A Guidebook for Corridor-Based Statewide Transportation Planning

DETAILS

68 pages | | PAPERBACK

ISBN 978-0-309-15479-6 | DOI 10.17226/14395

AUTHORS

Michael D Meyer; John L Carr; Carl D Dixon; Transportation Research Board

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

NCHRP REPORT 661

A Guidebook for Corridor-Based Statewide Transportation Planning

John L. Carr
Carl D. Dixon
WILBUR SMITH ASSOCIATES
Lexington, KY

AND

Michael Meyer
GEORGIA INSTITUTE OF TECHNOLOGY
Atlanta, GA

Subscriber Categories
Highways • Planning and Forecasting • Environment

Research sponsored by the American Association of State Highway and Transportation Officials
in cooperation with the Federal Highway Administration

TRANSPORTATION RESEARCH BOARD

WASHINGTON, D.C.
2010
www.TRB.org

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

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 Academies 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 communications 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.

NCHRP REPORT 661

Project 8-58
ISSN 0077-5614
ISBN 978-0-309-15479-6
Library of Congress Control Number 2010929232

COPYRIGHT INFORMATION

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.

The members of the technical panel selected to monitor this project and to review this report were chosen for their special competencies and with regard for appropriate balance. The report was reviewed by the technical panel and accepted for publication according to procedures established and overseen by the Transportation Research Board and approved by the Governing Board of the National Research Council.

The opinions and conclusions expressed or implied in this report are those of the researchers who performed the research and are not necessarily those of the Transportation Research Board, the National Research Council, or the program sponsors.

The Transportation Research Board of the National Academies, the National Research Council, and the sponsors of the National Cooperative Highway Research Program do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of the report.

Published reports of the

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

are available from:

Transportation Research Board
Business Office
500 Fifth Street, NW
Washington, DC 20001

and can be ordered through the Internet at:

http://www.national-academies.org/trb/bookstore

Printed in the United States of America

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

The **National Academy of Sciences** is a private, nonprofit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare. On the authority of the charter granted to it by the Congress in 1863, the Academy has a mandate that requires it to advise the federal government on scientific and technical matters. Dr. Ralph J. Cicerone is president of the National Academy of Sciences.

The **National Academy of Engineering** was established in 1964, under the charter of the National Academy of Sciences, as a parallel organization of outstanding engineers. It is autonomous in its administration and in the selection of its members, sharing with the National Academy of Sciences the responsibility for advising the federal government. The National Academy of Engineering also sponsors engineering programs aimed at meeting national needs, encourages education and research, and recognizes the superior achievements of engineers. Dr. Charles M. Vest is president of the National Academy of Engineering.

The **Institute of Medicine** was established in 1970 by the National Academy of Sciences to secure the services of eminent members of appropriate professions in the examination of policy matters pertaining to the health of the public. The Institute acts under the responsibility given to the National Academy of Sciences by its congressional charter to be an adviser to the federal government and, on its own initiative, to identify issues of medical care, research, and education. Dr. Harvey V. Fineberg is president of the Institute of Medicine.

The **National Research Council** was organized 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 advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both the Academies and the Institute of Medicine. Dr. Ralph J. Cicerone and Dr. Charles M. Vest are chair and vice chair, respectively, of the National Research Council.

The **Transportation Research Board** is one of six major divisions of the National Research Council. The mission of the Transportation Research Board is to provide leadership in transportation innovation and progress through research and information exchange, conducted within a setting that is objective, interdisciplinary, and multimodal. The Board's varied activities annually engage about 7,000 engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia, all of whom contribute their expertise in the public interest. The program is supported by state transportation departments, federal agencies including the component administrations of the U.S. Department of Transportation, and other organizations and individuals interested in the development of transportation. **www.TRB.org**

www.national-academies.org

CRP STAFF FOR NCHRP REPORT 661

Christopher W. Jenks, *Director, Cooperative Research Programs*
Crawford F. Jencks, *Deputy Director, Cooperative Research Programs*
Lori L. Sundstrom, *Senior Program Officer*
Megan A. Chamberlain, *Senior Program Assistant*
Eileen P. Delaney, *Director of Publications*
Andréa Briere *Editor*

NCHRP PROJECT 8-58 PANEL
Field of Transportation Planning—Area of Forecasting

George Gerstle, *Boulder County, CO* (Chair)
Sandra K. Beaupre, *Wisconsin DOT, Madison*
Arnold R. Burnham, *Arizona DOT, Phoenix*
Kenneth A. Carlson, *New York State DOT, Albany*
Barbara K. Fraser, *Oregon DOT, Salem*
Jack Kinstlinger, *KCI Technologies, Inc., Sparks, MD*
Jerome M. Lutin, *New Jersey Institute of Technology, Newark*
Craig B. Newell, *Michigan DOT, Lansing*
Robert A. Gorman, *FHWA Liaison*
Kimberly Fisher, *TRB Liaison*

AUTHOR ACKNOWLEDGMENTS

NCHRP Project 8-58 was performed by Wilbur Smith Associates (WSA) as the primary contractor in collaboration with Michael Meyer, Ph.D., P.E., of the Georgia Institute of Technology. The Principal Investigator for WSA was John L. Carr, P.E., and the Deputy Project Manager was Carl D. Dixon, P.E. of WSA's Lexington, Kentucky, office.

Other contributors from various WSA offices included Don Vary of the Falls Church, Virginia, office (statewide transportation planning); Rob Bostrom of Lexington, Kentucky, and Dave Powers of Columbia, South Carolina (travel demand modeling); Paula Dowell of Atlanta, Georgia (economics and freight); Tim Sorenson of Lexington, Kentucky (transit planning); Jeff Carroll of Columbia, South Carolina (literature research); Abra Horne of Orlando, Florida, and Bob Hamm of Tallahassee, Florida (Florida statewide planning); Rebecca Ramsey of Lexington, Kentucky (survey research, literature research, case study research, and report preparation); and Amanda Spencer of Lexington, Kentucky (corridor planning, statewide transportation planning, follow-up research, and report preparation).

Special thanks are extended to the transportation agency participants who gave of their time to participate in interviews for the case study research. Those participants included George Gerstle, formerly with the Colorado DOT (currently with the City of Boulder); Jerry Blair and Donna Day, East-West Gateway Council of Governments (St. Louis MPO); Bob Romig, David Lee, Ed Hutchinson, and Warren Merrell, Florida DOT; George Schoener, I-95 Corridor Coalition; Eryn Fletcher and Steve Smith, Indiana DOT; Calvin Leggett, David Wasserman, and Alpesh Patel, North Carolina DOT; and Bob Hannigan, Brian Wall, and Jeff Reid, Pennsylvania DOT. Thanks are also given to the staff from the 33 state DOTs who took the time to respond to our initial survey; the staff from the state DOTs who participated in our practitioners outreach; and the staff members from state DOTs that provided updated and additional information during our follow-up research.

Finally, WSA and Dr. Meyer wish to express our appreciation to the members of the NCHRP Project 8-58 Research Panel who provided valuable guidance, review, and input into this research project and its products.

FOREWORD

By Lori L. Sundstrom
Senior Program Officer
Transportation Research Board

This guidebook provides a template for corridor planning that will assist states to better understand the implications of transportation decisions on mobility, communities, economic development, and environmental stewardship. The template can be a useful tool to help states program funds to meet identified needs and priorities. It should be of immediate use to transportation decision makers, managers, and planning practitioners involved in the preparation of statewide transportation plans and priority programs.

Federal law (i.e., ISTEA, TEA-21 and SAFETEA-LU) requires states to develop long-range, statewide multimodal plans and priority programs. Some states have met this requirement by developing statewide policy plans while other states have developed statewide plans that result in lists of transportation projects. Without extensive detailed planning, neither policy plans nor project-specific plans contain a sufficient basis for decision making and prioritization.

Statewide corridor planning can be an effective method to (1) understand the relationship between modes of transportation, (2) evaluate transportation system performance, (3) generate innovative solutions to transportation problems, and (4) aid in preparing an effective statewide transportation plan. It can serve as the link between broad policies and strategies that serve as the foundation of many statewide transportation plans and the evaluation of needs and performance expectations that can guide development of priority programs. Statewide corridor planning can also serve as a mechanism for prioritizing the implementation of project-specific plans by linking long-range transportation plans to shorter-term state transportation improvement programs.

Under NCHRP Project 08-58, Wilbur Smith Associates was asked to develop a conceptual multimodal statewide corridor planning process and describe how it relates to other planning and programming activities (e.g., strategic planning, long-range transportation planning, metropolitan planning organization (MPO) planning, priority programming, and project development). To meet the project objectives, the research team conducted a literature review, identified applicable federal requirements and guidance, undertook surveys and case study research to further examine the current state of the practice, identified effective approaches and practices used by states and MPOs, and conducted a peer review of the draft guidebook to gather feedback on its content. The contractor's project final report that contains the results of the literature review and the results of the outreach and case study efforts is available on the TRB project website.

CONTENTS

1 Summary

4 **Section 1** Guidebook Organization and Purpose
4 Background
5 Purpose
5 Overview

7 **Section 2** Statewide Corridor Planning
7 Why Use an SWCP Process?
9 SWCP Framework
10 Establish Organizing Principles and Institutional Structure
11 Establish a Corridor Network
11 Identify Study Corridors
12 Conduct Corridor Studies
13 Identify Statewide Investment Program and System Management Strategy
14 Development of Technical Guidance

15 **Section 3** Technical Guidance for SWCP
15 Establish Organizing Principles and Institutional Structure
16 Establish a Corridor Network
17 Identify Study Corridors
17 Conduct Corridor Studies (Elements Related to the SWCP Approach)
20 Identify Statewide Investment Program and System Management Strategy

21 **Section 4** Hypothetical Example: Application of SWCP Guidance to the State of South Orange
21 SWCP in the State of South Orange
21 Establish Organizing Principles and Institutional Structure
24 Establish a Corridor Network
24 Identify Study Corridors
27 Conduct Corridor Studies (Elements Related to the SWCP Approach)
31 Identify Statewide Investment Program
33 Conclusion

34 **Section 5** References

36 **Appendix A** Transportation Agency Examples of Corridor-Based Planning

49 **Appendix B** Levels of Corridor Analysis for Statewide Corridor Planning

51 **Appendix C** Analytical Tools for Corridor Analysis

57 **Appendix D** Public Transit in Statewide Corridor Planning

60 **Appendix E** Freight Transportation in Statewide Corridor Planning

65 **Appendix F** Economic Development in Statewide Corridor Planning

SUMMARY

A Guidebook for Corridor-Based Statewide Transportation Planning

Purpose of the Statewide Corridor Planning Guidebook

The primary purposes of this Guidebook are to

- Provide practitioners with a strategic approach for initiating a multimodal, corridor-based statewide transportation planning process and
- Apply the results of corridor planning studies and analyses in making decisions about future investments in transportation facilities and systems.

The primary focus of the Guidebook is on the beginning and end of the statewide corridor planning (SWCP) process:

- Selecting and defining statewide and regionally significant corridors and
- Using corridor analysis findings and other statewide planning data to develop a long-range statewide transportation plan that includes investment and non-investment strategies.

Less attention is given to the middle phase of the process—corridor studies and analysis—since it is already well defined and familiar to state DOT planners.

Content

The SWCP Guidebook provides practitioner's with

- Reasons why statewide corridor planning is an approach that has proven useful to transportation planners;
- A framework for conducting statewide corridor planning;
- Technical guidance on the activities that transportation planners can follow to develop an SWCP approach to statewide transportation planning;
- An application of technical guidance in a hypothetical state;
- A list of useful references;
- Examples from state DOTs of how key steps of the planning process have been implemented; and
- Additional technical guidance on incorporating corridor analysis, public transportation, freight transportation, economic development, and travel demand modeling into the SWCP process.

