other. The consensus appears to be that the issues of modal mix, integration, and overall mobility are the key issues.
- The 1998 Conference on Travel Demand Forecasting (28) yielded some important preliminary conclusions, which relate directly to the multimodal synthesis:
 - The types of investment decisions being made today are quite different than in the past, when they were primarily highway project-level decisions.
 - Statewide forecasting methods are expected to provide information to support investment decisions among modes and between capacity and operational improvements.
 - Statewide forecasting methods need to be able to tie into asset management systems.
 - Decisions are being tied much more to performance measures. We need to understand the performance measures that will be used for decision making before designing our forecasting processes. When we seek additional funding, we need to be able to demonstrate what we will get in terms of performance.
 - Ensure that policy issues and questions are driving the technical process and not let the models drive the policy process.
 - Answer the question, "What can we expect to get in return for alternative investment strategies?"
 - Knowledge, not just data, needs to come from the information produced by the forecasting process.
 - As modal facilities such as airports and intercity highways reach capacity, we need to be able to test modes that may not exist today, such as high-speed rail.
 - Development of statewide models may not be justified in all states. Ultimately, a decision needs to be made as to whether the information produced is worth the cost and effort involved in model development.

STATE OF THE PRACTICE: RESULTS OF SURVEY OF STATES

A survey questionnaire (Appendix B) was distributed to all state DOTs. This chapter is based on survey returns from 38 states (Appendix A), of which 32 submitted completed surveys, with the remainder only able to complete the general parts of the survey and in several cases answer only a few questions. The responses came from both urban and rural states and are geographically balanced so that the results provide a good cross section of the state of the practice. The number of states that responded with complete information is noted with each question. The numbers and percentages in the following summaries reflect the responses by question.

THE SETTING FOR MULTIMODAL PLANNING

Each state was asked to describe the degree of funding support for the various modes within their state, the availability of funding sources for multimodal activities, the responsibilities of their DOT for the various modes, and the responsibilities for transportation programs in other state agencies.

The setting for multimodal planning is important because previous studies and research have shown that institutional fragmentation and funding restraints are two of the major factors that inhibit the consideration of multimodal aspects. Although ISTEA and TEA-21 have provided additional flexibility, and new programs such as CMAQ and Enhancements have helped to facilitate multimodal solutions, prohibitions on the use of federal and state funds for multimodal projects is still an issue. Similarly, previous studies have documented the reluctance or inability of an agency to undertake projects or measure the performance for modes where it does not have a self-interest; that is, it does not own or is not politically accountable for system performance.

State Funding for the Modes

The results of the responses regarding state funding for the different modes and whether there is a prohibition on using these funds for multimodal projects is summarized in Table 1.

All states reported funding highway programs, with 45 percent stating that there are state prohibitions on using highway funds for multimodal projects. All but three of the states that responded to the survey noted that they also

TABLE 1
STATE FUNDING FOR MODAL/MULTIMODAL

Mode	State Funds Modes		Multimodal Funding Prohibition
	Yes	No	Yes
Highway	38	0	17
Transit	35	3	14
Aviation	32	6	10
Rail	27	11	10
Waterways/port	22	16	8
Bicycle/pedestrian	33	5	4

Note: Data derived from survey questionnaire; 38 states reporting.

fund transit and aviation projects, with 40 percent and 31 percent of these fund sources, respectively, prohibiting their use for multimodal projects. Some 87 percent fund bicycle and pedestrian projects, 71 percent fund rail projects, and 58 percent fund ports/waterways projects. Although the responses to the question of funding restrictions for other modal programs was less complete than the responses to questions on highway funding, the results in hand show that the statutory prohibition on using other modal funding for multimodal projects is less restrictive than the use of highway funds. The reason is probably that other modal programs are not funded from vehicle revenues and thus avoid the statutory prohibition traditionally associated with user funding. The results of the survey show that the states are heavily involved in funding programs covering many modes; however, in almost one-half of the states there is a prohibition on using a modal fund source for more than that specific mode. The most frequently mentioned restriction is placed on the use of highway user revenues for other modes.

Organization Responsibility of the State DOT

A comprehensive summary of the modal responsibilities of the state DOTs does not exist in any one place except for highways. The following summaries are derived from the 38 states that responded to the survey. They are presented to provide a background for the responses to the other survey questions and are summarized in Table 2.

All 38 states reported that their DOT owns and operates highways in the state; however, the extent of the state highway mileage owned and operated by the respective state DOTs varies greatly. For example, in rural areas DOT responsibility ranges from a low of 7.7 percent of highway length accommodating 50 percent of daily travel to a high

TABLE 2
THE ROLE OF STATE DOTs IN THE VARIOUS MODES

Mode	Own	Operate	Conduct Joint Activities with Other Agencies	Plans/Monitor	No Involvement
Highway	38	38	36	38	0
Transit	3	3	33	37	1
Aviation	12	10	29	31	7
Rail	13	7	32	33	5
Waterways/ports	4	3	23	22	16
Bicycle/pedestrian	19	19	34	35	0

Note: Data derived from 38 states responding to questionnaire.

of 96 percent of highway length covering 99.5 percent of travel. For urban highways, the range is from a low of 4 percent handling 28.8 percent of travel to a high of 78 percent handling 93 percent of travel. Therefore, depending on the level of state responsibility, states are usually engaged in joint highway activities with other jurisdictions.

The DOTs also provide funding for other highways, engage in joint activities with other entities (unless the DOT is responsible for all the highways in the state), and plan and monitor highways. Similarly, all states reported involvement (funding, joint activities, and planning and monitoring) of bicycle and pedestrian facilities, with about one-half also owning and operating these facilities.

Regarding public transportation, three states DOTs reported that they own and operate transit systems, with only one state reporting no involvement in transit activities. Twelve state DOTs reported that they own at least one airport and 10 state DOTs operate the airports that they own. Seven DOTs reported no involvement in aviation activities. Thirteen states own some railroad facilities, with seven responsible for the operation of these facilities. Five states reported no involvement in railroads.

State DOTs are less involved in waterways and ports, with 42 percent having no (or no involvement with) waterways or ports. The remainder of the state DOTs engage in joint activities and plan and monitor water transportation activities. Four state DOTs own water transportation facilities and three of those four states operate them as well. Fewer than one-half of the DOTs administer funding for ports and waterways.

Other State Organizations Involved in Multimodal Transportation

Only five state DOTs (13 percent) reported that there were no other state agencies involved in transportation. Forty percent of the states have a different agency responsible for ports and waterways, and 24 percent have a separate agency for aviation. Other agencies mentioned frequently were toll authorities, rail agencies, safety agencies, and state-created regional transit agencies.

Summary of the Setting for Multimodal Considerations

Although the setting for multimodal considerations was not the primary focus of the synthesis, it is important to understand the context or setting within which the state DOTs operate with regard to multimodal considerations.

The findings of past studies were confirmed and in this study measured for two major impediments to the consideration of multimodal aspects—funding prohibitions and fragmentation of transportation responsibilities. Regarding financial constraints, about one-half of the states have funding prohibitions in place on their funding sources. As will be seen later, however, these prohibitions do not necessarily prevent the implementation of multimodal projects. Many states have been highly resourceful in using the existing flexibility in federal funds and combining state modal sources for multimodal projects.

The fragmentation of responsibility for the different modes is an inherent problem faced by most transportation departments. This survey documents the extent of institutional fragmentation. The consideration of multimodal aspects is one way to bring different organizations together for a common purpose.

In summary, the survey shows that there are broad opportunities for multimodal projects in the vast majority of the states. There is funding available for several modes and state DOTs have some involvement in most modes, with ports and waterways being the most common exception.

THE STATE OF THE PRACTICE

Defining State of the Practice

Defining the state of the practice in the consideration of multimodal aspects implies that there is some standard that exists that allows for a comparison. Past research has indicated that there is no such standard, nor is there any agreement on even a definition of multimodal considerations. The most recent study of multimodal planning (3) states that “multimodal planning can most profitably be seen as a series of tools that allows the practitioner to analyze the needs of the person or things to be transported,

giving consideration to the possible roles of candidate modes to serve those needs.”

In the most theoretical sense, multimodal considerations have been defined as those processes that are “modally blind”; that is, processes that look at a transportation problem without any regard to funding, institutional, or modal constraints, beginning with the notion of person and goods travel, and finding the best transportation solution. By this definition, few states are at that state of the practice.

For this study, we have added the notion of the consideration of alternatives, mix of modes, and the integration of modes to the definition of multimodal planning, with an emphasis on the implementation or decision-making role for multimodal planning.

As with all similar surveys of the state DOTs, this survey confirms the diversity of approaches and opinions on the need for and implementation of multimodal aspects in statewide planning. The issue of an “appropriate planning process”—a process that is appropriate for the issues and conditions of the state—is one standard against which to judge the state of the practice.

Some of the statements received from the survey shed light on the diversity of opinion and the state of the practice that is appropriate to that individual state. For example:

- “We only have two modes in this state, highways and rail, no congestion, and three transit systems, and we deal with these in an appropriate level.”
- “We do not normally begin our thought process with the notion of a trip utilizing multiple modes. The modes are generally more separate in our thought/plan process.”

When asked about the status of the survey form in a particular state, one response was “The person who does multimodal is on vacation this week so the survey will be delayed.”

Two states involved in multimodal considerations provided differing views in their survey response on the appropriate role for their state. From Montana:

Montana’s extreme rural character does not mesh with the concepts of definition in the instructions. We explore technologies that make sound economic sense but lack the resources to offer a large variety of travel options and alternatives. We must stay focused on maintaining the existing modal infrastructure and battle any further loss of system, be it essential air, AMTRAK, rail branch lines, or getting a rural farm district out of the mud and onto gravel roads. We meet growing travel demands logically with modal considerations. Alternatives are evaluated. Appropriate mix is factored into the statewide planning. Integration and connection are more difficult given the lack of choice, but we explore the options.

From Delaware:

We do not really plan for modes but rather plan to solve or mitigate problems, providing for access and mobility . . . We incorporate the MPO plans into our state plan. All projects are planned multimodally, with each mode making a contribution to addressing the transportation problem . . . to recognize and benefit from the synergies that exist between capital and operating budgets.

In each case, there are different approaches to the consideration of multimodal considerations that the state feels is “appropriate” for its conditions.

Results of the State Survey

The survey results will be examined through a series of analyses of the data interspersed with examples of best practices as reported by the states and documented in accompanying reports.

SURVEY RESULTS OF THE STATE OF THE PRACTICE

Initial Response to the Three Multimodal Aspects

States were initially asked whether they considered the three multimodal aspects (alternatives, mix, and integration) in three statewide planning functional areas: planning; corridor studies; and finance, budgeting, and programming.

Statewide Planning

All but one state responded positively to considering alternatives in the planning process. The reasons for the one state not considering alternatives included legislative prohibitions, no multimodal issues in the state, organizational constraints, and public/political resistance.

All but five states responded positively to the question on the consideration of modal mix in the planning process. The same reasons cited above were given for not considering, with two states citing the lack of feasible technical and/or analytical processes. Similarly, all but five states said that they consider the integration of modes in the planning process, with the same impediments cited.

In summary, the overwhelming majority of states consider multimodal aspects in the development of their state transportation plans.

When ISTEA was passed, states were faced with an extremely tight deadline in preparation of their transportation plans. At the time of the current survey, some states are going through the second round of updating the original plan and, in some instances, taking a different, more multimodal approach.

An example of statewide planning comes from the state of Washington. Washington's first statewide plan was basically a modal plan for the various modes, with the "ownership modes" and the "interest modes" brought together in planning (32). The updated plan calls for a three-step process: (1) vision—developing a common vision for transportation in Washington State; (2) integration—jointly setting priorities with transportation partners to improve the ability to make transportation investment decisions; and (3) implementation—coordinating transportation planning efforts at the regional level to enhance integrated solutions and developing coordinated 6-year implementation plans.

The major focus of the effort is on "how transportation can shape a livable future." The Washington Transportation Plan vision calls for "changing the way we approach transportation to ensure that Washington remains a desirable place to live in the future. The WTP vision is a balance of three key societal goals—vibrant communities, vital economies, and sustainable environment."

The common themes that emerged from the visioning process were partnerships and flexibility, funding needs, strategic approach and priority setting, multimodalism/transportation options, coordinated land-use and transportation planning, general safety issues, connectivity, congestion, freight, environmental outcomes, and breaching implications of the Columbia/Snake River (33). Proposed outcome measures are discussed later in this chapter in the section *Processes and Research Under Development*.

Corridor Planning

All states reported that they consider alternatives in corridor planning. Four states noted that they did not consider mix or integration in corridor planning, with funding constraints mentioned as the primary reason.

The notion of doing large corridor planning studies that consider alternative modes is active in many states. Several states said that they were conducting these studies for the first time and that it was too early to determine if multimodal considerations and projects would emerge from the studies. The state's experience with major investment studies (MISs) is relevant here and has been described in another report by Cook et al. (21). There are also many examples of multistate national corridor studies under way as a result of ISTEA and TEA-21. These studies were not highlighted by the states in their responses to this survey, but in almost every instance the studies involve the consideration of multimodal aspects.

An example of corridor planning was described by New Jersey, which has created a project development process that calls for developing 28 corridor strategies within the

state. The concept development process is designed to deliver projects from the initial problem statement to the scope development phase, with a well-defined need and recommended concept that has been environmentally screened and received community support. The department has in place a hierarchy of strategies (see Table 3) when reviewing transportation strategies. Listed in order of priority, they include eliminating person trips, shifting trips from automobiles to other modes, shifting trips from SOVs to HOVs, improving highway operations, and adding general-purpose capacity. This last strategy is followed only if no other strategy can satisfy the capacity need (34). The multimodal mobility investigation in the concept development phase includes defining bicycle and pedestrian access deficiencies and transit opportunities within highway improvement concepts.

Finance, Budgeting, and Programming

Seven states reported that they did not consider alternatives in this function and nine states did not consider mix or integration. Legislative/financial constraints were cited in each case. Four states noted that there were no multimodal issues, whereas three cited organizational constraints and one mentioned a lack of technical/analytical processes.

In response to other questions in the survey, 65 percent of the states reported that statewide multimodal plans have affected programming and budgeting decisions. In response to a question on whether multimodal considerations impacted the modal mix in the program, 41 percent of the states replied that the modal mix in the budget and capital program is not determined by multimodal factors. Several examples of statements provided illustrate different relationships between multimodal considerations and the programming process.

California—Programming decisions are primarily effected by a recent state law (SB45), which provides 75 percent of all TIP dollars to MPOs/regional transportation planning agencies (RTPAs) and 25 percent to the California DOT (Caltrans). (Money for the preservation of the state highway system is "taken off the top.") The MPOs/RTPAs base their funding decisions on the regional plans and TIPs and Caltrans on state and other planning processes. Set asides exist for transit and rail, but Caltrans feels that in the consideration of investments at the state level they have the flexibility to consider modal alternatives, mix, and integration.