SWCP Process

A corridor planning approach is a departure from a systems-wide or project-based approach used by many states. The SWCP approach places a greater focus on system preservation for the most significant transportation corridors and on modes and facilities of

statewide and/or regional significance. The steps necessary for a multimodal SWCP process are as follows.

1. **Establish organizing principles and institutional structure:**
   - Establish process guidelines,
   - Utilize or adopt transportation goals,
   - Identify common data sources and analysis methods,
   - Identify policy or problem areas of statewide significance, and
   - Create procedures for prioritizing projects.
2. **Establish a corridor network:**
   - Develop criteria for corridor selection,
   - Analyze candidate corridors and select those of statewide significance, and
   - Develop a statewide corridor database.
3. **Identify study corridors:**
   - Prioritize corridors previously selected,
   - Establish a corridor analysis strategy and schedule, and
   - Coordinate roles and responsibilities with planning partners.
4. **Conduct corridor studies:**
   - Establish principles of study process,
   - Develop corridor vision and performance measures,
   - Identify problems,
   - Identify alternatives and analyze impacts,
   - Evaluate projects and corridors using common criteria, and
   - Develop project and corridor investment program.
5. **Identify statewide investment program:**
   - Establish a process for using corridor information in statewide planning and
   - Monitor the ongoing SWCP process and adjust as needed.

The most important section of the Guidebook is the technical guidance on these steps in the SWCP process, which uses a "checklist" matrix of tasks within each step and the reasons and methods for each of the tasks.

Special Emphasis Areas

There are a number of "special emphasis" areas that should always be considered during the statewide planning process:

- Comparisons between modes within corridors;
- The eight federal planning factors;
- Land use;
- Urban design;
- Economic development;
- Consistency with local or regional planning agencies;
- Consistency with other planning by other state agencies;
- Freight movement;
- Public transportation;
- Traffic operations;
- Safety;
- Linking National Environmental Policy Act (NEPA) and planning;
- Environmental objectives and mitigation opportunities;
- Coordination with local, state, and federal resource agencies;
- Addressing and reconciling different stakeholder priorities and interests;

- Metropolitan planning organization (MPO) and non-metropolitan local official consultation;
- Performance measures;
- Institutional/organizational issues and procedures;
- Innovative financing options; and
- Public/private partnerships.

Benefits

Based on state DOT surveys and case studies, the following have been identified as the primary benefits of a corridor-based statewide planning process as compared with a systems-wide or project-based planning process:

- A more direct connection between the movement of people and goods and state-significant economic activity;
- The ability to more closely examine the trade-offs among different modes;
- A higher precision in monitoring the performance of transportation facilities and services;
- A more complete investigation of non-transportation strategies for addressing transportation challenges;
- A focus of multi-state efforts at improving transportation capabilities across boundaries;
- Familiarity to planning agency partners since corridor planning is already used in MPOs; and
- Greater engagement in planning by local officials and other stakeholders because of their ability to better relate to the issues being faced.

Challenges

Challenges identified with the SWCP process, and statewide planning in general, include the following:

- How can information generated from individual corridor analyses be consolidated to develop a comprehensive statewide investment program and action plan?
- How can broader state goals and policies be incorporated into the SWCP approach to provide consistency across all of the corridor studies?
- How can consistency in planning goals and objectives be maintained when agency or political leadership changes?
- How can corridor and NEPA planning efforts be integrated into both the SWCP process and long-range plan updates?
- How can the relationship be coordinated among SWCP and the planning efforts by all appropriate agencies such as local governments, rural planning organizations, MPOs, transit agencies, tribal governments, and federal land management agencies?
- How can the SWCP process help stakeholders and decisionmakers think in terms of corridors (which is somewhat conceptual) as opposed to focusing on individual projects?
- How does one ensure that the information and findings from individual corridor studies are consistent, replicable, and comparable?
- How does one distinguish between intra-state, interstate, and international corridors?
- Assuming that all corridor studies do not start and end at the same time, how can an internally consistent and comprehensive statewide transportation plan be developed?

SECTION 1

Guidebook Organization and Purpose

The primary sections of the Guidebook are as follows:

- Section 1 presents the Guidebook's organization, background, purpose, and overview.
- Section 2 discusses the reasons why statewide corridor planning (SWCP) is an approach that has proven useful to transportation planners, presents the rationale and reasoning for using an SWCP approach toward transportation planning, offers a framework for conducting SWCP as an organizing concept for the development of technical guidance.
- Section 3 provides technical guidance on the activities and actions that transportation planners can follow to develop an SWCP approach to statewide transportation planning.
- Section 4 applies this guidance in a hypothetical state to illustrate the substance and process of conducting SWCP.
- Section 5 presents a list of useful references for practitioners.

The following information is included in the appendices:

- Appendix A presents examples from state DOTs that describe how individual states have implemented key steps of the SWCP process.
- Appendix B and Appendix C present more detailed guidance on the levels of corridor analysis and analytical tools that can be used in the SWCP process.
- Appendices D, E, and F present additional guidance on pubic transit, freight transportation, and economic development, respectively. These three topics were identified as challenges by state DOTs through the surveys and case studies undertaken during the research project, as well as input received during the review of the Guidebook.

Background

Transportation planning provides important information to those making decisions on improving transportation system performance. Before the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 made statewide, long-range multimodal transportation planning a federal requirement, statewide transportation planning was undertaken by many states for a variety of reasons. Some of the early statewide planning efforts were aimed at producing a list of projects that best met the transportation needs of the state. Other efforts were required by state law, with many of these focusing not only on transportation needs, but also on the expected impacts on the environment, economic development, tourism and the myriad other issues that are influenced by transportation system performance. Still others could be best described as policy statements that established overall direction for transportation investment, but did not identify specific projects.

Just as there are many reasons for undertaking a transportation planning process today, including a federally legislated mandate, so too are there many different ways of producing the

statewide transportation plan. Some states prepare a policy-based statewide transportation plan, while others prepare a project-based plan that is compatible with projected funding. Some states update their statewide plans with a well-defined continuous planning effort every 2 to 4 years, while others update only when it is required by federal law. Some statewide transportation plans are developed almost exclusively by state transportation agencies. Others rely heavily on regional planning agencies to identify individual projects and strategies that are most relevant in their particular jurisdiction, which are, in turn, considered by the state and compiled into a statewide strategy for transportation actions or investment.

Over the past 10 to 15 years, another model for conducting multimodal statewide transportation planning has been evolving. This model, based on an SWCP approach, relies on the identification of significant state transportation corridors and the results of individual corridor plans to provide a more detailed and comprehensive perspective on the transportation needs in corridors that are designated as being of significance to the state. The statewide plans and programs are then developed based on the aggregated results of individual corridor analysis.

Recognition of and authority for a corridor or sub-area planning approach to the statewide transportation planning process has been included in federal regulations under 23 CFR 450.212.

Purpose

The Guidebook's purpose is to guide transportation decisionmakers, agency managers, and transportation planners on how to conduct a statewide transportation planning process with a focus on corridors of regional, statewide, or interstate significance.

This guidebook does not provide guidance on how to conduct corridor studies. The reader is referred to several other reports and technical guidance that have been produced on this particular topic—for example:

- *NCHRP Report 404: Innovative Practices for Multimodal Transportation Planning for Freight and Passengers* (1998) and
- *NCHRP Report 435, Guidebook for Transportation Corridor Studies: A Process for Effective Decision-Making* (1999).

It is assumed that planning practitioners are familiar with the basic approach to developing individual corridor plans. The primary intent of this guidebook is to describe a strategic approach for using the results of corridor plans in developing a statewide transportation plan.

Overview

The Guidebook was developed using information obtained from a literature review and from a national survey and case studies of state DOTs and metropolitan planning organizations (MPOs) with a corridor-based transportation systems approach to long-range planning.

The guidebook provides recommendations on steps for the implementation of an SWCP process in a state. According to state DOTs that develop a corridor-based statewide transportation plan, SWCP provides the following advantages over a systems-wide or project-based planning process:

- More direct connection between the movement of people and goods and state-significant economic activity;
- Better analysis of trade-offs among different modes of transportation;
- Higher precision in monitoring transportation system performance;
- More complete investigation of non-transportation strategies;

- Better cost estimates for the Statewide Transportation Improvement Program (STIP);
- Institutionalized consideration of major multi-state corridors;
- A process that is already familiar to planning partners; and
- More effective involvement of local officials and other stakeholders.

The major steps recommended for a successful SWCP process include the following:

1. Establish organizing principles and institutional structure.
2. Establish a corridor network.
3. Identify study corridors.
4. Conduct corridor studies or analysis:
   - Identification of vision, goals, and performance measures;
   - Problem identification;
   - Alternatives identification and analysis;
   - Project and corridor evaluation; and
   - Project and corridor investment program.
5. Identify statewide investment program and system management strategies.

Technical guidance for each of these steps is provided in Section 3, and application of the technical guidance is illustrated in Section 4 for the hypothetical state of South Orange. Some key decisions include the selection of significant corridors, the level of detail that will be provided in the corridor analysis, and the application of the corridor to the identification and prioritization of the final recommendations. For example, a cursory analysis could be used to define corridors or to identify categories of transportation problems, or a state DOT could use more detailed methods—whether for the criteria to identify corridors, corridor studies to identify needs, or the decisionmaking process to identify projects, strategies, or priorities. In any case, the concept of a statewide transportation planning process based on corridors is a useful way of incorporating a more detailed and structured foundation for the statewide transportation planning process and STIP process.

SECTION 2

Statewide Corridor Planning

An SWCP process represents a change in the way many states evaluate and invest in their transportation system. A corridor planning approach is a departure from a systems-wide or project-based approach used by many states. This section discusses why a state DOT might wish to use the SWCP approach, as well as some of the characteristics of such an approach.

Why Use an SWCP Process?

The SWCP approach places a greater focus on system preservation for the most significant transportation corridors and on modes and facilities of statewide and/or regional significance.

There are obvious perceived differences in how multimodal issues should be addressed as part of any statewide transportation planning process, depending on factors such as

- Level of multimodal activity,
- Urban versus rural issues,
- Population density,
- Financial resource,
- Overall state political priorities, and
- Perceived divisions between public- and private-sector responsibilities.

However, in all states, an SWCP process can help place emphasis on coordinating multimodal improvements and strategies in state-significant corridors rather than addressing individual modal needs separately at a more abstract level. Through the multimodal SWCP process, emphasis is given to those facilities and services that support interregional, interstate, and international trips; it also gives priority to the affordable transportation investments and strategies, regardless of mode, that would have the greatest positive impact on the state's economy and quality of life.

The results of the national survey and the case studies conducted for this research project indicate that SWCP has been adopted for a variety of reasons. Some of these relate not only to obtaining more detailed information on the needs and related strategies for improving transportation system performance, but also on linking better transportation investments and strategies with other state goals related to such topics as economic development, international trade and freight movement, environmental quality, and statewide connectivity.

From the research survey and case studies, the following benefits were provided by state DOTs to describe advantages that had been derived from the SWCP process over a systems-wide or project-based process:

- Corridors provide a more direct connection between the movement of people and goods and state-significant economic activity.

Purpose of SWCP Approaches in Selected States

Michigan: Corridors of significance delineate where the most critical movements of goods and people occur. The purpose of the plan is to create a statewide strategic multimodal plan for an intelligent, inclusive, integrated, and international transportation system that is socially, environmentally, and economically responsible. A high-level corridor approach is being used as a blueprint to talk about the vision and priorities for program development and investments.

Minnesota: The goal of the Interregional Corridor System is to enhance the economic vitality of the state by providing safe, timely, and efficient movement of goods and people. The corridors tie the state together by connecting people with jobs, distributors with manufacturers, shoppers with retailers and tourists with recreational opportunities.

Pennsylvania: PennDOT has identified a Core Pennsylvania Transportation System defined as "an integrated system made up of modal facilities that are of the highest importance for moving people and goods between regions within Pennsylvania, as well as between the Commonwealth and other states and nations."

Idaho: Corridor plans are designed to define the purpose of recommended improvements and strategies and prepare projects for entry into the STIP or other implementation strategies.

Florida: Corridors are identified in Florida based on their contribution to mobility and connectivity, economic competitiveness, community livability, and environmental stewardship.

Source: State DOT transportation plan documents, web sites, and/or NCHRP Project 8-58 research survey responses, December 2008.

- Corridors provide the transportation agency with an ability to more closely examine the trade-offs among different modes of transportation for people and goods movement.
- Corridors provide a higher precision in monitoring the performance of transportation facilities and services.
- Corridor-level analysis encourages a more complete investigation of non-transportation strategies, such as land use planning and zoning, for addressing transportation challenges.
- Corridor studies can provide more detailed project information including better cost estimates (compared with system-level cost estimates) when considering advancing projects to the fiscally constrained STIP.
- Corridors, especially trade corridors, handle significant amounts of through trips in many states and, thus, provide a better focus for multi-state efforts at improving transportation capabilities across state boundaries.
- Corridor planning is familiar to planning agencies and other planning participants since the approach has been used in both rural and metropolitan areas for many years, so the process is already well understood and can therefore be more easily accepted when adopting an SWCP approach.
- Because corridor studies provide more focus on localized problems, a corridor-level analysis can better promote the active engagement of local officials and stakeholders and a greater opportunity for addressing local issues, needs, plans, actions, and impacts.

SWCP Framework

A diagram of the conceptual framework for SWCP and for the planning guidance that follows is shown in Figure 1. This framework describes the key steps that are part of a corridor-based approach to statewide transportation planning.

Note that the key contributions of this guidance to the overall planning framework occur at the beginning and end of the process. Although there are key actions that must be done to ensure consistency of results on a statewide basis, the steps in the middle of Figure 1 constitute nothing more than a good corridor planning analysis.

The major steps that are recommended for undertaking a successful SWCP process include

1. Establish organizing principles and institutional structure.
2. Establish a corridor network.
3. Identify study corridors.
4. Conduct corridor studies (elements related to the SWCP approach):
   - Establish organizing principles and institutional structure,
   - Identification of vision, goals and performance measures,
   - Problem identification,
   - Alternatives identification and analysis,
   - Project and corridor evaluation, and
   - Project and corridor investment program.
5. Identify statewide investment program and system management strategy.

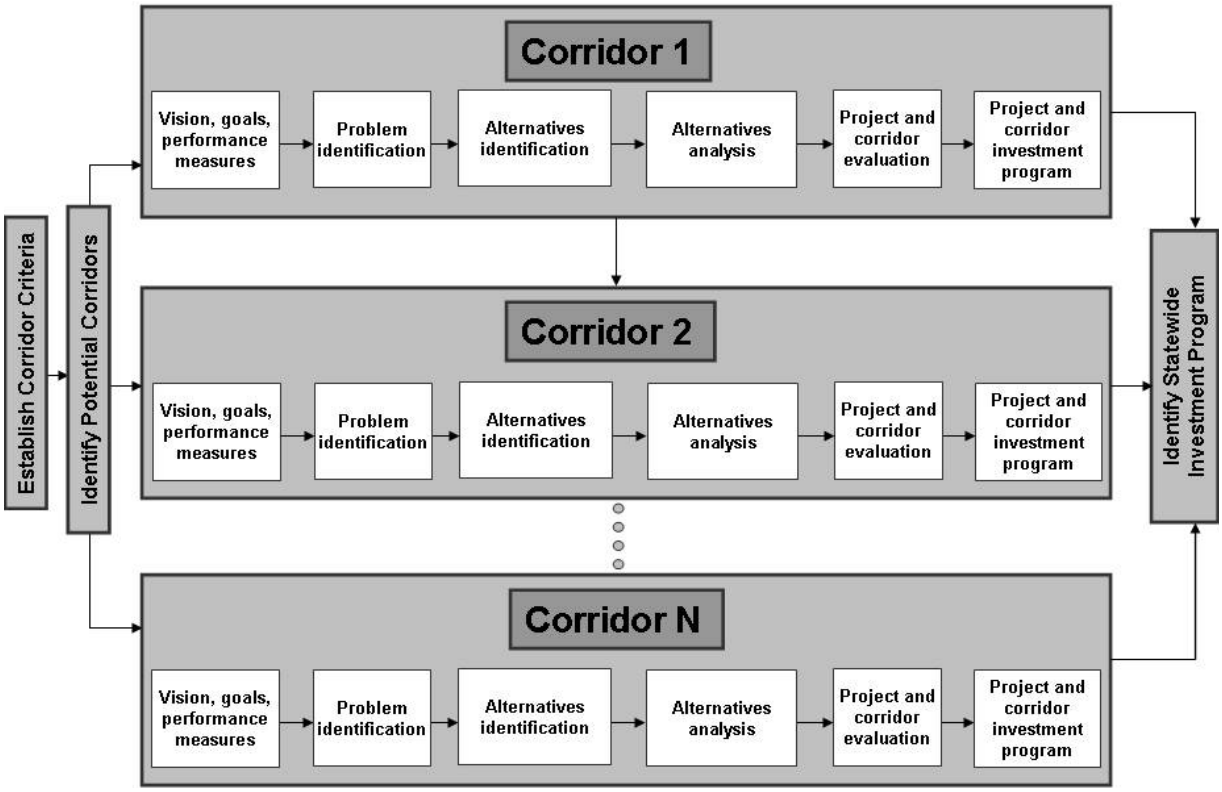


Figure 1. Conceptual framework for a statewide corridor-based transportation investment program.

Appendix A illustrates these steps with examples from transportation planning agencies that have utilized some aspect of the SWCP approach to statewide transportation planning. Each example represents a "best practice" for that particular step, so all examples in combination present a composite illustration of how a particular state DOT could undertake statewide corridor planning. The following sections provide a brief description of each of these steps.

Establish Organizing Principles and Institutional Structure

The SWCP approach to statewide transportation planning relies on corridor planning activities occurring in different parts of the state, but some actions may happen at the same time and some at different times. Therefore, it is important that state DOTs provide a structure and guidance for the planning activities that form the basis for the development of a state investment program and a system management strategy. This initial "organizing" step will have to deal with such questions as

- How can information generated from individual corridor analyses be consolidated to develop a comprehensive statewide investment program and action plan?
- How can broader state goals and policies be incorporated into the SWCP approach to provide consistency across all of the corridor studies?
- What types of public and stakeholder involvement strategies are appropriate at different steps in the process?
- How does one provide consistency in planning goals and objectives when agency or political leadership changes?
- How can corridor and NEPA planning efforts be integrated into both the SWCP process and long-range plan updates?

Involvement of Non-Metropolitan Officials in Transportation Planning

"The involvement of local officials should be one of the major elements in the state transportation agency's planning and programming process. Their input can provide important information, such as local knowledge about future economic development activities or a different perspective on needs, priorities, evaluation criteria, and potential impacts. Through this non-metropolitan local consultation process, both the state transportation agency and the local and regional bodies can make better decisions and, therefore, provide better service to their citizens.

State transportation officials can serve as catalysts for envisioning, organizing, and sustaining a proactive and credible non-metropolitan local consultation process that provides opportunities for continuing active and meaningful input into state transportation decisionmaking on planning, projects, programs, and policies.

The primary purpose of the non-metropolitan local consultation process is to engender active involvement by local elected and appointed officials in providing meaningful input that will affect state transportation decisions on plans, projects, policies, and programs that have an impact on the areas and constituents that they serve."

Source: AASHTO, *Non-Metropolitan Local Consultation Process: A Self-Assessment Tool to States,* Washington, DC (2006).

- How can the relationship among SWCP and planning efforts by all appropriate agencies be coordinated, such as local governments, rural planning organizations (RPOs), MPOs, transit agencies, tribal governments, and federal land management agencies?
- How can the SWCP process help stakeholders and decisionmakers think in terms of corridors (which is somewhat conceptual) instead of focusing on individual projects?
- How does one ensure that the information and findings from individual corridor studies are consistent, replicable, and comparable?
- How does one distinguish between intra-state, interstate, and international corridors?
- Assuming that all of the corridor studies do not start and end at the same time, how can an internally consistent and comprehensive statewide transportation plan be developed?
- Are legislative, regulatory, or policy initiatives needed to enable, support, or enhance plan development?

Providing answers to these questions is important for the development of a successful SWCP process.

Establish A Corridor Network

The SWCP framework begins with an effort to identify candidate corridors that will serve as the source for potential investment opportunities. This process will likely be based on both quantitative and subjective criteria—that is, crucial corridors will be defined by the periodic collection and analysis of condition and performance data, the estimation of travel flows and expected future travel demands, or the function the corridors serve in broader policy perspective. In many cases, a statewide strategic transportation network is identified as the target of state investment, so being on this network constitutes one of the most important criteria for a potential corridor study.

Identify Study Corridors

In the examples of corridor-based planning found in practice, the approach toward corridor identification has been based largely on geographical significance, transportation classification or function, thresholds of volume or throughput, and sometimes a higher-level analysis of key performance measures. Performance measures are related to such things as safety; travel delay or other measures of corridor performance (both today and in the future); physical condition; operations efficiency; and traffic volumes or trips, such as average daily traffic, commodity flows, or passenger volumes.

One of the more interesting aspects of this step in the SWCP framework is the degree to which corridors are focused on intercity travel and corridors in metropolitan areas. The "best practice" examples of a statewide corridor-based planning process combine both intercity and metropolitan corridors into a comprehensive statewide perspective of transportation needs. In California, for example, Caltrans has identified intercity corridors and has also worked with metropolitan and regional planning organizations to identify the most crucial corridor needs within the metropolitan area. The best example is the corridor-based planning approach in the Bay Area where both Caltrans and the Metropolitan Transportation Commission have partnered to examine several transportation corridors that are potential candidates for state and regional investment. If the corridor identification process is to include corridors in metropolitan areas, it requires close coordination and collaboration among the state DOT and the respective MPOs.

The more sophisticated corridor-based planning processes will incorporate periodic or real-time monitoring capabilities into the data collection efforts of the relevant agencies. For example, the Bay Area example mentioned above has relied on real-time monitoring of facility speeds, a

periodic assessment of the impacts of incidents and crashes on facility performance, and the identification of freeway bottleneck points.

An important characteristic of this initial step in the SWCP process is that individual corridors are likely to be identified and proceed into more detailed analysis at different times (thereby creating a challenge in later steps where priorities among corridors are to be determined). It is highly unlikely that corridor studies will all begin simultaneously, and certainly they will not finish at the same time. Thus, at any given point in the planning process, one could have some corridor studies underway, others in the early stages of being identified, and still others in the final stages of completion. This emphasizes the need for periodic monitoring of the performance and condition of corridor transportation facilities.

To the extent that the corridor approach is tied to other policy objectives (such as economic development), this on-going corridor identification process also needs to monitor the changing characteristics of the contextual factors within which the corridor planning process occurs. In the case of economic development, this would suggest a periodic assessment of the changing economic opportunities afforded the state and the corresponding importance of transportation infrastructure to supporting this policy goal.

Conduct Corridor Studies

Once potential corridors are identified, a corridor planning process will occur based on a statewide template applied to each corridor to ensure consistency in the approach and information produced. As noted earlier, this Guidebook will not provide detailed guidance on the individual steps that constitute good corridor planning. However, there are certain characteristics of the SWCP framework that are important to consider. Each of the individual steps in corridor planning shown in Figure 1—vision, goals, and performance measure identification; problem identification; alternatives identification and analysis; project and corridor evaluation; and project and corridor investment program recommendations—would likely have some common elements that would be consistent across all corridor planning efforts. These individual steps are described here.