Maryland—"Within MDOT each modal administration maintains an inventory of its capital and operating needs. MDOT annually evaluates its needs on a statewide basis against department revenues. MDOT develops a draft multimodal Consolidated Transportation Program (CTP) and takes it out on an 'annual tour' to the state elected officials

TABLE 3
CONGESTION MANAGEMENT STRATEGIES

Group Hierarchy and Subgroupings	Individual Strategies
Eliminate person trips Congestion pricing Transportation demand management (TMD) Growth management Alternative work hours	<ul style="list-style-type: none"> • Increased peak tolls • Parking rate adjustments • Transportation management associations • Ride matching • Telecommuting • Activity centers • Land-use policies/regulations • Staggered work hours/flexible work schedules • Compressed work weeks
Shift trips from auto to other modes Mode shift strategies	<ul style="list-style-type: none"> • Carpool/vanpool • Park and rides • Guaranteed ride home programs • Demand responsive transit services • Transit marketing • Transit first policy • Promotion of TransitCheck • Bicycle improvements • Pedestrian improvements • Traffic signal preemption • Transit coordination • New transit service • Bicycle/pedestrian improvements at rail stations • Transit enhancements/expansion • Exclusive right-of-way rail/bus • Expand parking at all rail stations
Transit service/operations improvements Transit capital improvements	<ul style="list-style-type: none"> • Parking regulations/ordinances • Enforcement • Restrict new parking • Preferential HOV parking • Parking supply adjustment • HOV lanes • HOV/ramp bypass lanes • HOV toll savings
Shift trips from SOV to HOV Parking management HOV treatments	<ul style="list-style-type: none"> • Median control • Driveway controls • Frontage roads • Intersection and roadway widening • Channelization • Traffic surveillance and control systems • Ramp metering • Computerized signal systems • Elimination of bottlenecks • Coordinate and upgrade traffic signals • One-way streets • Vehicle use limitations and restrictions • Incident detection/verification • Emergency response time improvements • Alternative routing techniques • Construction management • Automated toll collection • Traveler information services • Commercial vehicle operations • Intelligent bus stops • Advanced mode choice system
Improve highway operations Access management	<ul style="list-style-type: none"> • Incident management • Intelligent transportation systems
Traffic operation improvements	<ul style="list-style-type: none"> • SOV roadway widening
Add general-purpose capacity General-purpose lanes	<ul style="list-style-type: none"> • SOV roadway widening

Source: Concept Development Guidelines, New Jersey Department of Transportation, 1999.

for their review and comment. After the 'tour,' the CTP is finalized and transmitted to the general assembly for approval."

Montana—"Statewide multimodal plans define need, set program limits, and establish department policy. This steps down to what's programmed and how much is spent."

New Jersey—New Jersey has a capital investment strategy that sets targets and balances target attainment across modes (35).

New York—New York is "from the bottom-up, with the sum of the TIPs and STIP establishing the modal mix."

Oregon—"The modal mix is often driven by the way funds are appropriated. The Oregon Transportation Commission and the area commissions on transportation set directions. Public input is solicited in planning and STIP development."

Pennsylvania—"Much of the modal investment mix is a function of federal and state funding authorized and appropriated for a given mode."

South Dakota—"Funding availability is the major factor determining the modal mix. Gas tax revenues can only be spent on highways."

Wisconsin—Modal investment mix is based on needs.

The influence of the consideration of multimodal aspects diminishes as the process moves closer to the implementation of programs and projects, but an impressive number of states still report that multimodal aspects are included in the programming process.

Needs and Impediments

The states were asked to provide additional information on the needs and impediments faced in being better able to implement the results of statewide multimodal planning activities. These replies included those from states that responded positively to the initial multimodal questions.

The primary need, cited by almost one-third of the respondents, was the lack of adequate resources to implement multimodal projects. There was a sense that the backlog of infrastructure needs and the lack of resources to meet these needs precluded the ability to look at multimodal solutions and programs. This was a finding similar to that in *NCHRP Report 404 (3)*.

Lack of multimodal data and inadequate tools to plan and justify multimodal investments was the second-ranked impediment, being mentioned by eight states. The third

most frequently cited reasons were the inability to use private participation and partnerships in multimodal projects and the fragmentation of responsibilities among organizations. Funding prohibitions were mentioned by six states and were the fourth-ranked impediment. The fifth was simply political opposition.

Cited by three states, three impediments were the sixth most frequently mentioned and included a lack of training, lack of consistent quality freight data, and the overwhelming inertia of physical infrastructure planning and budgeting.

Other relevant impediments mentioned by one or two states included a lack of public interest and understanding of the impacts and benefits of multimodal projects, and the need for state, regional, and local agreement to implement multimodal projects.

Are Multimodal Considerations Institutionalized Within the DOT?

The evaluation of the state of the practice is concerned with whether the consideration of multimodal aspects is a one-time planning exercise or part of the everyday culture of the organization. Put another way, are multimodal considerations "institutionalized" within the DOT?

One indicator of the degree of institutionalization was a question pertaining to whether the consideration of multimodal aspects was centralized or decentralized between the main office and the field structure. The current trend in state DOTs is to decentralize the project development process to the field structure while centralizing the support functions to the main office (36). In response to this question, however, five states replied that the multimodal consideration was decentralized and six states noted that it was a mixture of main office and central office. In the remaining states, the consideration of multimodal aspects is centralized, with the planning function most frequently mentioned as having the primary responsibility. In some states, especially small states, the decision to centralize the consideration of multimodal aspects is not seen as an impediment to institutionalizing multimodal considerations; many of these states are leaders in the consideration of multimodal aspects. However, in those states where decision making on projects is decentralized, institutionalizing multimodal considerations in a decentralized manner is determined to be necessary.

A second aspect of institutionalization is whether the consideration of multimodal aspects is a continuous part of the planning and project development activities or a one-time effort for such activities as developing the statewide transportation plan or a particular corridor study. A total of 27 states responded that the consideration was on a

continuous basis. Three states reported that it was a one-time effort. One state noted that it was a one-time effort, but that it will be continuing. The remaining states reported either having no process or did not answer the question. The conclusion is that multimodalism is institutionalized as a continuous activity in most states, primarily as part of the planning function.

A third aspect of institutionalization not specifically covered in the questionnaire but mentioned in some of the responses is the consideration of multimodal aspects in other functional areas of the DOT, such as design, maintenance, and operations. For example, several states mentioned that multimodal considerations were included in the state highway design manuals.

Implementation

One of the major thrusts of this synthesis and the state of the practice was to determine if the consideration of multimodal aspects was leading to the implementation of multimodal decisions, policies, programs, and projects.

Information on implementation was gathered in three ways. First, states were asked to list examples of policies, programs, and projects that were developed using multimodal considerations. Second, states were asked to describe examples of the use of the three multimodal aspects—alternatives, mix, and integration. Finally, the case studies in chapter 4 concern the implementation of multimodal projects stemming from multimodal planning processes.

Policies

When asked if the consideration of multimodal aspects had resulted in the implementation of multimodal policies, 26 of 32 states responded positively and 20 states provided examples of policies. The following are some examples of the implementation of multimodal policies.

California Goods Movement Policy—California developed a Statewide Goods Movement Strategy in 1998 as part of the implementation of its 1993 California Transportation Plan. Its goals are to enhance California's economic vitality by improving multimodal access and mobility for goods and to develop and manage the transportation system based on explicit understanding of system performance and customer expectations. As a result of this planning process, 42 actions were recommended to improve the goods movement transportation system in California.

California Maritime Policy Statement—The California Maritime Policy Statement was adopted in response to an executive order regarding the protection and planning for

California's coast. It states that, "The state of California recognizes the critical economic importance of its commercial port and maritime activities. Accordingly, the policies and actions of state agencies shall promote and support maritime activities and efficient intermodal operations of California's commercial ports consistent with prudent environmental sensitivity and minimal regulation."

One of the goals under this policy is to "support funding and resources for maritime activities and the construction of major roads, highways, grade separations, and rail facilities that provide access to terminals and waterside improvements." The implementation of the Alameda Corridor Project, cited as a case study in several reports, is an example of the implementation of this policy and goal.

Florida Transportation Plan—The Florida Transportation Plan was adopted in 1995 and is currently being updated. In this plan, Florida's transportation programs regarding multimodal aspects are guided by two goals (goals one and two were not concerned with multimodal issues).

Goal three is a statewide-connected transportation system that enhances Florida's economic competitiveness and has several objectives.

- Place priority on completing the Florida Intrastate Highway System (FIHS). The FIHS provides a statewide network of transportation facilities that can move more people and goods faster.
- Complete a statewide high-speed rail system. (This objective was recently modified.)
- Improve major airports, seaports, railroads, and truck facilities to strengthen Florida's position in the global economy.
- Improve connections between seaports, airports, railroads, and the highway system for efficient inter-regional movement of people and goods.

Goal four is to create travel choices to ensure mobility, sustain the quality of the environment, preserve community values, and reduce energy consumption. Its objectives are to reduce dependency on the SOV; provide accommodation for transit vehicles, bicyclists, and pedestrians on state highways wherever appropriate; and increase public transportation ridership.

Florida Highway Lane Policy—Florida has adopted a policy that sets the maximum number of through lanes for various segments of the state highway system. This policy is currently being rewritten and simplified, but the new policy will likely include the following:

- Limited access facilities—six general use and up to four special use lanes, plus public transportation guideways.

- FIHS-controlled access—six general use lanes excluding frontage roads.
- Other non-FIHS—six lanes with restrictive median.

Minnesota State Transportation Plan—The Minnesota State Transportation Plan has the following policy, which guides multimodal programs. “Multimodal: Create an interrelated (intermodal) transportation system including light rail, commuter rail, freight railroads, bus (metro), rural transit systems, telework, highways, waterways, air services, and bikeways/walkways.”

Minnesota Bicycle Plan—The Minnesota Comprehensive State Bicycle Plan provides a framework to guide investments that will translate the needs of bicyclists into safe realities. The Minnesota DOT accommodates bicyclists through its multimodal and intermodal actions and continues to encourage the increased use and safety of bicycling. In conjunction with this policy, the Minnesota DOT has developed a manual on *Bicycle Transportation Planning and Design Guidelines* (37).

Oregon Legislative Direction on Multimodal Considerations—Oregon state law requires the Oregon Transportation Commission, as its primary duty, to develop and maintain a state transportation policy and a comprehensive long-range plan for a multimodal transportation system. This plan must encompass economic efficiency, orderly economic development, safety, and environmental quality. The plan includes, but is not limited to, aviation, highways, mass transit, pipelines, ports, rails, and waterways. It also guides the planning, development, and management of a statewide integrated transportation network that provides efficient access, is safe, and enhances Oregon’s economy and livability.

Other examples of multimodal policies include:

Arizona—A state transportation plan.

Arkansas—Establishment of intermodal authorities by state law.

Delaware—A long-range plan (see case study).

Indiana—A long-range transportation plan.

Maryland—Consideration of multimodal plans in the context of smart growth/growth management issues.

Mississippi—Consideration of multimodal issues to be included in goals, strategies, and the planning process.

Missouri—All major corridors will be required to have a planning study.

New Hampshire—Bicycle/pedestrian accommodation.

North Carolina—A rail grade crossing policy.

Pennsylvania—Reengineering the planning and programming process.

Virginia—“Virginia Connections” strategic plan for transportation.

Washington—Congestion relief policy: HOV, TDM, and economic development policies.

Programs

In response to a question on the consideration of multimodal aspects that have resulted in the implementation of programs, 75 percent of the states responding reported that they had implemented multimodal programs and 15 provided examples. The following are several examples of these multimodal programs.

Florida Intermodal Development Program—Florida developed an Intermodal Development Program to improve intermodal connections and access to facilitate the multimodal movement of people and goods. Since program inception in fiscal year 90/91, \$271.9 million has been allocated for improvement projects.

Maine Industrial Rail Access Program—The state of Maine funds multimodal projects under the Industrial Rail Access Program. This program is designed to support and enhance rail transportation in Maine and stimulate the economy by supporting rail infrastructure improvements that would benefit both railroads and shippers.

Maryland—A number of new programs have been initiated and incorporated into the Maryland DOT’s Consolidated Transportation Program, including the Transportation Emission Reduction Program, Transit Station Smart Growth, the Intermodal Projects Implementation Program, and the Neighborhood Conservation Program.

Minnesota Guaranteed Ride Home Program—The Minnesota DOT has developed a “guaranteed ride home” program that provides transportation home to DOT employees who regularly carpool, vanpool, ride the bus, bicycle, or walk to work in the case of an emergency or other authorized reason. Minnesota has also developed a Commuter Choice week that encourages employees to “B-BOP,” which is to bike, bus, or pool to work.

Other examples of programs listed by the states include bicycle/pedestrian, airport access, recreational access, National Highway System (NHS) intermodal connector routes, and strategic rail connections.

Projects

Twenty-six of 32 states reported that they had implemented multimodal projects, two replied that the implementation was limited, two that some projects were in the development stage, and two that they had no multimodal projects.

The following is a list of project types in the order of most frequently mentioned to least frequently mentioned. The listing is presented to illustrate the broad range of project types coming from multimodal considerations.

- Projects coming out of corridor studies or the MIS.
- Multimodal/intermodal centers.
- Bicycle/pedestrian elements in highway projects.
- Multimodal corridor access to freight facilities.
- Assistance in purchasing intermodal equipment and facilities (public and private).
- Airport access.
- Provision of highway rights-of-way for rail/light rail.
- Park/ride lots.
- HOV lanes.
- Light rail.
- Port rehabilitation.
- Railroad relocation.
- Rail clearance restriction removal to facilitate intermodal movements.

Examples of the Use of Alternatives, Mix, and Integration

In addition to the policies, programs, and projects previously discussed the survey requested examples of the use of alternatives, mix, and integration. Because these aspects are often intertwined in the planning process, several states provided examples of the consideration of alternatives, mix, and integration together rather than separately.

Arkansas River Valley Intermodal Center—The state of Arkansas conducted a study in conjunction with a number of agencies and the Arkansas River Valley Intermodal Transportation Committee on the need for and potential benefits of a regional transportation center and manufacturing/freight consolidation/distribution complex in Russellville. The results showed that the transportation center should include a multipurpose freight handling terminal, an intermodal train/truck terminal, and a slack water harbor for both domestic and export shipments. The analysis included highway, rail, pipeline, water, and air freight. The project is in the initial development stage (38).

Connecticut Multimodal Studies—The state of Connecticut has a history of multimodal planning dating back to the 1980s. The following are two examples of the consideration of the three multimodal aspects in the state.

- *Southwest Corridor Study*—In 1997, the Connecticut state legislature passed an act that required the Commissioner of Transportation to develop an update to the Southwest Corridor Study. (Previous studies had recommended the need for major capacity expansion in the corridor.) A goal of this study was a reduction in highway commuter demand during the peak periods from the 1997 base levels by 5 percent within a 5-

year period. The reduction must include any anticipated growth in the 5-year period as well as the 5 percent reduction from 1997 levels, which equates to a reduction of 8,600 vehicles during peak hours.

The study established eight goals for various modal areas and proposed a number of actions to meet these goals. The goals were to increase train ridership by 1,750/day, ridesharing by 2,400/day, vanpooling by 200/day, full-time telecommuting by 750/day, part-time telecommuting by 1,250/day, interregional bus ridership by 500/day, and ferry ridership by 250/day. In addition, alternative work schedules would remove 1,500 vehicles.

The Connecticut DOT has issued the first status report on the actions taken to achieve the reductions and is confident that the SOV reduction will occur in each year of the plan (39).

- *The Hartford West Major Investment Study*—The Connecticut DOT, in conjunction with the Capital Region Council of Governments, conducted the Hartford West Major Investment Study, which includes examples of the consideration of alternatives, mix, and integration. Six reasonable alternative packages were developed and analyzed against a set of goals and objectives, which will allow the Connecticut DOT and the Capital Region Council of Governments to reach agreement on the alternatives to be pursued through environmental and design processes (40).

Maine Integrated Freight Plan—The Maine Integrated Freight Plan was developed for the Maine DOT in cooperation with the Maine Freight Transportation Advisory Committee. The goals and objectives were to create a more efficient and free-flowing multimodal system, give shippers more modal choices to improve productivity, improve rates and competitive positions of state manufacturers and shippers through the generation of transportation cost savings, and safeguard the environment.

Generally, it is the policy of the Maine DOT to give priority to projects that will generate economic efficiency in the movement of goods rather than projects that may generate localized economic benefits. Improvements in economic efficiencies have the potential to benefit large numbers of the state's consumers, producers, and workers by reducing the time and cost associated with goods movement (41).

Michigan Airport System Plan (MASP 2000)—“Recognizing that:

- The value of aviation facilities is related to its proximity to population centers, business centers, tourism/

convention centers, and other aviation-related traffic generators;

- The closer an airport is located to these areas, the greater its value as a transportation resource;
- Beyond certain travel limits, airports may have little transportation value; and
- Rather than a beginning or ending point of a trip, airports should be viewed as a transfer point from one mode to another.

The Michigan Department of Transportation adapted and used a traditional highway analytical tool in development of the Michigan Airport System Plan (MASP 2000). The basic analytical tool used in alternative development and analysis within MASP 2000 is the Statewide Travel Demand Model used historically for highway analysis within Michigan. This model divides the state into approximately 2,300 zones, each generally a township or smaller in size. Each of these zones has a variety of socioeconomic data assigned to it, including current and forecasted population and employment.

Each travel analysis zone is connected to all other zones using an actual highway network with appropriate speeds and travel times. This permits an analysis of travel time between all zones. Early in MASP 2000 development, all of the public use airports were inserted into the statewide model. This entailed locating the airports in system, attaching physical and operational characteristics to them, and building a link to the highway system. This enabled planning professionals to evaluate alternative system plan goals using the Statewide Travel Demand Model, a traditional highway analytical tool.

North Carolina Thoroughfare Planning Study—The state of North Carolina conducted a thoroughfare planning study for the communities of Carolina Beach and Kure Beach. The final plan calls for a mix of thoroughfare improvements, bicycle facility improvements, and a rubber-tired trolley shuttle system (42).

ISSUES ASSOCIATED WITH THE CONSIDERATION OF MULTIMODAL ASPECTS

In addition to the survey questions that dealt directly with the experience in the consideration of multimodal aspects, there are a number of other issues that should be explored in order to complete the picture on the state of the practice.

Connection of the Statewide Planning Process to the MPO Process

Although this is a synthesis of statewide planning processes, there are similar planning processes required in all metropolitan areas being undertaken by MPOs. The need to consider multimodal issues at the metropolitan area level is generally stronger than at the statewide level because of congestion, air quality requirements, the presence of multiple modes, and land-use/growth issues. In addition, many states have planning processes and linkages with

planning processes in nonmetropolitan areas and in rural areas. All but three states said that there was a connection between the MPO planning process and the statewide process. Several states commented that they either incorporate MPO plans and projects directly into the state plan and the STIP and/or that they are active members of the MPO.

The following statement from the state of Pennsylvania describes the integration of planning processes.

From the Transportation Equity Act for the 21st Century, the current federal law carried forward planning requirements established in the Intermodal Surface Transportation Efficiency Act. The current statutes require Metropolitan Planning Agencies and the Commonwealth to submit long-range plans looking out 20–25 years. Additionally, Transportation Improvement Programs reflecting project approvals must be prepared by the MPOs and Local Development Districts (LDDs) and combined with a statewide program (STIP).

Both the MPOs and LDDs coordinate the planning and programming of projects and include representation from transportation groups such as transit agencies, and airport and rail authorities. TEA-21 added the requirement for the inclusion of private sector transportation providers, such as rail carriers and water port operators. Pennsylvania has worked with the MPOs to bring transportation providers into the planning process.

Goods movement planning groups were established in the Philadelphia and Pittsburgh regions and studies were conducted to develop a better understanding of their needs and the impacts of congestion on the timely flow of commerce. We developed a Long-Range Transportation Policy Plan, required by ISTEA, to formulate rational strategies to address the full range of transportation issues looking out 20 years.

The relationships between state and regional/local planning is seen in Figures 2, 3, and 4 from Pennsylvania, Florida, and Oregon, respectively.

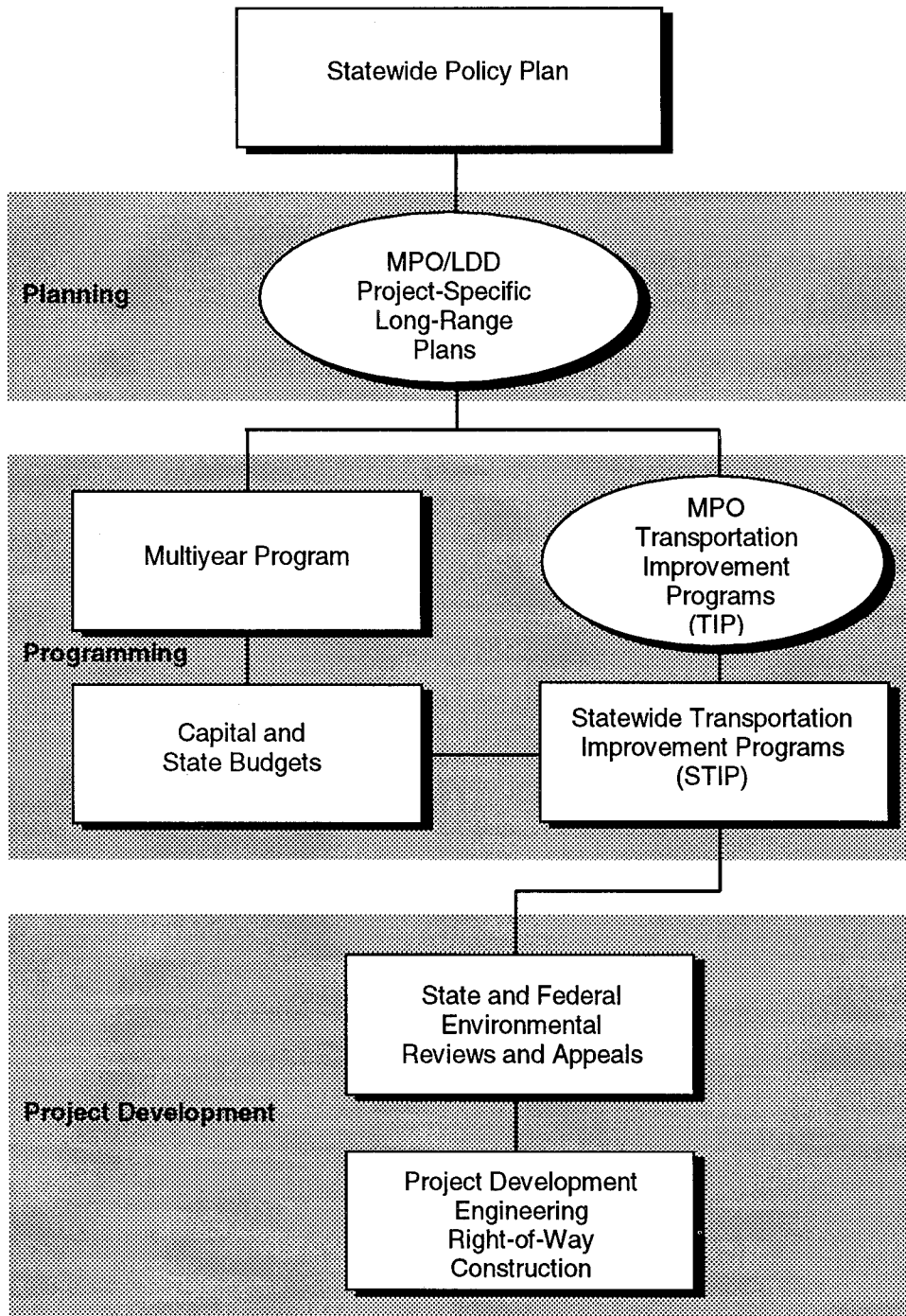
Many states also reported that they have active liaison with planning regions outside the metropolitan areas. Minnesota's approach to coordinated planning with regional organizations has been detailed in several previous reports. The planning program in Iowa is included as a case study in chapter 4.

Use of Management Systems for Multimodal Considerations

ISTEA mandated the development of the following six basic management systems by each state: pavement, bridge, congestion, safety, public transportation, and intermodal. Subsequently, Congress repealed the requirement, except for congestion management systems in large metropolitan areas that are not in compliance with air quality standards.

The survey responses received as part of this project show a mixed picture regarding the implementation of management systems. Almost all states have pavement and bridge management systems. Only four states reported

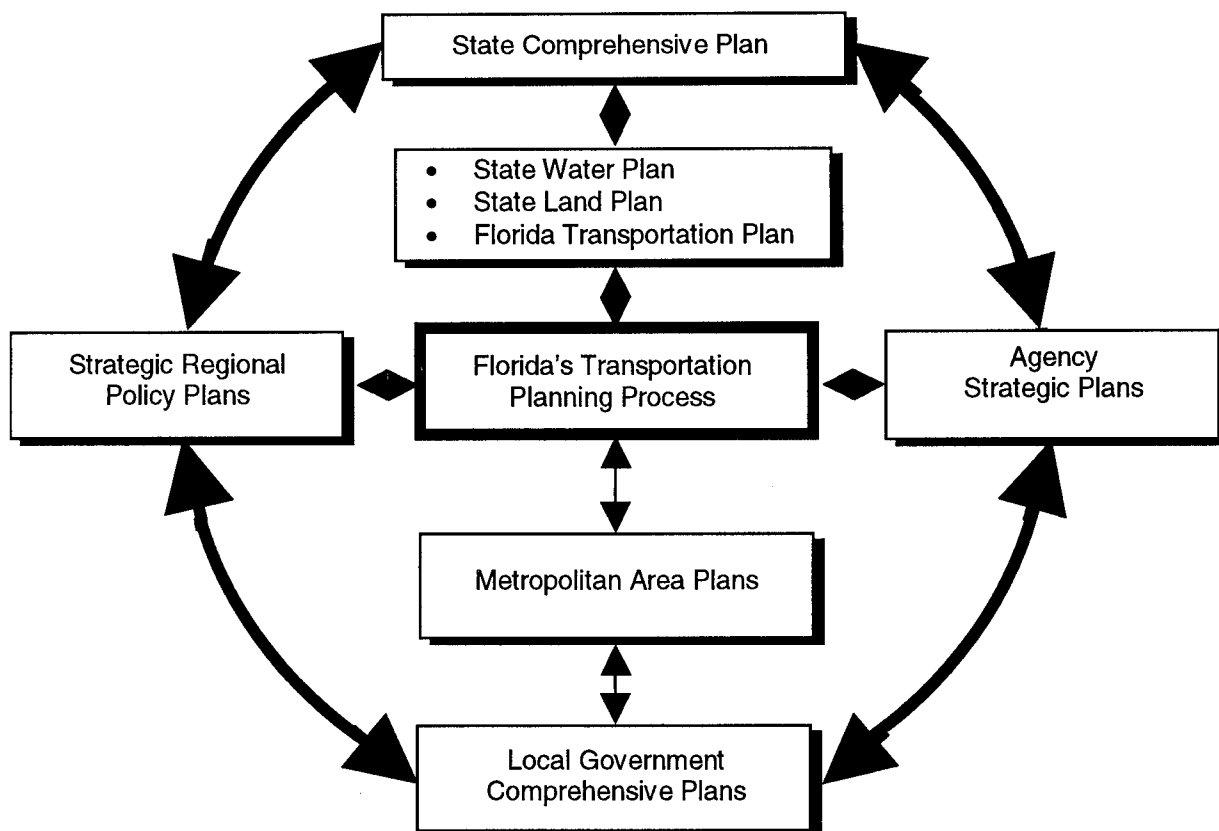
Planning and Programming in Pennsylvania



Public Involvement and Coordination

FIGURE 2 Pennsylvania statewide transportation planning under ISTEA (FHWA, Washington, D.C.) (Source: Pennsylvania Department of Transportation).

Relationship of Florida's Transportation Planning Process to Florida's Integrated Planning Framework



Federal Requirements

In response to what has been called a “disinvestment in transportation data” for many years, ISTEA mandated major new efforts in transportation management and monitoring systems. The seven systems are:

- Highway safety management
- Pavement management
- Bridge management
- Traffic congestion management
- Public transportation and facilities and equipment management

- Intermodal facilities and systems management
- Traffic monitoring systems

These systems are being developed for use by state and local agencies. Each system will be a process designed to provide information and strategies to assist decision makers as they determine future transportation programs and projects and to measure the performance of the transportation system.

FIGURE 3 2020 Florida Transportation Plan, “Connections—Bringing Florida Together” (Florida DOT), 1995.

having no management systems. Three states noted that they had management systems, but that they were not used in multimodal considerations.

The remaining states reported a large number of combinations of management systems. (A total of 17 different combinations are in existence.) Five states have all management systems in place. Of relevance to this synthesis,

eight states reported that they had intermodal management systems in place.