Vision, Goals, and Performance Measure Identification

When the results of one corridor study must be compared with those of another, it is important that some common planning goals and a set of common performance evaluation criteria be used to ensure a consistent evaluation at the end of the process. This is not to say that each corridor study could not have individual evaluation criteria that are specific to that corridor, but some subset of these criteria should be common across all corridors. It is likely that the common vision, goals, and performance measures for a corridor study will closely relate to statewide transportation planning goals as determined through the planning process.

Problem Identification

The rationale for conducting individual corridor analyses in the first place is to provide specific attention to the needs and issues in a particular corridor. Thus, it might not seem apparent how statewide concerns could be incorporated into this corridor planning step. However, one could envision certain types of problems that a state DOT would want to examine in all corridor studies. It may be desirable not only to have common evaluation parameters for proposed projects and strategies at the end of the process, but also because similar types of problem identification might be necessary due to the source of funding for solving the problems. For example, a state DOT could

require that problems associated with safety, intermodal freight movement, access to intermodal facilities, traffic operations, capacity, intelligent transportation system (ITS) opportunities, and access management be explicitly considered in the corridor studies, while implementation projects or strategies to address some of these issues might have funds available from dedicated sources with specific selection criteria.

There are a variety of levels for conducting corridor analyses as part of a statewide transportation planning process, ranging from major corridor studies to lower levels of analysis. To provide additional guidance, Appendix B identifies and discusses three levels of effort of analysis.

Alternatives Identification and Analysis

Similar to problem identification, certain types of alternatives and analysis tools might be applied to provide consistent and comparable results among the corridor studies. Additional guidance on analysis issues and methods are included in Appendix B and Appendix C. References to documents and websites with information on different analysis tools that can be used in a corridor study are provided at the end of this Guidebook.

Project and Corridor Evaluation

The purpose of any evaluation process is to produce information that can be used by decision-makers to select the most feasible, most performance-effective, and/or most cost-effective set of projects and strategies. The SWCP approach to statewide planning depends on having some common evaluation measures as well as evaluation methods that can be used to compare candidate projects across studies. For example, the state DOT could require the use of benefit/cost analysis as a means of providing a dimensionless measure of the respective values of candidate projects. As another example, if highway congestion is an important issue, state guidance could require that congestion measures relating to the extent, duration, and magnitude of congestion be considered in each corridor study. Similar to the corridor performance measures, each corridor analysis could also have corridor-specific evaluation criteria that have been identified through the public participation and resource agency coordination process.

During the research project, state DOTs identified some specific challenges in addressing corridor needs, impacts, and alternatives. For that reason, additional information is included in Appendices D, E, and F on the issues of public transportation, freight movement, and economic development, respectively.

Identify Statewide Investment Program and System Management Strategy

The final step in the SWCP approach is to use the results of individual corridor studies as input to the development of a statewide transportation plan, an STIP, and potentially a system management strategy. As in any type of planning, this final step usually considers not only technical information and public input, but also political considerations relating to such things as geographic equity, state and regional economic development needs, other statewide issues and goals, and long-standing project-specific promises. Such factors are to be expected in what is essentially a public investment decisionmaking process.

However, information produced by corridor plans are often better vetted through the local political process than more global plans produced on a state-level basis. In addition, corridor plans usually provide more specific project-level information that can be used as direct input into the project prioritization and STIP process.

Linkage Between Corridor Planning and the NEPA Process

Federal planning regulations provide the option to use a "corridor or subarea study" as a tool for linking planning and NEPA. The basic features of a corridor or subarea study are defined in the regulations. These include the following:

A corridor or subarea study is prepared by a state DOT, MPO, and/or transit operator as part of the statewide or metropolitan planning process. The corridor or subarea study itself is not a process for federal agency decisionmaking and therefore does not require NEPA review.

A corridor or subarea study can be used to produce a wide range of analyses or decisions for adoption in the NEPA process for an individual project. These include

- Purpose and need or goals and objective statement(s);
- General travel corridor and/or general mode(s) definition (e.g., highway, transit, or a highway/transit combination);
- Preliminary screening of alternatives and elimination of unreasonable alternatives;
- Basic description of the environmental setting; and/or
- Preliminary identification of environmental impacts and environmental mitigation.

The regulations define criteria that a federal agency must consider in deciding whether to adopt planning-level analyses or decisions in the NEPA process. These include

- Involvement of interested state, local, tribal, and federal agencies;
- Public review;
- Reasonable opportunity to comment during the statewide or metropolitan transportation planning process and development of the corridor or subarea planning study;
- Documentation of relevant decisions in a form that is identifiable and available for review during the NEPA scoping process and can be appended to or referenced in the NEPA document; and
- The review of the FHWA and the FTA, as appropriate.

Source: AASHTO, *Practitioner's Handbook 10: Using the Transportation Planning Process to Support the NEPA Process,* Washington, DC (2008).

Any addition to potential projects, low-investment or "non-investment" strategies could also be recommended for better management of the existing transportation system, such as travel demand management, land use planning and zoning, and congestion pricing. Such strategies could be included in the statewide transportation plan as tools and actions that the state DOT and others could adopt for enhancing the performance of the state transportation system.

Development of Technical Guidance

Section 3 of this Guidebook presents a "checklist" matrix of the steps and tasks for undertaking an SWCP process, along with a discussion of the reason and some further explanation of the issues for each task.

SECTION 3

Technical Guidance for SWCP

This section provides guidance to those interested in adopting an SWCP approach to transportation planning. The guidance is organized by the major steps as discussed in Section 2 and as shown in Figure 1. As indicated previously, the emphasis is on the beginning and end of the process. A more detailed description of the steps for corridor planning is found in other references, including those listed in Section 5.

Establish Organizing Principles and Institutional Structure

Step	Reason
1. Establish process guidelines on how SWCP will be conducted in the state.	This step is necessary to provide consistent guidelines to SWCP participants on expected approaches and products from SWCP. These guidelines will also recommend public involvement actions and strategies appropriate for different steps in the process. It is expected that the type and level of public involvement efforts will be different in the early and latter steps of statewide planning as compared with what will occur during the individual corridor studies.
2. Utilize or adopt existing statewide transportation goals that will guide SWCP efforts.	This step will provide some level of consistency and compatibility among the different corridor studies that will be conducted as part of the SWCP effort.
3. Identify common data sources and analysis methods that can be used in the corridor studies. For those that are readily available, incorporate them into the process guidelines.	Many states have developed statewide databases (for crashes, pavement condition, transit operations, bicycle/pedestrian facilities, environmental and cultural resources, economic development, etc.) that can be used consistently in all of the corridor studies.
4. Identify common policy or problem areas that are of statewide significance that should be considered in corridor studies. Incorporate them into the process guidelines.	This effort targets policy or problem areas of state significance that might not be ordinarily considered in corridor studies. For example, the state might want each corridor study to consider needs associated with freight movement to promote economic development, identify areas where ITS technologies could be readily used to maximize system preservation, or consider the use or expansion of public transit in corridors where sufficient demand might exist.

16 A Guidebook for Corridor-Based Statewide Transportation Planning

Step	Reason
5. Create internal procedures and/or organizational means of prioritizing projects resulting from corridor studies. An organizational center of responsibility for the SWCP process should be clearly identified.	In states that have progressed to the point that corridor planning results have been used to identify statewide priorities, a task force or advisory committee has often been created to assess the tradeoffs associated with different corridor recommendations. Such an institutional capacity is also important for guiding the initial implementation of the SWCP process in the state—for example, by helping to establish goals and related evaluation criteria for later use in decisionmaking.

Establish a Corridor Network

Step	Reason
6. Develop criteria for establishing a statewide multimodal network of candidate corridors.	As seen in most cases investigated for this project, the state corridor network identifies that set of corridors that meets some predetermined set of policy criteria. For example, those criteria could relate to the accessibility to economic activities, freight flows, freight and passenger volumes, evacuation routes, and national defense purposes. In some cases, it might be appropriate to establish a tiered system of candidate corridors. If so, the criteria for each tiered network should be clearly delineated. In addition, the identification of the statewide multimodal network could have important political consequences and, thus, should be undertaken in an open and transparent way, with opportunities provided for public involvement. Finally, corridors of statewide significance should be viewed from a multimodal perspective—that is, they should not be identified strictly as a highway corridor, rail corridor, transit corridor, and so forth. Even if funding strategies are constrained along modal lines, corridor needs should be identified for all the modes present in the corridor (e.g., the Florida example in Appendix A).
7. Utilize an appropriate analysis approach to delineate potential corridors or corridor segments.	This step is important to identify the corridors that meet the definition of "state significance" and, thus, are subject to increased state interest in investment. In many of the SWCP examples, a geographic information system (GIS) approach is used to identify those corridors that meet the combined identification criteria. In other cases where the identification criteria are not too complex (e.g., minimum length of highway segment and threshold values of average annual daily traffic [AADT] and congestion levels), the candidate corridor network can be identified through very simple application of threshold analysis.
8. Develop a statewide corridor database.	To identify priority corridors (the next step in the process), a database should be developed that organizes the corridor performance and condition data in a consistent manner. For example, one should access or create a database that includes all of the data available for all modes in the corridor network identification selection criteria. The data in this database should be monitored and updated periodically as needed to provide the most current data for future SWCP efforts.

Identify Study Corridors

Step	Reason
9. Applying the criteria used to identify the corridor network, prioritize the corridors in order of greatest urgency of need for a comprehensive corridor study or analysis.	This step uses the criteria established to identify state-significant corridors and applies them either directly or with a weighting scheme to establish a prioritized list of corridors for study or analysis. This prioritization can be organized in absolute ranking (e.g., 1 to 10) or possibly by tiers (e.g., 1 to 5 in Tier 1, 6 to 14 in Tier 2, etc.). A tiered approach provides some flexibility in proceeding with corridor studies or analyses to best meet state needs (e.g., any corridor study in Tier 1 should be undertaken as soon as possible). In some cases, numerical scoring does not reflect all of the factors that might influence the need for a particular corridor study; therefore, the state DOT should provide opportunities in the prioritization criteria to address other qualitative factors.
10. Establish a corridor study strategy and schedule to conduct corridor studies over a pre-determined cycle.	In some cases, the corridor analysis might be very general, simply using readily available data (such as functional classification or traffic volumes) to identify problem areas and potential solutions without project-level detail. Thus, the state should be able to complete the corridor studies quickly. In other situations, a corridor study that produces very specific project recommendations (and perhaps addresses environmental concerns, modal alternatives, or other issues) will take a longer time and most likely a larger budget. It is not likely that a state DOT has the resources to conduct numerous comprehensive corridor studies at the same time. The SWCP process is a continuous one that cycles through different corridors over many years. This step may require a multi-year strategy for undertaking major studies of all corridors listed as part of the study prioritization process.
11. Coordinate with the state DOT's planning partners in establishing study roles and responsibilities. If necessary, establish a memorandum of understanding to define the respective roles.	This step identifies the study management responsibility and the roles of each agency, as well as the budget contribution of the participating partners. Often, the state DOT itself would manage a corridor study. However, the lead agency might also be an MPO, an RPO, or a modal agency. For example, in urban areas having multimodal needs, it is likely that MPOs and transit agencies would be partners in corridor studies.

Conduct Corridor Studies (Elements Related to the SWCP Approach)

Establish Organizing Principles and Institutional Structure

Step	Reason
12. Define level of corridor analysis to be used in the corridor study process.	Statewide plan development may rely heavily on corridor studies that have been done previously. Such studies for other corridors can be costly and time consuming, so conducting timely studies for all corridors may not be feasible for plan development. Other methods may allow a state DOT to address all corridors in a shorter timeframe and at a lower cost (see Appendix B), so the level of effort should be defined at the outset. However, major corridor studies may eventually be desired for all corridors in the SWCP process, so much of this guidance has been developed to address that expectation.