The uses of the management systems for multimodal planning varied as much as the combinations of systems in place. The most frequently mentioned use was to provide information to the planning process. Other uses mentioned at least twice were project prioritization and selection and

ODOT Transportation Planning Integration

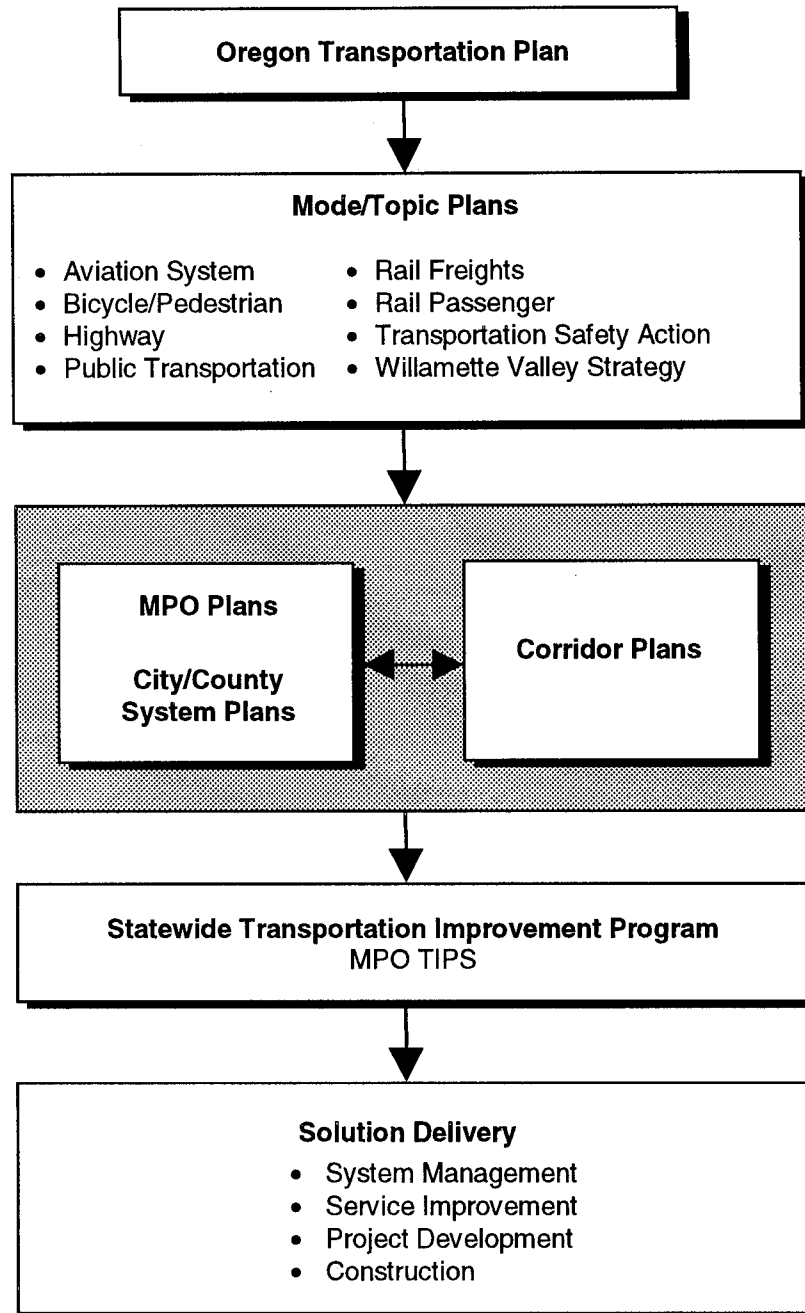


FIGURE 4 Oregon DOT Transportation Plan, 1999.

as a technical tool for congestion situations in metropolitan areas.

California Intermodal Transportation Management System (ITMS)—California has developed an ITMS as a performance-based decision support system that includes all forms of transportation. It is designed to assist transportation decision makers in selecting cost-effective actions and strategies for improving California's intermodal

transportation system. ITMS is documented in several case studies cited previously (43).

Indiana Intermodal Management System—The state of Indiana decided to develop an intermodal management system that addresses intermodal facilities relevant to the state's person and goods movement travel, and "links" connecting these facilities to the NHS. This was accomplished between 1995 and 1997, after Congress removed the federal

TABLE 4

GUIDEBOOK FOR TRANSPORTATION CORRIDOR STUDIES: PERFORMANCE MEASURES WITH HIGHEST POTENTIAL FOR MULTIMODAL COMPARISONS

Performance Measure	Possible Methods of Generating Measure	Advantages	Disadvantages
Change in person hours of travel	Should come from transportation model, but some models are not well equipped to generate information. Need good mode choice model.	Provides information on a person basis; uses time as core comparative factor.	Does not account for some of the intangibles. Time is important, but is not everything. Calculation of PHT can be difficult.
Change in vehicle miles of travel	Standard output of transportation model, but needs good mode choice model to estimate transit impact. TDM impact may need to be approximated.	Good measure of impact on vehicle usage, which also relates to air quality and energy.	Need to estimate transit VMT to provide a complete analysis.
Change in mode split to specified zones or on a regional basis	Regional trips by mode are normally available from mode choice model. Zone-specific mode split can be estimated with special runs.	Measure is easy to understand.	Often, differences are relatively small.
Percentage of employees or residents accessible to transit	Requires more of a GIS approach rather than a travel demand model.	Relatively easy to calculate if GIS coverages are available of transit lines, population, and employment; otherwise, can be tedious.	Does not factor in accessibility to destinations. Highway improvements can affect measure, but usually only by a small amount.
Economic measures (e.g., benefit/cost ratio or net present value)	Derived from PHT and cost data.	Brings both benefit and cost data together into a single measure. Incorporates differential values of time (e.g., trucks versus cars).	Does not take nonquantifiable benefits into account; may oversimplify the situation.
VMT per capita	Derived from VMT and population.	Is becoming a benchmark for comparing interaction of land use and transportation system.	Essentially provides same information as VMT, assuming constant population for all alternatives.

GIS = geographic information system; TDM = transportation demand management; VMT = vehicles miles traveled; PHT = person hours of travel.

Source: NCHRP Project 8-34, Transportation Research Board, publication pending.

requirements. A statewide advisory committee was established with a freight and a passenger subcommittee (44).

Evaluation Processes, Criteria, and Performance Measures

The literature search (chapter 2) lists references that document the struggle to develop performance measures; especially those particular measures that are common across modes. The results of this survey reveal the continuing struggle. When asked, "What evaluation processes and criteria have been used, including the incorporation of performance-based planning, measurement, and common measures across modes," the response from 14 states was that they did not have any measures. An additional four states reported that they were trying to develop measures.

The remaining states provided some information, most of which has already been reported in other sources. It

should be noted that this subject is well covered and researched as part of NCHRP Projects 8-32. In particular, reports that will be published under NCHRP Project 8-32(2) and (2A), *Multimodal Transportation: Development of a Performance-Based Planning Process* (6) provides information on performance measures in a number of states and important methodologies that can be used by states. *The Performance Based Planning Manual* will include the Performance Measures Library.

NCHRP Project 8-34, *Guidebook for Transportation Corridor Studies: A Process for Effective Decision-Making* (11) contains a listing of performance measures with the highest potential for multimodal comparisons (see Table 4).

The following are examples of performance measures reported through this survey.

California Performance Measures—As part of the 1998 California Transportation Plan, the development of

transportation system performance measures was one of the major products. This effort is documented in the final report, *Transportation System Performance Measures (45)*.

The goals of the initiative were to develop indicators/measures to assess the performance of California's multimodal transportation system; support informed transportation decisions by public officials, operators, service providers, and system users; and establish a coordinated and cooperative process for consistent performance measurement throughout California.

The development and implementation of performance is to be done in three phases. The referenced document is phase one, the design phase. Phase two, initial testing and design refinement, is currently in process. This will be followed by phase three, incremental deployment. Table 5 shows the performance measures and data needs for person movement.

Florida Performance Measures—Florida is testing two performance measures: person throughput and average travel time. In the interim, vehicles hours traveled (VHT) may be used as a draft interim performance indicator.

Regarding the Florida objective of reducing the dependence on SOVs, the state has four indicators: public transit trips, transit ridership growth rate compared with population growth rate, percent of work trips in SOVs, and employees statewide in carpools (46).

Maryland Performance Measures—Maryland uses the following cross-modal measures of effectiveness in its MIS process:

- Accessibility measures looking at existing and planned economic development areas; for example, number of jobs and households within 45 minutes of priority funding areas;
- Decrease in travel time; for example, A.M. peak period travel time between selected locations (priority funding areas) and average vehicle ridership during A.M. peak period by screenline;
- Increase in efficient use of transportation system; for example, A.M. peak period level of service for LOVs (low-occupancy vehicles) and HOVs by screenline, percent of A.M. person miles; and
- Increase in multimodal transportation options; for example, number of residents and employees within one-half mile of a line haul transit station.

Minnesota Family of Measures—Minnesota has adopted a "family of measures" that are comprised of outcomes and measures (47). The following measures relate to multimodal issues.

System performance:

1. Outcome—A predictable travel time for length of trip is maintained so that the customer expectations are met.

Measures:

- number of Twin Cities metro area freeway miles congested in A.M. and P.M. peaks by direction daily,
- average travel time and distance (work trips only), and
- percentage of Minnesotans satisfied with trip time.

2. Outcome—Services are provided to meet personal travel and shipping needs.

Measures:

- percentage of Minnesotans with satisfactory transit options,
- posted bridges and bridge load carrying capacity,
- miles of trunk highway spring weight restrictions by functional class and load levels, and
- percentage of Minnesotans satisfied with travel information.

Oregon Transportation Plan (OTP) Performance Measures—Table 6 lists the performance measures contained in the OTP and shows the progress in Oregon toward meeting OTP performance measures (48).

South Dakota—Reduce transportation costs:

- reduced travel time, and
- improved level of service.

How Have States Successfully Dealt With Stakeholders for Modes That They Do Not Own or Operate

Another issue raised in the literature on multimodal planning is that many of the facilities involved are owned and/or operated by agencies and organizations outside the state DOT. The response to this issue by the states has been to involve the additional customers and users in the planning process as required by ISTEA and TEA-21.

The states have developed a variety of methods for involving stakeholders. This has been the subject of numerous research studies, and NCHRP 8-32 has published *NCHRP Report 433: Guidelines for Developing and Maintaining Successful Partnerships for Multimodal Transportation Projects (8)*, which documents the state of the practice and suggests methods for creating and sustaining partnerships.

The survey results indicate that almost all states have a public participation process and reach out to stakeholders in a variety of ways. Among the methods most frequently cited by the states for dealing with multimodal issues associated with modes that the state DOT does not own or

TABLE 5
1998 CALIFORNIA TRANSPORTATION PLAN: PERFORMANCE MEASURE AND DATA NEEDS

Person Movement		Data Needed by Modal Source					
Performance Measure Group	Measure	Formula	Highway	Air	Rail	Water	Transit
Mobility	Mobility index	$PMT/VT \times \text{average speed}$	Vehicles, distance, speed, occupancy	Vehicles, distance, speed, occupancy	Vehicles, distance, speed, occupancy	Vehicles, distance, speed, occupancy	Vehicles, distance, speed, occupancy
	Level of service link	Volume/capacity	Highway demand, lanes	N/A	Track versus number of tracks	N/A	Passengers' seats
	Lost time	Actual time - theoretical time	Actual speeds, posted speeds	N/A	Free-flow travel time, actual travel time	N/A	Actual speeds, posted speeds
Financial	Cost to service provider	$(\text{Capital Costs})/(\text{Useful Life}) + (\text{Annual Operating Costs})/\text{Person Miles}$	Maintenance, repair, liability, capital, operating depreciation	Fuel, maintenance, repair, liability, capital, operating depreciation	Fuel, maintenance, repair, liability, capital, operating depreciation	Fuel, maintenance, repair, liability, capital, operating depreciation	Fuel, maintenance, repair, liability, capital, operating depreciation
	User costs	User costs/person miles	Fuel, insurance, repairs, maintenance, capital, depreciation	Fares	Fares	Fares	Fares
Environmental	Pollution	Pollution/person miles	Pollutants, distance, persons	Pollutants, distance, persons	Pollutants, distance, persons	Pollutants, distance, persons	Pollutants, distance, persons
	Greenhouse emissions	$CO_2/\text{person miles}$	$CO_2/\text{person miles}$	$CO_2/\text{person miles}$	$CO_2/\text{person miles}$	$CO_2/\text{person miles}$	$CO_2/\text{person miles}$
Economic	Fuel consumption	Fuel/person miles	Fuel/person miles	Fuel/person miles	Fuel/person miles	Fuel/person miles	Fuel/person miles
	Average jobs supported per year	$(\text{Capital Costs})/(\text{Useful Life})$	Operating expenditures, capital costs, useful life, employment multipliers	Operating expenditures, capital costs, useful life, employment multipliers	Operating expenditures, capital costs, useful life, employment multipliers	Operating expenditures, capital costs, useful life, employment multipliers	Operating expenditures, capital costs, useful life, employment multipliers
	GSP impacts	Annual* + operating costs	$\text{Annual*} + \text{operating costs}$	Operating expenditures, capital costs, useful life, GSP multipliers	Operating expenditures, capital costs, useful life, GSP multipliers	Operating expenditures, capital costs, useful life, GSP multipliers	Operating expenditures, capital costs, useful life, GSP multipliers
		Capital GSP multiplier	$(\text{Capital Costs})/(\text{Useful Life})$	Operating expenditures, capital costs, useful life, GSP multipliers	Operating expenditures, capital costs, useful life, GSP multipliers	Operating expenditures, capital costs, useful life, GSP multipliers	Operating expenditures, capital costs, useful life, GSP multipliers
Safety	Accidents	Accidents/person mile	Accidents, person miles	Accidents, person miles	Accidents, person miles	Accidents, person miles	Accidents, person miles

N/A = not available; PMT = person miles traveled; VMT = vehicle miles traveled; GSP = gross state product.
*Source: Transportation Systems Performance Measures Final Report, California Department of Transportation, August 1998.

TABLE 6
OREGON TRANSPORTATION PLAN (OTP): PROGRESS IN MEETING OTP PERFORMANCE MEASURES

	Performance Measure	1990	1996	1997	2010
Access/mobility	Percent of Oregonians commuting fewer than 30 minutes	88%	86%	86%	88%
	Percent of Oregonians commuting by non-SOV mode ⁺	24%	25%	28%	38%
	Percent of Oregonians living in communities with daily intercity service		99%	99%	99%
	Percent of urban state and local highways with bicycle lanes and sidewalks		6%	6%	100%
Land use	Annual VMT/capita in metropolitan areas ⁺	7,733	7,963	8,085	7,443
Safety	Transportation-related fatalities/100,000 persons	21.2	17.1	16.4	13.3
Preservation and maintenance of the infrastructure	Percent of pavements classified as "fair or better"		78%	77%	90%
	Percent of bridges rated "good"	70%	66%	66%	80%
	Percent of public transit vehicles, equipment, and facilities rated fair or better		65%	*	TBD
	Percent of public airport runway pavements rated fair or better			87%	TBD
Finance	Percent of funding received over funding required for OTP implementation	55%	55%	55%	TBD
	Light/heavy vehicle payments as percent of Cost Responsibility Study (estimated)		99%	99%	TBD
Air quality	Percent of Oregonians living in communities where air quality meets standards		100%	**	100%

Report card years are based on data collected during prior annual period.

⁺ Indicates 1996 Oregon benchmark.

* 1997 data not available at time of report.

** New standards will impact environmental quality attainment for Oregon in future years. Benchmark will need to be evaluated.

TBD = to be determined; VMT = vehicle miles traveled.

Source: 1997 Annual Report—ODOT Policy and Research Section, Oregon Department of Transportation, 1997.

operate were multimodal advisory committees, partnerships with projects and/or studies, through state funding programs, leases and loan programs, providing technical assistance, regular and routine communication, and focus groups.

Of relevance to multimodal planning is the emergence of formal advisory committees, such as freight advisory committees and passenger advisory committees, where an ongoing dialogue can occur across modal boundaries and planning and project agendas can be established.

The following are examples of stakeholder participation processes.

Florida Freight Stakeholder Task Force—A Freight Stakeholder Task Force was established in August 1998 as one of the objectives of Governor Chiles' Intermodal Transportation Summit held in June 1998. The objective was to create a forum for better communication between the private and public transportation stakeholder community.

Maine's Strategic Passenger Transportation Plan—The Maine DOT formed the Office of Passenger Transportation and chartered the Passenger Transportation Advisory

Committee in 1996. These initiatives are now fostering a multimodal approach to moving people that is unique among rural state transportation agencies.

A *Strategic Passenger Transportation Plan* was published in 1999 (49). The plan focuses on the creation of an integrated multimodal passenger transportation system capacity that supports and promotes tourism. Implementation of the plan will yield a direct economic benefit to Maine of \$48 million per year, increasing to \$121 million per year when indirect spending is included. The plan projects the creation of more than 1,400 new full-time jobs in Maine.