18 A Guidebook for Corridor-Based Statewide Transportation Planning

Step	Reason
13. Establish a common corridor study management or advisory structure to be used for corridor studies.	Given the importance of corridor study results to the statewide transportation planning process, it is important that similar management structures be used in all of the studies. For example, a standard procedure might include both a DOT district and central planning staff member for each corridor study to promote consistency with state guidelines. The project decision team or advisory groups could also include representatives from transit agencies; other modal agencies (e.g., a port or airport authority); regional planning organizations; industry stakeholders; local governments; and so forth. If the study includes a preliminary environmental assessment for larger scale projects, it could be worthwhile to include representatives from environmental resource agencies or interests as a member of the advisory structure. This step does not require that every corridor management structure will be the same. Indeed, they will most likely be different, given the different contexts and constituencies found in each corridor.
14. Incorporate issues of state significance into public involvement materials and outreach efforts.	Every corridor study has some form of public involvement, local consultation, and resource agency coordination aimed at soliciting input into the study. Major state issues need to be addressed in these efforts. Many studies develop the public involvement strategy as part of the initial steps in planning. Materials are produced for public dissemination and presentations are prepared for public meetings. It is important that the materials used in this program reflect the issues of state significance that have been identified *a priori*.

Identification of Vision, Goals, and Performance Measures

Step	Reason
15. Prepare and use templates that can be incorporated into the vision, goals, and performance measures identified for each corridor study that reflect state interests.	This step is very important for establishing the crucial state issues to be addressed in the corridor study. It is not likely that the vision and goals statement would be significantly different from those produced by the corridor study, anyway. However, a set of common performance measures for all corridor studies is crucial for establishing statewide consistency. The state template would be included in the process guidelines adopted at the beginning of the SWCP effort.

Problem Identification

Step	Reason
16. Prepare and use templates that can be incorporated into the problem identification phase of the corridor planning process relating to policy or problem areas of state significance.	State DOTs often have some policy or problem areas that merit more detailed attention. One way of accomplishing this is to require one or more performance measures unique to the specific problem area. However, another way is to require specific types of performance issues or even strategies. For example, a state DOT could require identification of problem areas that affect freight movement, place first priority on pavement and bridge condition, or provide a standard method for consideration of transit options.

Step	Reason
17. Identify environmentally sensitive areas in which extra effort must be made to consider potential impacts that could result in environmental harm.	This step provides an early warning system for projects that might need extra attention due to potential environmental harm. Many DOTs have adopted procedures and processes aimed at avoiding, minimizing, or mitigating environmental impacts. This step could be implemented through state guidelines on what to look for in corridor studies to identify environmental "hotspots." This guidance could also provide information on NEPA and state environmental law provisions that should be considered as the corridor study proceeds.

Alternatives Identification and Analysis

Step	Reason
18. Identify the types of alternatives that are of interest to the state DOT and include them in the SWCP process guidelines.	As a follow-up to the identification of common problem areas, this step identifies the types of alternatives or strategies that should be considered in the corridor study. For example, the state DOT could require the consideration of operations strategies before more capital-intensive actions are undertaken; the DOT might require the identification of opportunities for using ITS technologies or consideration of transit strategies in highly urbanized corridors.
19. Establish common standards or approaches for analyzing specific types of alternatives, especially those identified as being of state interest.	This step promotes consistency among the corridor studies by providing common standards or tools that can be used in the corridor analysis. For example, if a statewide travel demand model exists, use of the statewide model estimates in the travel corridor could be recommended. Similarly, economic analysis tools (such as REMI or HERS) could also be required as standard procedures in the study process to determine relative economic benefits.

Project and Corridor Evaluation

Step	Reason
20. Establish a set of common evaluation criteria on state issues of greatest concern.	Given the importance of the evaluation results to prioritizing projects from different corridor studies, this step will ensure that a subset of the corridor study evaluation criteria will be common for all studies. However, some "types" of corridors may have very specific criteria related to the context of a particular study (e.g., tourism, freight, environmental sensitivity, etc.).
21. Identify common methods to be used in evaluation.	This step will specify the use of common evaluation methods for comparative assessment of the alternatives under consideration. For example, the use of benefit/cost analysis might be required for all major projects, which could give a consistent basis for comparing projects from different corridor studies (such as for safety projects), or the same scoring scheme could be applied for assigning assessment values to categories of projects or potential environmental or community impacts.
22. Provide guidance or a template on the assumptions and approaches to be used in estimating project costs.	One of the most important steps (but one that is most often done inconsistently) is the estimation of project costs. To compare project viability among corridors and projects, it is important to provide a common approach for estimating project costs.

Project and Corridor Investment Program

Step	Reason
23. Establish common approaches or methods for assigning project priorities.	Given the limited amount of funding to meet all of the state transportation needs, some form of project prioritization must occur. Project priorities can be established in many ways. This step will establish consistency in the ways that priorities are assigned and used in the process of defining a corridor investment program.
24. Develop templates that provide information on the feasibility of different financial strategies for corridor investment.	Given that a range of corridor strategies will be considered and possibly recommended as part of the corridor study, the state DOT should provide information on the feasibility of different financing strategies for transportation investments. For example, the characteristics of successful public-private partnerships (PPPs) and the types of projects for which they are applicable should be part of the information available to corridor decisionmakers.
25. Establish a common reporting format to the state DOT on the results of the corridor study or analysis.	This step will define the format and content of the information that is reported to the state DOT for projects that are state funded. This format could be structured by project category (e.g., capacity expansion, safety, public transit, etc.) or by overall priority (No. 1 project, No. 2 project, etc.).

Identify Statewide Investment Program and System Management Strategy

Step	Reason
26. Establish a process for using information from corridor analysis for the statewide plan update and for STIP development.	This step establishes the process for using different corridor study input to define the fiscally constrained statewide investment program or the statewide transportation plan. This could entail process guidance on internal DOT organizational responsibilities as well as technical guidance on how corridor study information will be used. It is likely that the results of the corridor studies will be only part of the information that will be used to develop a statewide investment program.
27. Establish a process for considering non-investment strategies within the context of a statewide transportation plan or adopted state DOT policies.	Corridor studies could recommend actions other than implementing projects. For example, a study might recommend the use of access management policies to preserve highway capacity or the adoption by local governments of smart-growth principles to control development. These strategies should be considered as part of statewide transportation policy development, and this step provides a path for this to occur.
28. Monitor the ongoing SWCP process and modify it as needed.	To be effective, the SWCP process needs to be flexible in responding to the changing needs of the state; thus, the state DOT should regularly assess the effectiveness of the SWCP process and modify it when and where appropriate. It seems likely that state DOT officials will identify areas in the SWCP process where continuing improvements can be made.

SECTION 4

Hypothetical Example: Application of SWCP Guidance to the State of South Orange

This section presents an application of the above guidelines to the planning process in a hypothetical state DOT. The hypothetical example describes the thinking process of the state DOT planning director as an SWCP approach was incorporated into the statewide transportation planning process. Characteristics of the state DOT technical guidance provided to regional planning agencies and consultants are also described.

SWCP in the State of South Orange

The state of South Orange has decided to restructure its statewide transportation planning process as an SWCP approach. One primary reason was that the Governor and the Secretary of the South Orange DOT (SODOT) decided that the level of information on relative project benefits was inadequate to determine the most cost-effective set of state priorities. Also, since a requirement was established by the SODOT Transportation Commission for a fiscally constrained STIP, SODOT officials needed to have realistic and reliable information on project costs that could be best estimated at the corridor level.

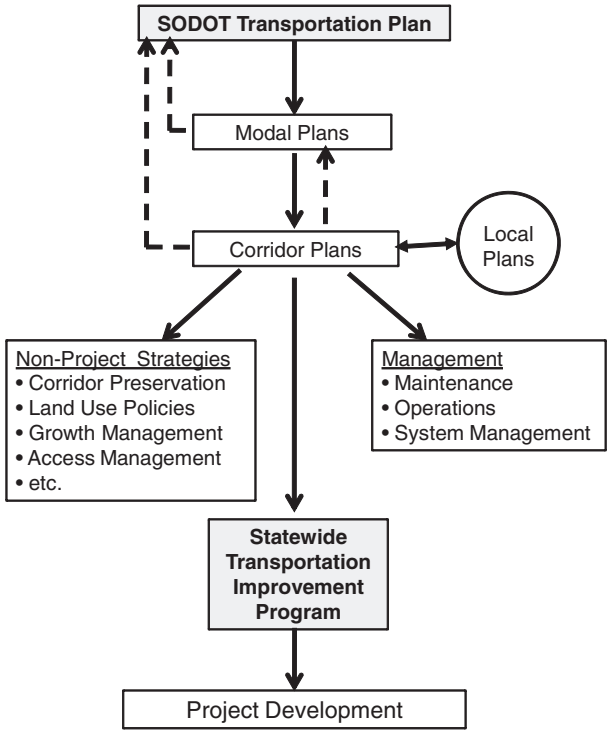
SODOT officials used a newly released technical guidance document on how to establish an SWCP process in response to the Governor's and Secretary's request. The following case study describes the steps that were taken.

Establish Organizing Principles and Institutional Structure

The Secretary tasked the Director of the SODOT Bureau of Transportation Planning with the responsibility of developing the overall approach to SWCP. One of the first decisions made by the Director was that a process guidebook had to be developed that would provide information on the approach to be followed by regional planning agencies or consultants when undertaking a corridor planning study.

Figure 2 was prepared to illustrate the relationships between a corridor plan and other products of the statewide transportation planning process. As shown, corridor planning was intended to feed into

- The statewide transportation plan;
- SODOT's modal plans that focused on state rail, aviation, transit, bicycle/pedestrian transportation, and highways;
- System management strategies that would improve traffic flow on the state's highway network; and
- The fiscally constrained STIP.



Source: Based on Idaho DOT's *Guidebook on Corridor Planning* (2006).

Figure 2. Relationship between corridor plans and SODOT activities.

The approved SWCP process guidelines included the following requirements:

- The corridor study goals shall include statewide transportation goals adopted by the Transportation Commission and incorporated into the latest update of the South Orange Long Range Statewide Transportation Plan.
- SODOT has identified the following issues and solution strategies of statewide significance that should be considered in the corridor study methodology:
  - Enhancing statewide and urban mobility;
  - Enhancing the connectivity of the state with special attention given to rural areas;
  - Providing safe and reliable access from the state's military bases to major ports;
  - Providing safe and reliable evacuation routes from the state's coasts to inland areas;
  - Reducing the number and severity of crashes on the state's road network (the Governor is chairman of the National Governors' Association task force on road safety);
  - Improving the movement of freight and goods in South Orange, especially access to major freight intermodal terminals; and
  - Applying, where appropriate, ITS technologies to the state's transportation system. SODOT has been a national leader in developing and implementing a state ITS infrastructure that has so far been primarily focused in the state's urban areas.
- Public and stakeholder involvement shall occur throughout the process. It is expected that a high-level stakeholder group will be formed early in the study to advise on the overall planning process, as well as provide input on the corridor selection criteria and network definition. As the individual corridor studies are conducted, many more opportunities will be provided for public and stakeholder involvement, with regional and local planning agencies taking the lead. SODOT has an established policy of holding regional forums preceding the Transportation

Commission's consideration of the statewide transportation plan and the STIP; thus, the results of the SWCP efforts will be presented at many public forums for input and reactions.

- Where appropriate, corridor studies are intended to be multimodal—that is, they are to examine the cost-effectiveness of achieving mobility and accessibility goals through different modal investments. In particular, for corridors in urban areas, this multimodal perspective is to include the consideration of different transit options. Similarly, for corridors having significant freight flows, the multimodal perspective should include the feasibility of both freight rail and trucking.
- SODOT has adopted a context sensitive solutions (CSS) policy that encourages community involvement in defining project characteristics and desirable project outcomes. This policy is aimed at very specific locations and would most likely be applied within an individual corridor study context. Many of the project designs and accompanying strategies resulting from the CSS approach would not be at the scale and scope needing referral to SODOT headquarters; rather, SODOT division offices and local agencies are encouraged to implement them under their own authority.
- To provide consistency in traffic analysis across the state, the statewide travel demand model will be used to estimate the traffic flows entering and exiting a corridor, but the actual distribution of internal corridor trips will result from a corridor-specific model. Economic forecasts at the county level will be obtained from the South Orange Department of Community Affairs and will be used as control variables for county population and employment growth forecasts.
- Crash data shall be obtained from SODOT's crash database, and condition data for pavements and bridges will be obtained from SODOT's pavement and bridge management systems. SODOT's cost template will be used to estimate expected costs associated with different projects and strategies.
- SODOT realizes that considering the environmental impacts of proposed projects or strategies will be an important element of the individual corridor studies; therefore, corridor-level, project, and strategy assessments will consider the range of impacts that are currently stipulated in federal and state environmental laws and are appropriate for the types of projects and strategies under consideration. In addition, the state has recently adopted a climate action plan that has placed the responsibility of reducing transportation-related greenhouse gases with SODOT. SODOT is in the process of preparing guidance on how such an assessment should be conducted. When approved, this guidance will become part of the SWCP guidelines.
- Corridor studies shall result in purpose and need statements for candidate projects that might require an environmental analysis. Sufficient detail on potential environmental impacts shall be provided to allow SODOT to conduct a "fatal flaw" analysis of potential new roadway alignments.
- All proposed capital projects greater than $1,000,000 shall have a benefit/cost analysis conducted that will be considered by SODOT, along with other relevant evaluation criteria. An evaluation template will be used to standardize the presentation of project-specific information to SODOT.
- Innovative funding sources should be considered in every corridor study, with specific attention given to the steps needed for their use and implementation.
- Project decisions that have reached a level of consensus from the corridor planning process should be documented and forwarded to the Bureau of Transportation Planning as soon as they are approved as part of the corridor plan. In this way, SODOT does not have to await the final corridor study report to consider a project for inclusion in the statewide plan update or in the STIP.
- All federal requirements for statewide planning (such as providing opportunities for consultation with non-metropolitan officials in the planning process) shall be included in the corridor study design.

The SODOT Director of Planning also realized that SODOT needed to be better organized to utilize the SWCP approach to statewide planning and worked with the Secretary and other

DOT executives to implement the following organizational changes within the agency. An SWCP Committee was formed, consisting of the Directors of Planning, Project Development/Pre-Construction, Traffic Operations, Capital Programming and Investment, Intermodal Programs, and the Deputy Secretary. This committee meets quarterly to assess projects that have surfaced from the ongoing corridor studies that are to be considered for the statewide plan update and/or the STIP.

In addition to expanding the internal decisionmaking structure, SODOT requires that at least one SODOT official sit on each corridor study decisionmaking body. The presence of the SODOT representative is intended to provide the state's perspective in meeting state-significant goals and issues.

Establish a Corridor Network

The Governor of South Orange has identified fostering economic development and connecting regions within the state as two of the most important policy goals of his administration. It turns out that both goals have been part of the SODOT policy vision and goals for some time. South Orange has historically been a manufacturing state, but over the past several decades, this manufacturing base has switched to a service economy. Tourism is an important industry for South Orange, and there are several major military bases that will likely serve as points of debarkation in the event of a national mobilization. South Orange has several ports, including a container port that is among the fastest growing in the country. The capital of South Orange, Orangeville, is one of the fastest growing metropolitan areas in the country and has major state radial freeway corridors that include express bus services, heavy rail lines in two corridors, and proposed commuter rail services in three other corridors. Orangeville's airport is one of the busiest in the country and has provided the foundation of much of the economic growth in the metropolitan area.

SODOT officials identified the following criteria for defining a network of state significant corridors:

- State highways with > 50,000 AADT;
- Urban state highways > 75,000 AADT and transit service;
- State highways connecting all urban areas > 50,000 population;
- Corridors with Class 1 freight rail service;
- Roads connecting major intermodal facilities (such as airports and ports);
- Roads connecting military bases to ports; and
- Hurricane evacuation routes.

Another criterion that was added by the Director of Planning was the existence of a South Orange highway corridor that was part of a multi-state corridor planning study. Such a criterion was not included in the original list because of the unique nature of such a planning effort. In this case, the SODOT is participating on a multi-state task force examining a corridor that connects the major port city in South Orange to the rest of the nation. Figure 3 shows the corridors defined after application of these criteria.

Identify Study Corridors

The SWCP Committee decided that major corridor studies should be initiated for all corridors of state significance rather than relying on an abbreviated analysis. The SODOT Director of Planning realized that not all of the corridors could be subject to corridor studies at the same time. A methodology was therefore created to identify which corridors deserved urgent attention, and a schedule was developed for the remaining corridor studies.

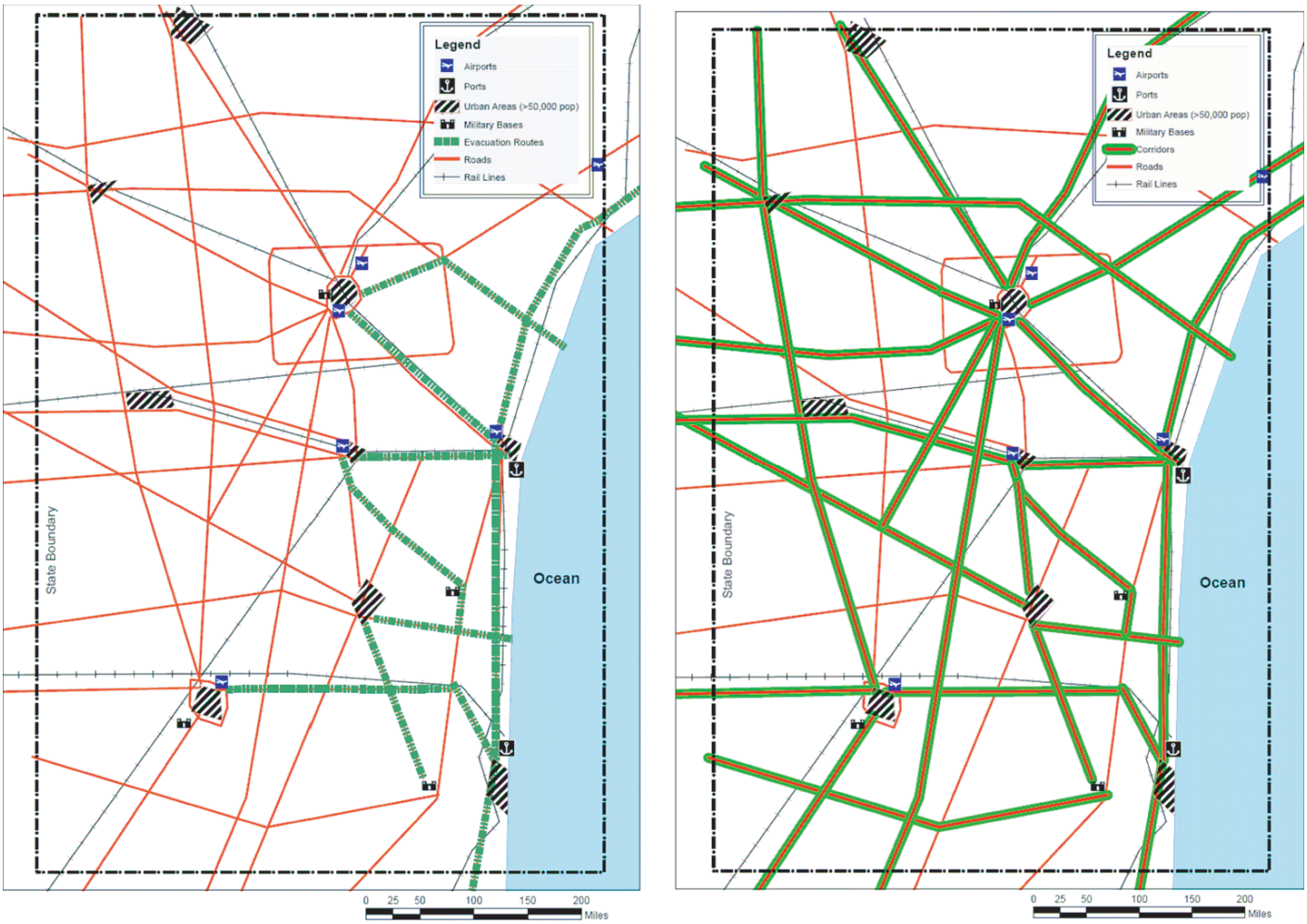


Figure 3. South Orange's major transportation network and corridors of state significance.

It was expected that the initial corridor study cycle would take up to 6 years, and the subsequent planning cycle (i.e., the time between updates of a corridor plan) would be approximately 10 years unless priorities changed. Of course, any significant change in study context (e.g., a major new automobile manufacturing plant moving into the corridor) could create the need for an earlier study update.

The methodology and criteria used to identify the corridor study schedule are shown in Table 1. The approach was very straightforward: simply assign points on a 1 to 5 scale of how each corridor related to a specific consideration. For example, one criterion is the perceived feasibility of multimodal options in a corridor to address issues and alternatives related to commuter rail and the movement of freight. The scale was set as a "1" for the lowest possible achievement of a particular consideration, and a "5" meant that the corridor had the best possible achievement. The shaded corridors indicate those that have been identified as being of greatest priority and, thus, will proceed first.

SODOT has entered into a memorandum of understanding (MOU) with the South Orange Department of Environmental Affairs that outlines the agency responsibilities and commitments in incorporating environmental factors into the corridor studies to produce a defensible purpose

26 A Guidebook for Corridor-Based Statewide Transportation Planning

Table 1. Methodology for selecting priorities in scheduling corridor studies.

Corridor	High traffic volume	Feasibility of multimodal options	City connections	Connection to rural areas	Class 1 railroad network	Intermodal access	Hurricane evacuation	Military base access	Total Score	Priority Schedule
City A to City B	2	1	5	1	5	3	1	1	19	In 5 to 6 years
Town E to City U	3	5	4	3	2	2	1	2	22	In 2 to 4 years
Johns AFB to Port A	1	5	2	3	3	4	2	5	25	In 2 to 3 years
State line to City B	4	1	2	4	3	1	3	1	19	In 5 to 6 years
Port A to City W	5	1	3	3	2	3	5	1	23	In 2 to 3 years
City U to Town F	3	2	3	3	5	2	3	3	26	In 1 to 2 years
City Z to City P	2	4	5	1	4	5	2	2	25	In 2 to 3 years
State line to Town F	2	3	2	3	4	3	2	2	21	In 4 to 5 years
Port B to City B	3	5	3	2	5	4	5	4	31	In 1 to 2 years
Miles Army Base to Port A	4	2	3	4	4	4	3	5	29	In 1 to 2 years
City I to City U	5	2	5	1	2	2	1	2	20	In 4 to 5 years
Town F to City X	5	4	2	3	1	1	3	3	22	In 2 to 4 years
City X to City B	4	3	5	2	2	4	1	1	22	In 2 to 4 years
City B to state line	3	5	2	3	4	3	2	1	23	In 2 to 3 years
Port A to City X	2	5	3	4	3	2	5	3	27	In 1 to 2 years
City X to City Y	4	2	5	3	2	3	2	4	25	In 2 to 3 years
City B to City C	1	4	5	3	2	2	3	1	21	In 4 to 5 years

Key: 1 = Very low priority; 2 = Low priority; 3 = Medium priority; 4 = High priority; 5 = Very high priority.

and need statement. The Director of Planning also anticipates developing similar MOUs with the state's regional planning organizations and modal agencies that outline the expectations associated with corridor study methodology and results, as well as the respective organizational responsibilities.