Nebraska Public Participation Process—The Nebraska Department of Roads has a public participation process that encourages participation at a number of events, including the Nebraska Railway Council and annual district transportation program meetings.

Oregon Policy—

The Oregon Department of Transportation (ODOT) owns and operates scenic and rural highways and bridges and major networks of urban freeways. ODOT, in cooperation with other state agencies, also conducts planning activities and programs

in partnership with local governments. These partnerships address facilities and services that the state does not own, but may contribute to, including commuter light rail, high-speed passenger rail, airports, marine ports, and freight terminals as well as passenger alternatives, including transit, ride share, and private taxi.

Innovations

When asked if they had developed any innovative data collection and analytical methods, 13 states responded in the affirmative, provided descriptions, and, in some cases, examples of innovative methods.

Arizona—The Arizona DOT is collecting volume data and delay data on the highway using an acoustic method. The Arizona DOT also uses a space satellite to collect centerline data on highways.

Arkansas—A manufacturers' survey was conducted to determine current and anticipated usage and freight types.

California—Caltrans has developed the Intermodal Transportation Management System (ITMS).

Florida—The Florida DOT has developed a metadata database and is collecting data to support mobility measurement.

Indiana—The Indiana DOT has developed an intermodal management system.

Iowa—The Iowa DOT conducts interactive statewide transportation meetings using its fiber optics network.

Maryland—Freeway congestion is being examined from aerial photography, which determines traffic densities measured in units of passenger cars per lane per mile. This is then converted into level of service.

New Hampshire—The New Hampshire DOT used a tour-based analytical process in its planning process.

New Jersey—The New Jersey DOT has developed a process for assessing seasonal beach travel in conjunction with the South Jersey Transportation Planning Organization.

South Carolina—The South Carolina DOT has developed a statewide model for highway travel and is researching possible models for other modes.

PROCESSES AND RESEARCH UNDER DEVELOPMENT

Because the state of the practice of multimodal considerations is evolving rapidly, this synthesis will look at the

future of multimodal considerations by examining processes and research currently under development. As part of the survey, the states were asked to list activities that were currently underway, but not yet implemented, and also to list research activities underway.

Processes Under Development

Because the consideration of multimodal aspects is still evolving within many DOTs, the states were asked what multimodal processes were currently under development. Nineteen states reported that they had one or more multimodal process currently under development.

The following are some examples of these processes.

Alabama—Alabama is updating its long-range transportation plan.

Arkansas—The Arkansas Highway and Transportation Department is in the process of updating the Statewide Long-Range Intermodal Transportation Plan and defining criteria for locating intermodal facilities.

California—The Transportation System Information Program is in the process of developing multimodal measures for the whole system.

Florida—The Florida DOT has a scope of services for the development of a year 2020 Statewide Intermodal System Plan that will address both intermodal passenger and intermodal freight/goods movement trends and conditions; identify Florida goals, strategies, and objectives for improving intermodal connections between modes; and address institutional barriers, infrastructure needs, operational issues, and policies from the state perspective that will improve accessibility and connectivity to intermodal facilities of statewide significance. The target completion date was February 2000.

Hawaii—The Hawaii DOT is currently updating the statewide transportation plan.

Idaho—Corridor planning is the department's and its six jurisdictional district's approach to long-range planning. The Corridor Planning Program is just getting underway.

Indiana—Indiana is participating in the Midwest High-Speed Rail Initiative and has several MISs underway.

Iowa—The Iowa DOT is in the process of completing statewide intercity passenger service and freight service studies. The study results will be used in developing modal plans that will assist integrating and coordinating

investments in intercity freight and passenger transportation. The studies were completed late in 1999.

Maine—The Maine DOT is developing a revised transportation planning and project programming process.

Minnesota—The Minnesota DOT is convening a dialogue among the various modes to explore possible integration strategies. Transportation operations/communications centers are mini-traffic management centers that will also handle public safety and public transit. The transit component consists of computer-assisted dispatch and scheduling, automatic vehicle location devices, and mobile display terminals.

Mississippi—As part of the study of trade and connections with Latin American countries (LATTs), the process will consider individual modes as well as modal transfers as they affect the demand and capability necessary to take full advantage of the anticipated increased trade with Latin America. Modes considered include ports/river ports, aviation, rail, and highway (limited to NHS routes and major ports identified by NHS). The Mississippi DOT is also conducting a ports study to identify all modal access and transfer capability to meet anticipated demand.

Montana—The Montana DOT is implementing a multimodal performance programming process using management systems, planning, and public/private involvement inputs.

New York—The New York DOT is working on converting its mobility performance measure of vehicle-hours of delay (VHD) to person-hours of delay (PHD) and ton-hours of delay (THD) as well as improving the availability of freight/truck data (see chapter 4, case study 1).

North Carolina—The North Carolina DOT is restructuring its planning process.

Oregon—The Oregon DOT developed multimodal investment criteria for use in project selection; however, because of funding constraints and the complexity of criteria, the process has not been implemented.

Pennsylvania—The Pennsylvania DOT has completed the reengineering of the planning and programming process and is in the process of developing an updated long-range transportation plan.

South Carolina—The State Infrastructure Bank has a statewide multimodal committee that is developing recommendations for change. The South Carolina DOT is also developing a vision for rail transportation and public transit in South Carolina.

Texas—The Texas DOT has the Austin–San Antonio Commuter Rail Feasibility Study (MIS) underway and is considering updating its long-range plan.

Washington—The state of Washington is currently updating its transportation plan through a three-step process previously described. As stated, the state has developed a number of transportation outcomes. “Transportation outcomes are the measurable goals that support the Washington Transportation Plan vision. The outcomes are intended to be measurable so that benchmarks and performance measures can be established toward reaching a preferred future.” Figure 5 illustrates the relationship of the transportation outcomes used in the visioning process.

West Virginia—Multimodal aspects are being considered in future plans for providing access to developing river ports and with plans for a proposed regional airport.

Research Activities

Following the passage of ISTEA, a number of research activities were undertaken to advance the state of the art of multimodal planning. Of particular note were seven projects developed under NCHRP 8-31, 8-32, and 20-29 (discussed in chapter 2). The FHWA has developed SPASM and STEAM (26) as multimodal planning tools.

The recently completed *Conferences on Refocusing Planning for the 21st Century* (13) resulted in the development of 106 proposed research statements. The intent of the sponsors of the conferences is to create a National Planning Research Agenda that will be available for future NCHRP, TCRP, USDOT, and other national, state, and regional research organizations. Many of the proposed topics have relevance to improving the state of the art in the consideration of multimodal aspects.

Additionally, the states were asked if they had any research activities underway that involved the consideration of multimodal aspects. Fourteen states responded positively and provided the following information.

Arizona—Pedestrian and bicycle linkages research; electric cars for the Clean Air Program, and integration of Federal Transit Program and Public Transportation Management System.

Arkansas—Development of a rural transportation model.

California—A personal computer-based multimodal benefit-cost analysis model: the model will be used as an investment analysis tool to evaluate all proposed transportation capital outlays.

Transportation Outcomes

Vibrant Communities

Essential Mobility

- System maintenance
- System operation
- System preservation
- Special needs transportation

Enhanced Mobility

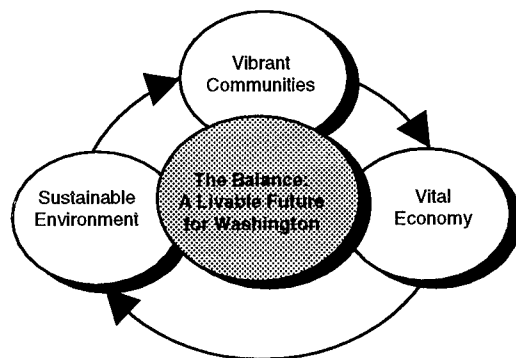
- Congestion relief
- Increased *travel options*
- Seamless connections
- *Preserve capability for new corridors*

Improved Safety

- *Continuously* reduce injury and fatality
- Reduced risk
- Increased security

Supporting Livable Communities

- Effective community-based design
- Collaborative decision making



Sustainable Environment

- Maintain air quality, meeting federal health standards (for transportation-related pollutants)
- Discharge into surface water from transportation facilities to meet water quality standards
- Mitigation targeted to high-priority watershed needs
- Minimized wetland and habitat disruption

Vital Economy

- Efficient, competitive freight movement
- Retain Washington's global competitive position and strategic trade advantage
- *Support for tourism*
- Safe and efficient access to business
- *Address transportation impacts on economy as a result of endangered species listing*
- Support connectivity to major national and international centers

Listed above are key vision descriptions and desired transportation outcomes for the visioning process. Descriptors or vision statements describe the preferred transportation future. Transportation outcomes are the goals we are striving to accomplish through Washington's Transportation Plan. The outcomes are intended to be measurable so that benchmarks and performance measures can be established towards reaching a preferred future.

FIGURE 5 1998 Washington Transportation Commission/MPO/RTPO Workshop Results and Recommendations (Washington State DOT, February 1999) (*Source*: WTP Transportation Outcomes Chart).

Florida—Development of a statewide model for heavy truck freight movement on external road networks connecting with Florida ports; refinement of the Florida Standardized Urban Transportation Model System trip distribution methodology and integrated transit demand and supply modeling using comprehensive travel data.

Indiana—High-speed rail studies.

Iowa—The department is in the early stages of developing its first multimodal transportation system performance and condition assessment.

Maine—Evaluation of high-speed ferry alternatives, with a synthesis of studies to determine economic impacts of multimodal investments.

Maryland—The Maryland DOT has a proposal for a grant (currently unfunded) to develop cross-modal measures that would enable the department to prioritize multimodal projects in the development of the Consolidated Transportation Program.

Minnesota—Transportation and telecommuting: sustainable transportation.

Oregon—Statewide travel modeling: freight shipper/carrier survey.

Pennsylvania—Study on freight movement in the commonwealth.

Texas—Impact of Mexican rail privatization on the Texas transportation system.

Virginia—The Virginia Transportation Research Council has a study in progress, *Statewide Intermodal Freight Planning Methodology: Application and Validation*.

Washington—Multimodal planning/multimodal service objectives and performance measures.

SUMMARY OF STATE SURVEYS AND THE STATE OF THE PRACTICE

These survey results provide an update on the observations obtained from the literature search (chapter 2). The results show that the state of the practice is rapidly evolving. Significant progress was reported following the passage of ISTEA. With the completion of the major research efforts undertaken following the passage of ISTEA, the state of the practice should continue to evolve as new and improved techniques become available and are tested. The notion of the “appropriate process for the conditions in the state” is introduced as a way to define the state of the practice. Almost all states that responded to the survey indicated that they consider multimodal aspects, with the primary location for this consideration being in the statewide and regional planning functions.

There are many examples of the successful consideration of multimodal aspects illustrated in this report and documented in other research and conference publications. There are still significant obstacles to multimodal considerations in statewide planning including funding prohibitions, institutional fragmentation, and the lack of technical tools. However, many states have been able to overcome these obstacles.

The state of the practice is fairly advanced in the consideration of multimodal aspects in the development of plans, policies, programs, and projects. Most states have involved multimodal aspects to some degree. There are several states where multimodal aspects are integrated and institutionalized into the agency culture and where the theoretical view of multimodalism (a “modally-blind” analysis process) is practiced in at least one or more of the statewide processes. In many states, the consideration of multimodal aspects is evolving following the first round of state transportation plans.

From a technical viewpoint, the survey of states conducted as part of the statewide Travel Demand Conference showed that 17 of the 37 states responding to the survey reported having statewide travel demand models in operation (28). Of these, 11 states have a four-step process that can consider modal split options. Eight states are in the process of developing or improving their forecasting processes.

One of the important trends is that the states are now talking to the various stakeholders and customers. The move to a planning process focused on customer and user needs naturally leads to the increased consideration of multimodal aspects.

The survey also documents the large number of multimodal activities within the states and research activities currently underway. With the completion of these activities in the next few years, the state of the practice will be even further advanced.

CASE STUDIES

A number of states were selected as case studies to illustrate in more detail the consideration of multimodal aspects in statewide transportation planning. There were many options available for selecting case studies based on the responses to the surveys and the review of literature.

A recent NCHRP study (*NCHRP Report 404*) (3) went through a similar and more comprehensive analysis of case studies in 1995. Some 19 case studies were included in that report.

The most recent report on multimodal considerations—the 1998 report by the Policy Research Project on Multimodal/Intermodal Transportation (12)—contains up-to-date case studies on Florida, Minnesota, Oregon, Pennsylvania, Virginia, Washington, and Wisconsin. This report cites the following exemplary practices in multimodal/intermodal transportation contained in the case studies.

Florida—Transportation planning process in relationship to Florida's planning framework. Development of an intermodal planning process that includes the intermodal management system, public and private involvement, and the use of performance measures as evaluative tools.

Minnesota—Area transportation partnerships.

Oregon—Planning process, citizen-involvement—the Oregon Transportation Initiative, intermodal management system, and transportation and growth management team.

Pennsylvania—Comprehensive planning, intermodal planning coordination, doublestack rail freight project, and performance measures.

Virginia—State support for regional planning, doublestack container rail development, corridor planning, and Public-Private Transportation Act of 1995.

Washington—Washington State DOT funding framework and multimodalism at Washington DOT.

Wisconsin—Transportation funding, multimodal transportation planning process—Translinks 21, public participation, and multimodal travel modeling.

The reader is directed to these reports for detailed case study reports.

Therefore, for this synthesis it was decided not to duplicate, except in one instance, the previously reported case studies. (Note that a catalog of case studies from previous studies is provided in Appendix C.) Rather, this report uses case studies to present the successful application of multimodal considerations from a broad policy perspective. Furthermore, the report describes planning processes in other states that have not been previously reported. The case studies in this synthesis touch on a variety of state experiences from across the country, and include small and large states as well as urban and rural states to illustrate the fact that multimodal considerations are appropriate in different settings.

In addition to these newly reported states, an updated case study is presented for Wisconsin. The planning process, Translinks 21, has been extensively reported on. This synthesis focuses on the implementation of policies, programs, and projects stemming from multimodal planning. Therefore, the case study in Wisconsin deals with the status of multimodal planning implementation 5 years after the initial planning process was completed and reports on the status of the implementation of multimodal policies, programs, and policies.

NEW YORK DOT MOBILITY PROGRAM AND GOAL-ORIENTED CAPITAL PROGRAM

Description of Case Study

New York is faced with increasing congestion problems throughout the state. In the 1980s, the state realized that it would not be possible to build the necessary physical system to maintain congestion at acceptable levels. New York established a goal-oriented capital programming process. One of the four goals in this process was to reduce the predicted future level of congestion through the implementation of a variety of transportation strategies. The initial performance measure for this goal was VHD at a specified level of service. This case study will trace the early development of this goal through the current refinement of the goal and implementation of projects in response to the goal.

Setting for Case Study

New York reported that state funding is currently provided for all modes, except for waterways and ports, and that there

are prohibitions in using funds appropriated for specific modes for multimodal programs. However, there are additional appropriations specifically for multimodal programs. The New York State DOT (NYSDOT) owns and operates about 15 percent of the highway system, two airports, and bicycle/pedestrian facilities. The state provides financial support for all other modes, conducts joint activities with other agencies, and plans and monitors all the modes.