Once the state-significant corridors have been identified and scheduled, corridor studies have to be initiated. The Director of Planning realizes that simply defining corridor boundaries can be a contentious issue with local officials. In the case of the SWCP approach, not only will a corridor study recommend improvements that are aimed at locally defined problems, but it will also address issues of statewide significance. Thus, the corridor study area boundaries must be wide enough to encompass all of the issues relevant to the differing perspectives. The SWCP guidelines recommend that, at a minimum, a 10-mile corridor boundary be adopted, centered

on the major highway in the study area. If major alternative modes (such as rail) run parallel to the corridor and provide an alternative mobility option but are not within this boundary, then the boundary should be expanded.

Conduct Corridor Studies (Elements Related to the SWCP Approach)

The Director of Planning realized that each corridor study would likely have characteristics and issues specific to each corridor. However, the Director wanted to make sure that each study has common elements so that the studies' recommendations could be compared for relative effectiveness. The following corridor planning steps were identified as having important elements that required that state interests be represented.

Establish Organizing Principles and Institutional Structure

One of the most important starting points for any corridor study is the creation of a study management and/or advisory committee structure. Given that most of the corridor studies will be managed by agencies other than SODOT (e.g., regional planning agencies), it is likely that the study management structure will differ in important ways from one part of the state to another. However, the Director of Planning wanted to ensure that SODOT had representation on every corridor study management and/or advisory committee structure to ensure that the state's interests were represented throughout the study. Therefore, corridor study guidelines required that a SODOT representative from the Bureau of Transportation Planning and from the relevant SODOT district office be part of each corridor study.

SODOT wants each corridor study to result in a purpose and need statement that will satisfy federal and state environmental requirements. Thus, SODOT has recommended that representatives from the state environmental agency be part of the corridor study committee structure, as well as representatives from federal resource agencies, if agency participation can be obtained.

The corridor process guidelines also included a recommended set of minimum steps that each corridor study should follow. This overall planning framework was intended to ensure that each study would have common characteristics and would result in similar types of project and strategy information. One of the more important steps in the corridor study process is the development of a public involvement program. SODOT has developed materials relating to issues of state interest that should be incorporated into every corridor study public involvement program.

Identification of Vision, Goals, and Performance Measures

SODOT already had an adopted policy statement that outlined the vision and goals for a statewide transportation program. This policy statement was synthesized and put in the form of a template that could be used in corridor studies. As one would expect, the vision statement and planning goals were defined in rather abstract terms, so the SODOT Bureau of Transportation Planning identified several common performance measures that were to be part of every corridor study assessment. These measures were considered important by SODOT officials because this information was to be used later in the process when projects from different corridor studies would be prioritized into a statewide investment program. It was fully expected that each individual corridor study would produce its own set of performance measures that reflected the problem definitions of local stakeholders, but SODOT wanted to ensure that some measures were the same for every study.

The system performance measures required by the state included

- Travel time delay, volume/capacity ratios, and level-of-service measures, both during normal operation and during periods of evacuation (South Orange is in a hurricane zone);
- New transit ridership (if appropriate);
- Number and extent of bottlenecks;
- Crashes by type (fatality, personal injury, and property damage only);
- Accessibility to major employment and industrial sites;
- Pavement and bridge conditions; and
- Environmental conditions (noise levels at sensitive locations, emission levels at key spots, acres of wetlands impacted by the transportation system).

SODOT officials spent considerable time developing this list of performance measures. The process was not as simple as might be expected. The natural tendency was to identify a large number of performance measures that covered every possible topic of interest to the state, but the planning director knew that the more performance measures there are in the list, the more difficult it is to establish a sense of what is really important.

In addition, the Secretary of SODOT wanted to ensure that the performance measures that were to define "state interests" truly reflected a sense of what was important to state officials and key stakeholders, as well as the general public. Thus, SODOT commissioned a market research firm to conduct public surveys aimed at gauging the level of public concern on different system performance issues. The Bureau also used its existing public involvement capabilities to interview approximately 50 key stakeholders in the state to identify what they considered to be the most important measures of acceptable system performance. The final six measures resulted from this effort. In fact, the Secretary was so impressed by the effort to identify these measures that she decided to use them as the foundation for an annual "state of the system" report to be produced by SODOT.

Problem Identification

Corridor needs and problem areas will differ from one study to another. However, SODOT identified several policy areas that every corridor study should investigate. A template, in the form of a set of questions, was prepared for each policy area. An example template for freight issues is shown below.

Template for Considering Freight Transportation in Corridor Studies

- ✓ What are the current and expected freight flows in the corridor?
- ✓ Where are the most important intermodal facilities and distribution/warehousing centers and what is their future growth?
- ✓ Where are the highest numbers of truck-car or rail-car crashes?
- ✓ What is the expected growth in freight traffic?
- ✓ Where are the key freight bottlenecks today? In the future?
- ✓ Will there be any changes in land use that could significantly affect freight movements in the corridor?
- ✓ What types of strategies can be implemented to improve freight flow in the corridor? Is modal diversion a feasible option?
- ✓ What types of innovative funding strategies can be used to support freight-related infrastructure improvements?

Given the concern for potential environmental impacts, SODOT has required that an environmental overview be conducted as part of each corridor study to identify areas of high environmental sensitivity—that is, areas where some effort would likely be needed to avoid, minimize, or mitigate environmental impacts. SODOT suggests that the corridor agency sponsor use the environmental resource base maps prepared by the state environmental agency for identifying these sensitive areas. By using GIS, the corridor study sponsor should delineate locations where changes to the transportation system could cause major environmental disruption. Participation from the state environmental agency should occur at this early stage.

SODOT has also stressed in its process guidelines that problem definitions should be multimodal to the extent possible. This means that a problem should not be defined as "widen State Route 93 from city X to city Y." Rather, the problem definition should be portrayed as being "inadequate or insufficient transportation system capacity to provide desired mobility." This implies that such capacity could be provided with different transportation modes or by managing the demand more judiciously to free up capacity during peak periods.

Alternatives Identification and Analysis

Each corridor study will identify strategies and project types relevant to the problems in the corridor. SODOT, however, wants to ensure that certain types of alternatives are considered in each study. Accordingly, the corridor study guidelines include the following strategies to be considered in each corridor:

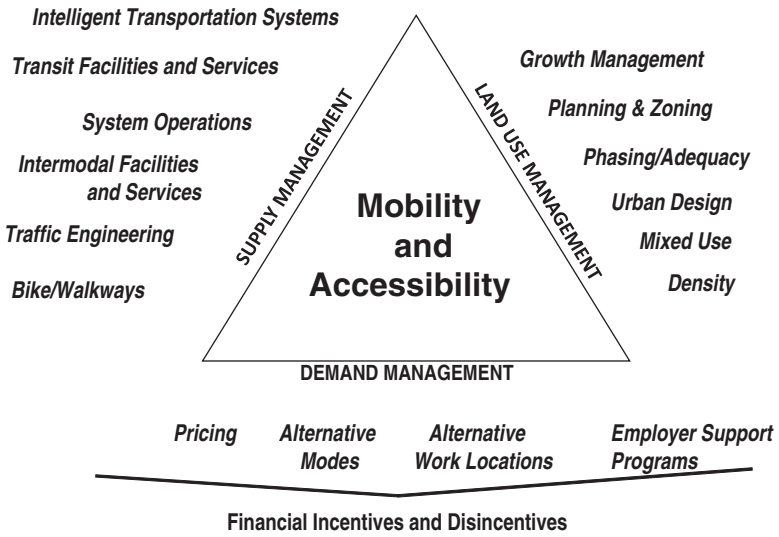
- Multimodal strategies, where appropriate, that encourage the use of alternative modes of travel;
- ITS technologies as described in the ITS statewide systems architecture;
- Transportation demand management (TDM) strategies that reduce the demand for road capacity at the most congested locations (including pricing strategies);
- Transportation system management (TSM) strategies that promote the more efficient utilization of existing transportation system capacity;
- In collaboration with local communities, land use strategies that provide a long-term benefit in reducing traffic demand on the state's road network; and
- Strategies aimed at reducing crashes, including non-engineering strategies targeted at risk drivers.

The SODOT Director of Planning attended a conference where the illustration shown in Figure 4 was presented. The Director felt that this illustration indicated quite well the types of strategy combinations that each corridor study was expected to produce. Figure 4 was thus included in the corridor study guidelines.

Given that many of the corridor studies will likely be undertaken by consultants, the Director of Planning wanted to ensure that the data and analysis methods used in each study were consistent with state practice. Accordingly, SODOT included the following requirements in the process guidelines:

- The state travel demand model should be used to obtain the external-external, external-internal and internal-external trips in the corridor. It is expected that the state's travel demand model will be used by the consultant in obtaining this information.
- The socio-economic forecasting for the corridor should be consistent with the state's own forecasts for population and employment in the corridor.
- Crash data will be obtained from the state's crash database.
- The planning time horizons for analysis will be 5 years, 10 years, and 25 years.
- If a corridor is of such a length that it traverses multiple regional planning agency boundaries, efforts shall be made to make the corridor analysis consistent with each agency's own planning analysis efforts.

30 A Guidebook for Corridor-Based Statewide Transportation Planning



Source: Meyer, M., and E. Miller, *Urban Transportation Planning: A Decision-Oriented Approach,* New York: McGraw-Hill (2001).

Figure 4. Combination of corridor strategies.

Project and Corridor Evaluation

The purpose of an evaluation process is to assess the relative merits of different alternatives and to determine which are more feasible, more performance-effective, or more cost-effective based on the stated goals. For projects under SODOT jurisdiction, state officials will be faced with the typical challenge of choosing among a set of projects given limited funding.

Accordingly, the corridor study process guidelines include a requirement for certain types of information to be provided as part of the evaluation process. Of special importance, they need to be tied to the alternatives recommended for state consideration. In addition, some of this information will result from the application of certain types of evaluation methodologies, such as benefit/cost analysis. Therefore, not only is SODOT requesting specific types of information, but in some cases it is requiring that certain evaluation methods be used as well.

Changes in the following information are to be provided to SODOT for any state projects resulting from the corridor study:

- Congested hours in the period of 6:00 A.M. to 8:00 P.M. (number of hours);
- Peak free-flow average speed/current peak average speed;
- Volume/capacity ratio;
- Crashes (3-year average);
- Industrial sites accessed (number of sites);
- Benefit/cost ratio;
- Cost/rider for transit; and
- Key environmental measures specific to potential project impacts.

To provide consistency from one study to another, SODOT has developed a manual on how such information can be provided with emphasis on how to conduct a valid benefit/cost analysis.

The Director of Planning realized that one of the weaknesses of previous corridor studies has been the non-standard approaches toward estimating project costs. Therefore, the Director has incorporated into the guidelines a requirement that study analysts must use a standardized

cost template for estimating the capital and life-cycle costs of the projects being considered. This cost template was based on the past 5 years' of cost data for different types of projects.

Project and Corridor Investment Program

In the SWCP guidelines, it was emphasized that the major product of a corridor study will be a corridor plan with specific recommendations for the implementation of projects and strategies. Some key directions were given in how this was to be done.