There are many other state-created agencies responsible for other segments of the transportation system, and the fragmentation of responsibilities was cited as an impediment to the consideration of multimodal aspects. Although all transportation agencies are represented as voting members of the MPOs, each agency has its own funding sources and political constituencies. New York was one of the first states to use the flexibility provisions in federal highway funding legislation and has consistently used the flexibility throughout the state.

Case Study—Goal-Oriented Capital Program

Historical Development

In the development of the 5-year capital program going back to the mid-1980s, the NYSDOT established four basic goals—pavement condition, bridge condition, safety, and mobility. The same four goals are still in effect today, but the performance measures and objectives within the goals have changed and been updated. This synthesis will concentrate on the mobility goal.

The original mobility goal was to reduce future levels of congestion, measured as VHD, at level of service “E.” The department developed a crude model for measuring VHD. The cost implications of achieving improved levels of service were evaluated before selecting level of service “E” as an affordable goal.

The limitations of the measure were recognized; that is, the measure was not multimodal in that it measured vehicle-hours rather than person-hours, and it only measured recurring congestion. However, creating a measure that could be used to create an institutional focus on mobility was seen as more important than spending time on a better measure.

The goal-oriented capital program mobility goal was first implemented by establishing a goal task force within the department with representatives from the various functional areas, including design, traffic and safety, maintenance and operations, planning, the modal divisions, and the field structure (regional offices). The purpose of the task force was to identify actions that could be taken by the various elements in the department to support and institutionalize the achievement of the goal.

The main purpose was to change the thought process from facility planning concerned with the movement of vehicles to a process that considers the movement of people and goods resulting in programs and projects that were cost-effective in reducing projected levels of congestion.

The programming process was decentralized to the regional offices. In the development of the 5-year capital program, the regional offices were provided the tools to estimate VHD and targets were set for VHD reductions. The update of the 5-year program was an annual event, where new projects were added to the program each year as other projects moved to the construction phase.

Annually, regional directors made presentations to the commissioner and the executive staff on progress toward achieving the four goals. For the mobility goal, projects were evaluated based on the cost-effectiveness measured as daily VHD reductions/\$million. Threshold values of 25 VHD/\$million in the upstate regions and 50 VHD/\$million in the more dense downstate regions were established. This measure enabled rural regions to address localized congestion with low-cost solutions as well as justifying high-cost solutions in the New York City metropolitan area.

As an example of how this measure can affect the priority of project selection, when projects were ranked by this cost-effectiveness criterion one year, the most cost-effective project in the state was the introduction of express bus service from the northern suburbs of Albany to downtown Albany.

Mobility manager staffs were established in each of the downstate regions and a small funding program was set up to enable low-cost mobility demonstration projects to be implemented. Examples of projects implemented were shuttle bus services from commuter rail stations, intracounty express bus service, and park and ride facilities. The commitment to the mobility goal led to a policy to pursue the construction of an HOV network and consider the inclusion of HOV lanes in any reconstruction project.

HOV lanes were implemented on the Long Island Expressway and a high-occupancy/toll lane was implemented in the city. The HOV program became controversial, with increased opposition from the environmental community, which resulted in the canceling of one major proposed HOV project and put future extensions of the Long Island HOV lanes in question.

The department’s ITS program was folded into the mobility program and ITS projects were developed to support the overall mobility goal. To deal with nonrecurring delay, highly cost-effective incident management teams (HELP teams) were established on the recommendation of the Mobility Task Force.

In 1993, in his State of the State Message, New York's governor required the department to prepare a mobility plan for the state (50). A multi-agency task force was established to increase the buy-in of the other transportation agencies to the mobility goal. The resulting plan provided recommendations for mobility policies, programs, and projects. It divided the state into five areas based on the severity of the congestion: Manhattan, the outer boroughs of New York City, the downstate suburban region of Long Island and the lower Hudson Valley, the upstate metropolitan areas, and the other smaller upstate urban areas. Policies, programs, and projects were proposed for each area.

Current Situation

The mobility concept and goals were carried forward by the new governor and incorporated into the 1996 State Transportation Plan, *The Next Generation: Transportation Choices for the 21st Century* (51). The mobility goal has evolved to "move people and goods conveniently, reliably, safely, at a reasonable cost and in an acceptable travel time on the state transportation system by implementing mobility projects that are cost-effective, accommodate the various interdependent modes, and are compatible with and enhance economic development, the community, and the environment." Goal achievement is evaluated by service and performance objective measures that were set for the 1998/1999 5-year program update. PHD and THD are the primary measures (52).

Service Objectives

- Reduce the growth of daily recurring PHD by 10 percent by the end of the first 5 years of the program period. Measure PHD and PHD per centerline mile on the CMS network.
- Reduce the growth of daily nonrecurring PHD by 10 percent by the end of the first 5 years of the program period, using the above measures.
- Reduce the growth of daily THD by 10 percent by the end of the first 5-year program. Measure THD and THD per centerline mile on the CMS network.
- Program highly cost-effective mobility projects that provide a network reduction in daily PHD/\$million in the opening year of the project year by at least 35, but in regions 8, 10, and 11 (downstate metropolitan regions) provide a reduction in daily PHD/\$million of at least 75. Measure PHD/\$million.

Also established are seven performance objectives dealing with low-cost TDM initiatives; spot congestion locations; development of a network of coordinated facilities dedicated full- or part-time to improving the operation of traffic through ITS, dedicated lanes, and/or other mobility strategies; connectivity of the designated NHS routes to the nonhighway transportation modes and highways at the

state's international border crossings; increased bicycle and pedestrian transportation; arterial management techniques; and improvement of current models and measures.

Summary of Case Study

NYSDOT has had a programmatic approach toward the consideration of multimodal aspects since the mid-1980s. The major process for implementing the mobility goal has been through the development and implementation of an annual 5-year capital program. The program is coordinated through the various MPOs and other transportation agencies in the state.

The performance measures have evolved from VHD to PHD and THD to add more emphasis to the multimodal aspect of the central goal. The mobility concept is decentralized to the regional offices for implementation, and has been institutionalized into the different functional areas of the department. Although the measures are not very precise, the structure and institutionalization of the thought process to consider multimodal considerations is a major benefit to this approach.

The implementation of mobility projects is still a lower priority than the three other goals of pavement condition, bridge condition, and safety. The department still views the fragmentation of responsibilities for transportation as an impediment to implementation. There is still a "highway versus transit mentality" in the downstate region, especially among environmental groups, which has resulted in opposition to HOV projects and the canceling of one major HOV corridor.

DELAWARE INTEGRATED STATE PLANNING, TRANSPORTATION PLANNING, AND SIX-YEAR CAPITAL PROGRAM

Description of Case Study

Delaware's approach to the consideration of multimodal aspects in statewide transportation planning can best be summarized from the following statement contained in the survey response. "We do not plan for modes, but rather plan to solve or mitigate problems—providing for accessibility." This case study covers the relationship and progression of transportation projects from the overall state development strategy (*Shaping Delaware's Future*) to the state transportation plan to the six-year capital improvement program (CIP).

Setting for Case Study

The mission for the department is "to provide a safe, efficient, and environmentally sensitive transportation network

that offers a variety of convenient, cost-effective, mobility opportunities for people and the movement of goods.” The Delaware DOT (DELDOT) owns and operates about 90 percent of the highways in the state, provides all transit service, and operates airports and the bicycle/pedestrian facilities. The Port of Wilmington is under the responsibility of the Department of State. The transportation programs are funded by a transportation trust fund that allows DELDOT to “recognize and benefit from the synergies that exist between capital and operating budgets.”

Case Study—The Progression of Multimodal Considerations from the State Development Plan to Transportation Projects

In 1994, the governor of Delaware established a Cabinet Committee on State Planning Issues. The committee produced a report, *Shaping Delaware's Future*, that provides a vision for growth and development. The DELDOT Long-Range Transportation Plan is based on implementing that development vision, with additional input from MPO long-range plans.

DELDOT Long-Range Transportation Plan

The DELDOT Long-Range Transportation Plan (53), which was published in 1996, has seven strategies for Delaware's transportation future.

- Make transportation investments support growth management goals. The state was broken up into three investment areas: (1) multimodal investment areas, dealing with growth and congestion; (2) management investment areas, satisfying moderate growth with sustainable solutions; and (3) preservation investment areas, preserving existing roads and bridges in slow or no growth areas.
- Better coordinate transportation and land use.
- Expand travel choices; reduce driving alone.
- Take advantage of new technologies.
- Preserve existing transportation facilities, a top priority.
- Ensure safe, efficient services/facilities.
- Get “multimodal.”

1999–2004 Capital Improvement Program (CIP)

The six-year CIP for 1999–2004 (54) is the second CIP implementation year for the long-range plan and the state development plan. The transportation strategies for the implementation of these plans in the capital program have evolved to emphasize the preservation of infrastructure and management of the existing transportation network to pro-

vide the best possible service to Delaware's citizenry; focus on maintenance efforts to minimize long-term capital exposure; promote efficiency of operations, including transit, to get the most out of the assets the department is entrusted to manage on behalf of the taxpayers; expand the network selectively, with reliance on affordable transit and system management investments, to add capacity where possible; support existing communities by supporting and building upon their current infrastructure bases; and define the areas within the state where commitments to preservation, management, and transportation expansion can complement the land-use plans of the counties.

The resulting program is heavily weighted toward preservation of the existing system—47 percent, up from 36 percent in the previous year. System expansion is less than 10 percent of the total program.

In response to the survey DELDOT reported:

In developing the comprehensive operating/capital financial program, the department is indifferent as to whether an investment is supported through capital or operating expenditures. The governing principle at work is to select that portfolio of activities/investments that provides the greatest long-term benefit to the transportation network as a whole, be they capital or operating. On this basis, in 1997 major increases to the operating budget maintenance and transit accounts were made.

Under the system management portion of the CIP, implementation of an Integrated Transportation Management System (ITMS) will be undertaken as an essential element toward proactively managing the existing transportation network.

DELDOT has a 15-factor prioritization process for system expansion projects, which includes weighted factors related back to the implementation of the long-range plan. System expansion projects that were selected for inclusion in the program are a mix of transit, para-transit, highway, and economic development support projects.

Corridor Planning—Churchmans Crossing Infrastructure Investment Project

Churchmans Crossing is located within New Castle County, Delaware, at the intersection of I-95, the East Coast's “Main Street,” and SR1, the state's major north-south spine road. Because of its location, this area has become a major regional employment and retail center. In 1993, DELDOT and local developers agreed that a “highway only” solution was neither prudent nor feasible. A partnership was developed with New Castle County, the Wilmington Area Planning Council (WILMAPCO, the MPO), and DELDOT. Political and local stakeholders were also directly involved in the process.

The goals were to develop and support land-use and multimodal transportation solutions with a high degree of stakeholder buy-in and the potential for implementation. DELDOT's regional travel demand model was used as the basis for developing traffic forecasts for the planning area. The resulting recommendations were in four areas—land use, transit, TDM, and roadway connections/intersections. As of 1998, many of the recommendations had been implemented or were in the design phase. A total of \$33 million is programmed for the near-term package of multimodal improvements from 1999 to 2002 (55).

Summary of Case Study

The overall approach of DELDOT is focused on multimodal aspects. There is a progression of the consideration of multimodal aspects from the state planning level to the long-range transportation plan. The plan is then implemented through the six-year capital improvement program and the overall DELDOT budget, which recognizes the synergy between capital and operating budgets. The application of the principles of coordinating land-use and multimodal transportation solutions is described in the Churchmans Crossing Investment Project.

The application of multimodal aspects is facilitated by the centralized responsibility within DELDOT for all modes except port facilities and the existence, since 1987, of a transportation trust fund. The consideration of multimodal aspects is a policy decision from the highest political level in the state and is implemented by DELDOT through plans, programs, and projects. The policy direction is to have transportation support the desired growth and development of the state and the commitment of the department to look at transportation problems without regard to individual modes.

IOWA PLANNING PROCESS FOR INTEGRATING REGIONAL AND MPO PLANNING

Description of Case Study

The Iowa DOT's Planning and Programming Division is responsible for developing and maintaining the statewide long-range transportation plan and the modal implementation plans for highway, public transit, aviation, rail, and bicycle/pedestrian. These plans are prepared in coordination and consultation with other department divisions, eight MPOs, 18 regional planning affiliations (RPAs), and state plan and modal advisory committees. The RPAs are used to help develop and implement the statewide plan and TIP. These RPAs develop their own long-range transportation plans.

Multimodal considerations occur in the department. Major affected areas include: offices of system planning, project planning, and program management; the transportation centers (field offices); and the director's staff division.

Setting for Case Study

The Iowa DOT owns and operates 9 percent of the highway system in the state. It provides financial support for all modes and conducts joint activities with other agencies and plans/monitors all modes except for waterways/ports. There is a Rail Finance Authority that is staffed by the Iowa DOT. The state road use tax fund can be used for roads only. The other modal sources have restricted eligibility requirements.

Case Study

Iowa decentralized planning and programming efforts in 1993. There are six transportation centers (field offices). In addition, the state has 10 transportation center planners, with each having the responsibility for coordinating plans and programs with the 8 MPOs and the 18 RPAs, thereby providing complete statewide coverage for the coordination of plans and programs. Each transportation planning center is staffed with Iowa DOT employees.

State Transportation Plan

The Iowa DOT began the development of the state transportation plan in 1994, using a three-part planning approach called "Iowa in Motion." The final plan was adopted by the Iowa Transportation Commission in 1997 (56).

Part one of the planning approach provided Iowa's transportation customers with an initial look into the future, using current trends and conditions, and outlined those state transportation policies and plans guiding present investment decisions. A number of future issues were identified through the extensive public and stakeholder participation process.

Part two identified and analyzed intermodal transportation system alternatives and developed an intermodal system stratification. The following six alternatives were developed and compared with each other and another extensive public involvement process was undertaken:

- benchmark (existing) alternative;
- alternative A, reduced spending;

- alternative B, resource conservation—greater emphasis on providing alternatives to automobile use such as transit, bicycle, pedestrian, and rail systems;
- alternative C, expansion/development—providing more transportation choices, including bicycle, rail, transit, and intermodal facilities, to obtain a more efficient transportation network, services and development, and use of advanced technology;
- alternative D, economic/urban focus; and
- alternative E, rural focus.

Part three presented the preferred intermodal transportation system alternative (a combination of the above alternatives) based on the thousands of public comments received and an investment plan to finance its development.

Iowa in Motion contains five overall themes to complement the department's goal of providing and preserving adequate, safe, and efficient transportation services for the public: (1) safety; (2) preservation; (3) efficiency, including combining modes to improve services and lower costs of transportation; (4) economic development, recognizing the tie between a well-connected transportation system and the state's economic future; and (5) balance, preservation and expansion, including urban and rural, economic development and quality of life variables, benefits, costs, and modes.

Within this overall context, the plan presents recommendations for aviation, bicycle and pedestrian, highway, intermodal, pipeline, rail, transit, and waterways projects. The plan has a gap, or shortfall, in funding that is projected to grow from \$15 million per year in 1996 to 2000 to \$107 million per year in 2011 to 2020. The development of a financial plan and individual modal implementation plans are the next steps in the continuing planning process.

1999–2003 Iowa Transportation Improvement Program

Using the guidance from the adopted State Transportation Plan and the extensive planning network previously described, the *1999–2003 Iowa Transportation Improvement Program* (57) provides up-to-date information on each mode and lists projects to be implemented in this 5-year period for aviation, railroads, trails, park and institutional roads, Revitalize Iowa's Sound Economy (RISE), enhancements, Iowa's clean air attainment program, traffic safety, public transit, and highways.

Corridor Studies

Iowa has several corridor studies underway, most notably the Des Moines area I-235 corridor improvement plan, for which multimodal aspects are under consideration.

Summary of Case Study

Iowa provides an illustration of a multimodal process in a rural, west-of-the-Mississippi state, where the planning process has been decentralized to 8 MPOs and 18 RPAs, which are coordinated through Iowa DOT transportation centers. The adopted State Transportation Plan, MPO Long-Range Transportation Plans, RPA Long-Range Transportation Plans, local TIPs, and the STIP reflect the integrated planning process and the multimodal considerations.

NEW HAMPSHIRE ROUTE 16 CORRIDOR PRESERVATION STUDY

Description of Case Study

In 1993, using funds earmarked from ISTEA, the New Hampshire DOT commenced a 5-year demonstration corridor study for Route 16. This roadway is the major north-south route running for 156 miles along the eastern edge of the state, linking Portsmouth, historic towns, tourism destinations such as the White Mountains, and industrial activities. The road changes character, starting as a toll road in the south and becoming a rural two-lane road in the north. It passes through many cities and towns, and there are areas of level-of-service "E" conditions (heavily congested). The Route 16 study followed the development and approval of the state's long-range transportation plan.

This case study documents the conduct of the Route 16 study, which was intended to put in place a process involving local governments, regional planning agencies, and state agencies in a continuing process of managing and protecting the corridor through transportation improvements, land-use planning techniques, and other corridor preservation strategies. The planning process was highly interactive, using many different techniques. It has resulted in the development of a preservation plan and a continuing process to assist in the implementation and modification of the plan. During this process, multimodal considerations became important and the final plan reflects these considerations.

Setting for the Case Study

The New Hampshire DOT owns and operates 26 percent of the highway mileage, owns and operates one airport, and owns about 163 of the 450 miles of active rail lines in the state. The department also owns some 240 miles of abandoned rail lines, and it owns and operates bicycle and pedestrian facilities. Ports/waterways are under the jurisdiction of the New Hampshire Port Authority.

The DOT provides financial support for all modes, except ports and waterways, and plans/monitors all modes.

There is a prohibition on using highway user funds for nonhighway purposes. The department has a four-step statewide travel demand forecasting model that was used for the Route 16 corridor study.

Case Study—Route 16 Corridor Protection Study

Conduct of the Study

The Route 16 Corridor Protection Study was a 5-year demonstration project funded 80 percent federally and 20 percent by the state. The goal of the study was to create an innovative approach to developing a long-range solution in order to provide an efficient transportation system that promotes economic vitality and a high quality of life for the residents of communities and visitors to the regions served by the Route 16 corridor (58).

The study was done in four phases: phase I, initial data collection; phase II, additional data collection and public input and development of a computer travel model for the Route 16 corridor; phase III, analysis of the data collected in phases I and II and generation of a range of potential transportation solutions to be considered by the public participants; and phase IV, development of short-term and long-term recommendations.

The study used a bottoms-up approach through public working groups, obtaining input from people who live and work in the corridor. A vision was developed for the corridor and a number of tools and techniques were developed to implement that vision. These tools and techniques were in the areas of transportation, community design, travel and tourism, and land-use and access management.

Although this synthesis deals with the multimodal transportation aspects of the study, it is worth noting that the study participants felt that the recommendations in the other areas (including land use, community design, and access management) were at least as, if not more, important than the transportation recommendations for preserving the corridor. In the land-use area, the study developed guidelines for clustering development, minimizing linear development, and controlling access in order to preserve the character of the roadway. Products also included guidelines on aesthetics, tourism, economic development, and community design.

Recommendations are presented for state, regional, and local agencies. Following the development of the recommendations, a Route 16 Advisory Committee was established to educate, inform, coordinate, and prioritize, including assisting the regional agencies and the state in the development of the STIP.

Multimodal Considerations

The DOT noted that early on in the study the public identified the necessity to address other transportation modes. Five alternative scenarios, each constrained by a fixed budget, were developed. The scenarios ranged from emphasis on highway improvements (scenario one) to an emphasis on alternative transportation (scenario five). Intermediate scenarios had a varying mix of modal emphasis.

The results of the scenario runs showed that, based on average summer weekday traffic, the best choice was a combination of highway and alternative improvements, which maintain the current network while offering some level of mode choice. The development of rail passenger service and extensive bus service did not materially reduce highway congestion. Public transportation and shuttle services could potentially serve tourist uses, but the benefits would be local rather than regional, with limited effect on the regional demand.

The final recommendations include multimodal considerations to preserve existing transit service, expand bus service in one segment of the corridor, accommodate bicycle travel by providing a 10-foot shoulder for all new construction projects, add some additional bicycle and pedestrian facilities, and launch a long-term program of reestablishing rail freight service on abandoned rail lines, many of which the state still owns. Finally, an extensive traveler information system was recommended.

Summary of Case Study

This case study illustrates a multimodal corridor study and implementation approach that has several outstanding features.

- There is the consideration of multimodal aspects in an essentially rural corridor, resulting in several alternative approaches and a mix of modal solutions.
- The process was highly interactive with local, regional, and state officials as well as the general public. The approach was, “This is your corridor. How do you want to see it developed?” The considerations integrated transportation, land-use planning, community design, and access management.
- The emphasis was on a vision for the corridor and the use of transportation as only one of a number of actions and techniques to achieve that vision.
- The products of the study include many non-transportation tools and techniques that must be employed along with transportation improvements to preserve the corridor. These include access management, land-use planning, community design guidelines, and the consideration of aesthetics.

- The study used many innovative methods to help town officials, residents, business owners, and other interested citizens better understand the issues and concerns identified. These included the development of a number of videos, an interactive CD-ROM, visualization techniques, and use of GIS tools to display transportation and land-use information.
- Finally, the study produced a continual element by creating an implementation and education advisory committee with direct links to the programming process at both the regional and state level.

WISCONSIN'S TRANSLINKS 21 MULTIMODAL PLAN REVISITED

Description of Case Study

Translinks 21 (59) was the first multimodal plan prepared by the state of Wisconsin and one of the first in the country. The public outreach program for Translinks 21 started in 1993 and the plan was adopted by the Wisconsin DOT (WISDOT) at the end of 1994. The public participation process and the development of multimodal analytical processes for both passenger and freight systems have been the subject of several case studies and were regarded as "best practices" in several documents. This case study focuses on the impact and implementation of Translinks 21 some 5 years after the initial plan was prepared.

Setting for the Case Study

WISDOT owns and operates about 11 percent of the highway system in the state. The department plans, monitors, and provides financial support for all modes of transportation. Wisconsin has a transportation fund where all transportation revenues are collected and deposited. Theoretically, the fund has total flexibility in modal distribution, but in reality the fund is partitioned by mode through the legislative process.

The modal emphasis is influenced by recommendations from WISDOT and the governor. A separate Office of the Commissioner of Railroads is involved in rail crossings. Otherwise, WISDOT is the transportation agency for the state. Internally, the planning function is part of the finance and budgeting operation that provides linkage between planning and implementation.

Translinks 21 has been reported on extensively. Referring to the catalog of case studies in chapter 2, there are eight references to various aspects of the planning process.

Case Study—Translinks 21 Revisited After 5 Years

Looking back on the development and implementation of Translinks 21, it is proposed that the planning process set

out to accomplish several purposes. This case study will examine how those purposes have fared 5 years after the enactment of the plan.

Purpose One—To Establish a Policy Framework for WISDOT and the State Regarding the Need to Think Multimodally

Translinks 21 sets out five fundamental values: mobility for people and products, and choice among modes, should be provided; partnerships for community development should be cultivated; transportation investments should be cost-effective and balanced; Wisconsin's environmental assets should be respected by transportation; and economic development should be promoted.

These five values, and specifically the mobility and choice value, were widely supported through the extensive public participation process and are integral to the stakeholder groups that were established for passenger and freight planning. It is the view of WISDOT that this first purpose has been met. The notion of mobility and choice has been institutionalized throughout the department. The design manual, by way of example, now reflects multimodal considerations. In addition, the public and stakeholders now expect WISDOT to consider multimodal issues in all programs.

Purpose Two—To Establish a Multimodal Technical Process

Much of the literature review of Translinks 21 was focused on the development of the technical tools that allow WISDOT to do multimodal planning. Translinks 21 recommended that these processes be used in a number of planning activities, including the development of modal plans. The technical process is alive and well in Wisconsin and is being used. Modal plans for bicycles, intercity rail passenger, and intercity bus have been completed. With the exception of the waterborne freight plan, the five other plans called for in the final report are presently being worked on. The proposal for high-speed rail from Chicago through Milwaukee to the Twin Cities has moved to the point where the department is currently doing preliminary engineering between Milwaukee and Madison and studying the location for a depot in Madison.

Purpose Three—Financial Recommendations

Translinks 21's primary recommendations were financial in nature. The plan calls for an additional \$8.9 billion (in 1994 dollars) over the 25-year life of the plan. Regarding the state trunk highway system, WISDOT was able to meet 75 percent of the Translinks 21 recommendations for the first 5 years of the planning period.

Purpose Four—Implementation of the Plan Recommendations

The final purpose of a planning process and document is to implement the plan recommendations and influence the selection, prioritization, and implementation of transportation projects. WISDOT officials feel that Translinks 21 has been successful in achieving this purpose. Of the 36 recommendations in the plan, 6 have been completed and 24 others are currently being worked on.

Local Roads Translinks 21 recommended significant funding increases in assistance to local governments. Thus far, WISDOT has not been able to provide funding increases to local governments commensurate with Translinks 21 recommendations for the first 5 years, largely because of lack of sufficient data to justify funding increases of this magnitude. However, to address local road needs, WISDOT is leading and financing development of a database to collect necessary data on all 100,000 miles of roads under local jurisdiction. After sufficient data have been collected, WISDOT will work with local governments to conduct a comprehensive needs assessment, which will be used to help develop future budget requests.

Bicycle/Pedestrian WISDOT has achieved implementation of Translinks 21 recommendations for the first 5 years of the planning period.

Transit WISDOT has achieved implementation of Translinks 21 recommendations for the first 5 years of the planning period. Specifically, WISDOT currently holds 50 percent of the operating costs for transit in Wisconsin's largest cities and an average of 62 percent of operating costs of transit systems in medium and smaller cities. In addition, WISDOT has significantly increased the number of transit systems receiving operating assistance.

Rail WISDOT is on pace to achieve expansion of conventional rail service as recommended in Translinks 21. In addition, WISDOT is ahead of schedule on implementation of high-speed rail service.

Summary of Case Study

When looking back on Translinks 21 after 5 years, it appears that the purposes put forth have, for the most part, been accomplished. The first purpose, establishing a policy framework for WISDOT and the state regarding the need to think multimodally, was the most important and the one that will yield the most long-term benefits to the state. Sustaining that purpose in the long run will assist the implementation of the other purposes. Wisconsin provides an illustration of developing a change of direction through an extensive public participation process, achieving public and stakeholder buy-in to the values and directions in the plan, and then following through with the implementation processes.

CONCLUSIONS

Although the consideration of multimodal aspects has evolved rapidly since the passage of ISTEA, the evolution should be even more rapid in the next 6 years under the provisions of TEA-21 for the following reasons:

- Advances in the availability of technical methods, such as those resulting from eight multimodal research studies under the auspices of NCHRP (discussed in chapter 2), and national databases from the Bureau of Transportation Statistics and the modal administrations will provide improved technical tools and information for use in statewide and regional planning.
- There has been much experimentation with management systems, including intermodal management systems; some ideas have worked, others have not. States are developing a set of performance management systems, including the content, scope, and scale of systems that make sense for their state, not because of a federal mandate.
- The initial round of state transportation plans required under ISTEA is largely complete. The survey showed that many states are updating these plans and that the consideration and implementation of multimodal aspects is increasing.
- TEA-21 has removed some of the impediments to intermodal and multimodal projects. The “One U.S.DOT” initiative is also facilitating the implementation of these projects.
- Initial efforts to involve additional stakeholders in the planning process have created a greater understanding of the needs of different groups. The initial dialogues should continue to present opportunities for intermodal and multimodal projects and programs.

The following conclusions are offered from the information gathered and analyzed for this synthesis report:

- The consideration of multimodal aspects, as defined for this study, is a policy decision. The decision to assess transportation programs multimodally needs to be made at the highest decision level in the state and involves changing the mindset of an organization from modal facility planning to a customer/performance-based process that considers the movement of people and goods.
- Successful multimodal planning processes operate best under the umbrella of some higher state or regional vision, land-use and/or economic development policy, or sustainability consideration. These broader policy objectives tend to direct the transportation planning process toward a more multimodal focus.
- The multimodal planning process should be appropriate to the conditions and issues of each state, but there is a minimum level of multimodal planning and the consideration of multimodal aspects that are appropriate for each state. The state DOT may be the appropriate agency for this process or it can occur at some other administrative level, for example, at a transportation commission or in the governor’s office, if the state DOT is not chartered to take the lead in multimodal issues. Even for states primarily involved in the operation of the state highway system, these highways alone are major multimodal facilities handling single-occupant vehicles, multiple-occupant vehicles, public transit vehicles, car- and vanpools, goods movement vehicles, and communications systems.
- To increase effectiveness, the consideration of multimodal aspects could be institutionalized throughout the agency (DOT). Institutionalization means that the multimodal considerations are part of the daily business of all the functional areas, including design, construction, maintenance, operations, and modal divisions. They must also be present in planning and, where appropriate, the field structure and main office. To be effective, the consideration of multimodal aspects needs to be more than a planning responsibility.
- The impediments to effective multimodal planning most often cited—funding restrictions, organization and institutional fragmentation, and the lack of technical tools—are real; however, they have been successfully overcome in some states. Again, the consideration of multimodal aspects is a policy decision.
- The initial step for the successful consideration of multimodal aspects is not data collection and the development of technical processes; rather it is the creation of a dialogue with the customers and stakeholders of the transportation system. Technical tools and data requirements will follow.
- Data collection and the application of technical processes should be appropriate to the scale of the multimodal considerations. If multimodal concerns are at the margin, that is, plus or minus 1 to 2 percent of travel, it does not make sense to invest in detailed technical processes. Sketch planning tools and focus

groups may be more appropriate, at least initially, to set the scale of the consideration.

- The focus of statewide multimodal planning activities has shifted from meeting federal requirements under ISTEA to developing processes that are appropriate to the conditions within the state, while still meeting the requirements.
- States are struggling with the notion of whether to provide a choice of modes when they look at a mix of different modes in a planning process. Providing a choice has fiscal implications that can affect the entire transportation program and budget. More information and analysis is needed in this area.

This synthesis shows that whereas the consideration of multimodal aspects is evolving and there has been a considerable investment made in research to advance the state of the art, there are areas where additional research investment would be warranted during the period of TEA-21.

- The bibliography of references on multimodal planning created in 1995, as part of *NCHRP Report 404* should be updated and published every 5 years.
- A summary and users' guide should be prepared for the eight NCHRP multimodal research projects. The summary should also include the use of STEAM (Surface Transportation Efficiency Analysis Model) and IDAS (Intelligent Deployment Assessment System) as multimodal planning tools at the state level. The summary should include case studies on the application of the new technical tools in real world situations.
- A synthesis or summary should be provided on the lessons learned from the first round of state trans-

portation plans prepared under ISTEA and the issues and processes being used by the states in the current round of plan updates.

- Research is needed on the role of state financial programs in the consideration of multimodal aspects. The research should examine in greater depth the "real funding prohibitions" in state trust funds and multimodal funding programs in some states. It should also look at how some states have successfully overcome impediments to multimodal programs and projects.
- More in-depth research is needed on the different institutional arrangements that exist in the states, the role of the state DOT, and successful models for coordinating or consolidating the various transportation organizations.
- Research is needed on how a state transportation agency can successfully institutionalize the consideration of multimodal aspects throughout the agency and the "authorizing environment."
- The development of quick-response order-of-magnitude multimodal planning tools is needed to establish the initial scale of the multimodal considerations.
- The reporting on multistate, national, and international corridor planning activities was incomplete in the responses to the survey. However, there appears to be a great number of innovative planning practices, many of which are multimodal, evolving from these planning activities. These types of studies will probably increase over time. Therefore, a synthesis should be conducted of the multimodal aspects of multistate studies at the point that the studies reach the implementation stage.

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APPENDIX A**List of States Responding to Questionnaire**

Alabama	Missouri
Arizona	Montana
Arkansas	Nebraska
California	Nevada
Connecticut	New Hampshire
Delaware	New Jersey
Florida	New York
Georgia	North Carolina
Hawaii	North Dakota
Idaho	Oregon
Indiana	Pennsylvania
Iowa	Rhode Island
Kansas	South Carolina
Maine	South Dakota
Maryland	Texas
Massachusetts	Virginia
Michigan	Washington
Minnesota	West Virginia
Mississippi	Wisconsin

2. What is the role of your department in the various modes? **38 STATES RESPONDED**

Mode	Own	Operate	Provide Financial Support	Conduct Joint Activities with Other Agencies	Plan/Monitor	No Involvement
Highway						
Transit						
Aviation						
Rail						
Waterways/Ports						
Bicycle/Pedestrian						
Other (specify)						

3. What other state organizations have responsibility for the modes listed above? **38 STATES RESPONDED**4. How is your department organized to deal with statewide planning and the various modes? Please provide an organization chart and identify the relevant groups involved in multimodal considerations. Where in the organization do multimodal considerations occur? **36 STATES RESPONDED**5. Would you describe your organization as centralized or decentralized with regard to the consideration of multimodal aspects between the main office and the field structure? **37 STATES RESPONDED**

Part 2

1. Do you consider multimodal aspects, as defined in the instructions, in statewide transportation planning, including strategic or policy planning?

<u>Multimodal Aspects</u>	<u>Yes</u>	<u>No</u>
Alternatives (Alt.)	___	___
Mix	___	___
Integration (Int.)	___	___

2. If you answered no to any of the three aspects, indicate the reasons for not considering multimodal aspects. There are a number of valid reasons why a state may not have considered multimodal aspects. Please check off any of the possible reasons listed below:

	<u>Alt.</u>	<u>Mix</u>	<u>Int.</u>
2a. We are prohibited by state legislation from considering multimodal aspects.	___	___	___
2b. There are no multimodal issues at the state level in this state.	___	___	___
2c. There are funding constraints at the state level.	___	___	___
2d. There are organizational constraints at the state level.	___	___	___
2e. This department is not responsible for other modes.	___	___	___
2f. There are no feasible technical and/or analytical processes available for incorporating multimodal aspects.	___	___	___
2g. There is political and/or public resistance to considering multimodal aspects.	___	___	___
2h. If your state has a different multimodal process or uses different definitions of multimodal aspects, please describe your process or indicate that the contractor should call you to discuss it. 38 STATES RESPONDED			

Part 3

1. Do you consider multimodal aspects, as defined in the instructions, in corridor planning?

<u>Multimodal Aspects</u>	<u>Yes</u>	<u>No</u>
Alternatives (Alt.)	___	___
Mix	___	___
Integration (Int.)	___	___

2. If you answered no to any of the three aspects, indicate the reasons for not considering multimodal aspects. There are a number of valid reasons why a state may not have considered multimodal aspects. Please check off any of the possible reasons below:

	<u>Alt.</u>	<u>Mix</u>	<u>Int.</u>
2a. We are prohibited by state legislation from considering multimodal aspects.	___	___	___
2b. There are no multimodal issues at the state level in this state.	___	___	___
2c. There are funding constraints at the state level.	___	___	___
2d. There are organizational constraints at the state level.	___	___	___
2e. This department is not responsible for other modes.	___	___	___
2f. There are no feasible technical and/or analytical processes available for incorporating multimodal aspects.	___	___	___
2g. There is political and/or public resistance to considering multimodal aspects.	___	___	___
2h. If your state has a different multimodal process or uses different definitions of multimodal aspects, please describe your process or indicate that the contractor should call you to discuss it. 38 STATES RESPONDED			

Part 4

1. Do you consider multimodal aspects, as defined in the instructions, in statewide financing, budgeting and programming?

<u>Multimodal Aspects</u>	<u>Yes</u>	<u>No</u>
Alternatives (Alt.)	___	___
Mix	___	___
Integration (Int.)	___	___

2. If you answered no to any of the three aspects, indicate the reasons for not considering multimodal aspects. There are a number of valid reasons why a state may not have considered multimodal aspects. Please check off any of the possible reasons listed below:

	<u>Alt.</u>	<u>Mix</u>	<u>Int.</u>
2a. We are prohibited by state legislation from considering multimodal aspects.	___	___	___
2b. There are no multimodal issues at the state level in this state.	___	___	___
2c. There are funding constraints at the state level.	___	___	___
2d. There are organizational constraints at the state level.	___	___	___
2e. This department is not responsible for other modes.	___	___	___
2f. There are no feasible technical and/or analytical processes available for incorporating multimodal aspects.	___	___	___
2g. There is political and/or public resistance to considering multimodal aspects.	___	___	___
2h. If your state has a different multimodal process or uses different definitions of multimodal aspects, please describe your process or indicate that the contractor should call you to discuss it. 38 STATES RESPONDED			

Part 5

If your state does consider multimodal aspects, using the definitions in the instructions or using your state's definition of multimodal planning, please answer the following questions on this survey questionnaire or indicate that you would prefer to submit your answers during a telephone conversation with the contractor.

Check here if you would prefer to submit your answers by telephone. _____

Please call me at (phone number): _____

Best time of day to reach me: _____

1. How have you successfully dealt with multimodal issues associated with modes that the state DOT does not own or operate? Please provide examples and/or documents. **32 STATES RESPONDED**

2. How and to what extent are the multimodal aspects of statewide and metropolitan/regional planning processes connected? **32 STATES RESPONDED**

3. In 3a and 3b, describe the role of management systems in the consideration of multimodal aspects.

3a. Which management systems are currently in place and updated on a continuous basis? **32 STATES RESPONDED**

3b. How are the management systems used in the consideration of multimodal aspects? **29 STATES RESPONDED**

4. In this part, we are interested in learning more about the consideration of multimodal aspects and examples that have resulted in the implementation of policies, programs and projects. In 4a, 4b and 4c, describe the application of the three aspects of multimodal planning.

4a. Evaluation of modal alternatives: **25 STATES RESPONDED**

4b. Evaluation of modal mix: **24 STATES RESPONDED**

4c. Evaluation of modal integration: **23 STATES RESPONDED**

5. Is the consideration of multimodal aspects integrated into the continuous planning process, or was it a one-time effort? Please explain the nature of the application. **32 STATES RESPONDED**

6. What evaluation processes and criteria have been used, including the incorporation of performance based on planning and measurement and common measures across modes? Please provide examples. **32 STATES RESPONDED**

7. How are stakeholders identified and involved in this process? Who are the stakeholders you have involved? **32 STATES RESPONDED**

8. What innovative data collection and analytical methods have been developed? Please send examples. **32 STATES RESPONDED**

9. Has the consideration of multimodal aspects resulted in the implementation of:

9a. Policies? **29 STATES RESPONDED**

9b. Programs? **29 STATES RESPONDED**

9c. Projects? **29 STATES RESPONDED**

10. List no more than five examples of policies, programs and/or projects that resulted from the consideration of multimodal aspects. Can these examples be used for case studies? **29 STATES RESPONDED**

11. How have statewide multimodal plans affected programming and budgeting decisions? **28 STATES RESPONDED**

12. How is the modal investment mix determined? Please provide report, if available. **29 STATES RESPONDED**

Part 6. Processes Currently under Development and Current Research

1. Does your state currently have under development processes that include the consideration of multimodal aspects? If yes, please list the processes and the current state of development. **32 STATES RESPONDED**

2. Is your state currently sponsoring or involved in research on the consideration of multimodal aspects for the statewide transportation planning processes? If yes, please list the research projects the current state of development. **32 STATES RESPONDED**

Part 7. Needs and Impediments

1. What are the greatest needs and impediments that states face in being able to do better statewide multimodal planning? **33 STATES RESPONDED**

Thank you for taking the time to fill out these forms. We hope the resulting synthesis report will be helpful to your organization.

APPENDIX C

CATALOG OF CASE STUDIES

State/County	Case Study Topic, Year	Reference
Arizona	State Infrastructure Bank, 1997	(20)
	California	Metropolitan Transportation Commission's Programming Process, San Francisco, 1991
California	Freight Planning in California, 1993	(14)
	Intermodal Management System, 1995	(16,23)
California	Alameda Corridor Project, 1993-2001	(23)
	The Altamont Corridor in Oakland, 1992-1994	(5)
Canada	Toronto Mobility Study, 1990	(1)
Colorado	Rural Areas, 1995	(3)
Florida	Freight Planning, 1993	(14)
	State Infrastructure Bank, 1997	(20)
Florida	East-West Multimodal Corridor Study, 1993-1998	(23)
	Miami Intermodal Center Study, 1993-2002	(23)
Florida	Interstate 4 Multimodal Master Plan, 1995	(23)
	State Transportation Plans and Programs and Exemplary Practices in Multimodal/Intermodal Transportation, 1998	(12,24)
Florida	Measures of Performance, 1995	(3)
	Intermodal Management Systems Performance Measures, 1995	(3)
Florida	Performance-Based Planning, Cambridge, 1997	(6)
	Statewide Travel Demand Forecasting (Travel Demand Conference), 1998	(28)
Illinois	Chicago Area Consolidation Hub, 1991-1998	(23)
Indiana	The Indiana Freight Model (Travel Demand Conference), 1998	(28,29)
Kentucky	The Kentucky Passenger Model, 1998	(29)
	Statewide Transportation Focusing Process (Travel Demand Conference), 1998	(28)
Louisiana	Tchoupitoulas Corridor Project, 1989-1996	(23)
Maine	Auburn Intermodal Freight Terminal, 1993-1994	(23)
	Public Involvement, 1995	(3)
Maryland	Statewide Commuter Assistance Study, 1990	(1,17)
	Planning and Funding Intermodalism in Maryland, 1995-2000	(23)
Maryland	Organization, 1995	(3)
	Case Study Pending as Part of NCHRP 20-29, 1999	(10,14)
Massachusetts	U.S. 301 Corridor Study—Evaluation of Land-Use Alternatives	(11)
	Fort Devens Intermodal Freight Facility and Intermodal Transfer Facility, 1993-1995	(23)
Massachusetts	Logan Airport Access Performance Measures, 1995	(3)
	The Michigan Passenger Model, 1998	(29)
Michigan	Organization and Institutional Issues (Travel Demand Conference), 1998	(28)
Minnesota	State Transportation Plans and Programs and Exemplary Practices in Multimodal/Intermodal Transportation, 1998	(12)
	Organization, 1995	(3)
Minnesota	Rural Areas—Local Partnerships, 1995	(3)
	Financial Constraints, 1995	(3)
Missouri	Crevo (Travel Demand Conference), 1998	(28)
New Hampshire	Statewide Travel Model (Travel Demand Conference), 1998	(28)
New Jersey	Evolution of a Statewide Model (Travel Demand Conference), 1998	(28)
New Mexico	Albuquerque Long Range Plan, 1995	(15)
	Santa Teresa Intermodal Facility, 1993-1994	(23)
New York	Queens Intermodal Facility, 1995	(15)
	Full Freight Access Program, 1970-1998	(23)
Ohio	New York Metropolitan Area River Crossing Corridor, 1992	(5)
	Integration of Freight Planning into State Plan, 1993	(14)
Ohio	State Infrastructure Bank, 1997	(20)
	Ohio Inland Port and "Access Ohio" Program, 1994	(23)
Oregon	Freight Planning, 1992-1993	(14)
	State Infrastructure Bank, 1997	(20)
Oregon	State Transportation Plans and Programs and Exemplary Practices in Multimodal/Intermodal Transportation, 1998	(12)
	Policy-Driven Programming, 1995	(3)
Oregon	Intermodal Management Systems Performance Measures, 1995	(3)
	Performance-Based Planning (Cambridge), 1997	(6)
Oregon	Travel Demand Forecasting (Travel Demand Conference), 1998	(28)

State/County	Case Study Topic, Year	Reference
Pennsylvania	Doublestack Clearance Project, 1993–1995	(23)
	State Transportation Plans and Programs and Exemplary Practices in Multimodal/Intermodal Transportation, 1998	(12)
Rhode Island	Statewide Travel Demand Forecasting (Travel Demand Conference), 1998	(28)
Texas	Austin–San Antonio Corridor, 1995	(15)
	State Transportation Planning Process	(24)
Utah	Crevo (Travel Demand Conference), 1998	(28)
	I-15/State Street Corridor Alternatives Analysis, Salt Lake City, 1987	(1,17)
Vermont	Rural Areas, 1995	(3)
	Performance-Based Planning (Cambridge), 1997	(6)
Virginia	Crevo Demand Forecasting (Travel Demand Conference), 1998	(28)
	State Transportation Plans and Programs and Exemplary Practices in Multimodal/Intermodal Transportation, 1998	(12)
Washington	Eastern Washington Intermodal Transportation Study, 1994–2000	(3,23)
	State Transportation Plans and Programs and Exemplary Practices in Multimodal/Intermodal Transportation, 1998	(12,24)
Wisconsin	The North–South Corridor in Seattle, 1994	(5)
	Organization, 1995	(3)
	Freight Planning in Puget Sound, 1995	(3)
	Performance-Based Planning (Cambridge), 1997	(6)
	Travel Demand Forecasting Decision Process (Travel Demand Conference), 1998	(28)
	Washington State FAST Project, 1996–1997	(10)
	Freight Planning Translinks 21, 1993	(14)
	Intercity Multimodal Plan Translinks 21	(23)
	State Transportation Plans and Programs and Exemplary Practices in Multimodal/Intermodal Transportation, 1998	(12)
	The East–West Corridor in Madison, 1993	(5)
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Policy-Driven Planning, 1995	(3)	
Financial Constraints, 1995	(3)	
Statewide Passenger Demand Forecasting (Travel Demand Conference), 1998	(28)	

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