Many of these projects and strategies will focus on solving issues that are more local in nature and, thus, will require local implementation. For projects on state highways, the adopted corridor plan will clearly delineate those for which the SODOT is responsible. The corridor plan submittal to SODOT will be organized in the following categories:

- Projects on the state highway network;
- Projects not on the state highway network that need state action;
- Non-highway projects; and
- Projects using innovative funding strategies.

Projects identified in each of these categories should be prioritized based on the evaluation criteria identified earlier and, in some cases, by funding category. In particular, those projects that best meet the state identified goals should be clearly noted.

In addition to capital projects, the corridor plan should identify other strategies that are important to maintain the future performance of the transportation facilities in the corridor, such as those relating to land use and demand management. Also, the corridor study could identify legislative or regulatory changes that might have to be adopted to implement a particular strategy (such as safety or access management).

Identify Statewide Investment Program

The organizational structure created by SODOT at the beginning of the SWCP process has proven to be very useful in developing a statewide investment program based on the results of the corridor studies. The SWCP management committee has met several times since the SWCP process was established and has found that the corridor planning approach to statewide planning provides a timely and more operations-oriented perspective on a state investment program than does the systems-wide approach used previously.

The committee initially relied on the existing South Orange Long Range Statewide Transportation Plan as the foundation for projects being forwarded into the STIP. However, as recommended projects started to be forwarded to SODOT, the committee considered each from the perspective of statewide priorities. Given limited resources, not all of the projects were recommended for inclusion in the plan and STIP; however, the level of specificity associated with the projects recommended in the corridor studies did allow the committee to determine which projects were more important than others with respect to statewide goals.

One of the useful aspects of the SWCP approach was that projects and strategies for improving state transportation system performance other than highway expansion surfaced from the process. For example, given the more detailed examination of options in one particular corridor, SODOT was able to identify operations-oriented, ITS, and TDM actions that are now being implemented to manage travel demand in that corridor. In another corridor, the regional planning agency that directed the study identified several potential transit options, including park-and-ride and express bus, that most likely would not have been considered under

a more traditional statewide planning process. A more detailed alternatives analysis is now being considered for this corridor.

One of the key issues facing SODOT was how to prioritize the many projects coming from different corridor studies as well as from other sources. The Director of Planning was aware that there are a variety of ways to establish the relative value of one project versus another. However, with the large number of projects expected to be recommended from the SWCP process, there was a good chance that statewide consistency in considering different projects could be lost without some framework for comparison. The need for this framework became apparent after initial efforts to compare all projects on the basis of a benefit/cost (B/C) ratio. The B/C ratio provided useful information concerning the level of benefits that would accrue given costs, but it did not take into account non-monetary benefits, and it showed little sensitivity to the level of investment. For example, a B/C ratio of 1.4 on a $100,000 project is difficult to compare with a 1.2 B/C ratio for a $10,000,000 project.

To take these factors into account, the SODOT adopted a corridor project evaluation approach that placed all projects within quartiles for the range of values found among all corridor projects. This example method for prioritizing among corridor projects is offered as an illustration only. There are many other approaches that transportation agencies could use to serve the same purpose. A score of "4" was assigned to project factors that fell in the fourth quartile, a "3" in the third quartile, and so forth. Thus, for example, if the number of crashes (3-year average) for all projects ranged from 0 to 31 over 3 years, the quartiles would be defined as follows:

- Quartile 1: 0–7 crashes,
- Quartile 2: 8–15 crashes,
- Quartile 3: 16–23 crashes, and
- Quartile 4: 25–31 crashes.

If a project crash record was 22 crashes, it would fall into the third quartile and receive a "3" in the scoring scheme. In other words, this implies that making improvements to a location having 22 crashes should receive greater priority than those having 15 or fewer crashes, and it should not receive a greater priority than a location having 25 or more crashes.

The sum of the scores for each project provides a relative ranking of the projects from the perspective of state investment. The Director of Planning realized that the highway project rankings would most likely have to be undertaken by funding category since some funds cannot be transferred between programs. Transit or other modal projects would likely have to be handled separately as well.

Table 2 shows an example application of this approach for some of the early SWCP corridor studies in South Orange.

It will take some time for SODOT to cycle through all of the corridors that have been identified as being of state significance, but the experience to date with the SWCP process suggests that, once all of the corridor studies have been completed, the statewide transportation plan and STIP will truly represent a well-founded "picture" of the transportation needs of the state.

If generating new funds is any indicator of a successful planning process, then the SWCP process has been very effective. Based on the initial success of the SWCP process, the state legislature provided additional funds to SODOT to expedite the process of completing the state's corridor studies. State legislators did not want to wait for several years to get their projects considered as part of the statewide transportation plan. The Secretary of Transportation was pleased that, for the first time in many years, the state legislature actually focused on the transportation planning process rather than mandating specific projects be built.

Table 2. Prioritizing projects among corridors.

Corridor Projects	Number of congested hours in 6:00 A.M.–8:00 P.M. period	Peak free-flow average speed/current peak average speed	Volume/capacity	Crashes (3-year average)	Number of industrial sites accessed	B/C ratio	Total for Highway Projects	New riders	Cost/rider for transit	Total for Transit Projects	Key environmental measures specific to project impacts
Corridor 1: Project A	2	3	2	4	2	3	16				None
Corridor 1: Project B	1	3	1	4	3	4	16				AQ, Wetlands
Corridor 1: Project C	3	2	2	3	1	2	13				Historic
Corridor 2: Project A	4	4	2	2	2	4	18				AQ, Noise
Corridor 2: Project B	2	1	3	3	1	2	12				Historic, AQ
Corridor 2: Project C	3	3	4	4	2	3	19				EJ, AQ, Noise
Corridor 2: Project D	1	2	2	2	1	4	12				None
Corridor 3: Project A	4	3	3	3	4	2	19				AQ, Wetlands
Corridor 3: Project B	2	1	4	1	2	4	14				Community, AQ
Corridor 1: Transit A								2	1	3	None
Corridor 2: Transit A								3	2	5	Historic
Corridor 2: Transit B								4	2	6	None
Etc.											

Key: Quartile 4 = 4 points; Quartile 3 = 3 points; Quartile 2 = 2 points; Quartile 1 = 1 point.

Conclusion

While the SODOT scenario is hypothetical, it has been based on realistic examples and outcomes. The goal of this exercise has been to demonstrate real-life issues that can arise and how the SWCP process can be applied in addressing those issues. While there is no certainty that this will lead to an outcome similar to the one in the State of South Orange, the SWCP process can still provide positive benefits to state DOT planners and decisionmakers—and possibly to other state government decisionmakers as well—and a better statewide transportation system.

SECTION 5

References

While not all encompassing, the following reference documents and web sites may provide useful points of departure for implementing the various elements of a statewide corridor planning process.

State Guidance

Bluegrass Tomorrow and Glatting, Jackson, Kercher, Anglin, Lopez, Rinehart, Inc. *Bluegrass Corridor Management Planning Handbook.* Prepared for Kentucky Transportation Cabinet (2000). www.kytc.state.ky.us/Multimodal/Access.asp

Colorado DOT. *2035 Regional and Statewide Transportation Plan Guidebook.* Division of Transportation Development, Denver (2006). www.dot.state.co.us/StateWidePlanning/PlansStudies/RegionalPlanning.asp

Delaware DOT. *Corridor Capacity Preservation Program Guide.* www.deldot.net/static/pubs_forms/manuals/corr_cap/toc.html

Florida DOT. *Strategic Intermodal System (SIS) Strategic Guide Implementation Guidance.* Tallahassee (2005).

Idaho Transportation Department. *Guidebook on Corridor Planning (*2006). itd.idaho.gov/planning/corridor/2006plans/CorridorPlanning_2006_December.pdf

North Carolina DOT. *Charting a New Direction for NCDOT. (*2004). www.ncdot.org/doh/preconstruct/tpb/statewideplan/pdf/NCStatewideTransportationPlan.pdf

Pennsylvania DOT. *Developing Long Range Plans, A Guide for Pennsylvania Planning Partners.* Harrisburg (2006). ftp.dot.state.pa.us/public/Bureaus/Cpdm/FinalLRTPGuide.pdf

Washington State DOT. *RTPO Transportation Planning Guidebook.* Planning and Programming Service Center, Olympia (1998). www.wsdot.wa.gov/NR/rdonlyres/E5A25A1A-61E0-44E8-B000-AA546E5C3BE3/0/RTPOGuidebook.pdf

Other References of Interest

AASHTO. "Non-Metropolitan Local Consultation Process: A Self-Assessment Tool for States," Washington, DC (2006).

AASHTO. *Practitioner's Handbook 10,* "Using the Transportation Planning Process to Support the NEPA Process," Washington, DC (2008).

Amekudzi, A., and M. Meyer, *NCHRP Report 541: Consideration of Environmental Factors in Transportation Systems Planning,* Transportation Research Board of the National Academies, Washington, DC (2005).

Cambridge Systematics. *NCHRP Report 399: Multimodal Corridor and Capacity Analysis Manual,* Transportation Research Board, National Research Council, Washington, DC (1998).

Cambridge Systematics. *NCHRP Report 446: A Guidebook for Performance-Based Transportation Planning,* Transportation Research Board, National Research Council, Washington, DC (2000).

Cambridge Systematics. NCHRP Project 8-36, Task 7, "Development of a Multimodal Tradeoffs Methodology for Use in Statewide Transportation Planning," Transportation Research Board of the National Academies, Washington, DC (2004).

Cambridge Systematics, Prime Focus, and Heanue, K. *NCHRP Report 594: Guidebook for Integrating Freight into Transportation Planning and Project Selection Processes* Transportation Research Board of the National Academies, Washington, DC (2007).

Center for Urban Transportation Research. *NCHRP Report 337: Cooperative Agreements for Corridor Management.* Transportation Research Board of the National Academies, Washington, DC (2004).

Coogan, M.A., and M. Meyer. *NCHRP Report 541: Innovative Practices for Multimodal Transportation Planning for Freight and Passengers.* Transportation Research Board, National Research Council, Washington, DC (1998).

Dye Management Group. *NCHRP Report 548: A Guidebook for Including Access Management in Transportation Planning.* Transportation Research Board of the National Academies, Washington, DC (2005).

FHWA. 23 CFR Part 450 and 500, "Statewide Transportation Planning and Metropolitan Transportation Planning Final Rule." (2007).

FHWA. *Tool Kit for Integrating Land Use and Transportation Decision Making.* www.fhwa.dot.gov/planning/landuse/index.htm

Hendren, P. *Transportation Research E-Circular E-C062: Addressing Fiscal Constraint and Congestion Issues in State Transportation Planning, July 2002, Wood's Hole, Massachusetts.* Transportation Research Board of the National Academies, Washington, DC (2004).

ICF International. *Integrating Climate Change into the Transportation Planning Process.* Federal Highway Administration (2008).

Peyrebrune, H. L. *NCHRP Synthesis of Highway Practice 286: Multimodal Aspects of Statewide Transportation Planning.* Transportation Research Board, National Research Council, Washington, DC, (2000).

Seggerman, K.E., S. J. Hendricks, and A.C. Joslin. *Guidelines and Performance Measures to Incorporate Transit and Other Multimodal Considerations into the FDOT DRI Review Process.* National Center for Transit Research, Center for Urban Transportation Research, University of South Florida (2008).

TransCore. *NCHRP Report 435: Guidebook for Transportation Corridor Studies: A Process for Effective Decision-Making.* Transportation Research Board, National Research Council, Washington, DC (1999).

Washington, S., M. Meyer, I. Schalkwyki, E. Dumbaugh, S. Mitra, and M. Zoll. *NCHRP Report 546: Incorporating Safety into Long-Range Transportation Planning.* Transportation Research Board of the National Academies, Washington, DC (2006).

Williams, C.N. *NCHRP Synthesis of Highway Practice 337: Cooperative Agreements for Corridor Management.* Transportation Research Board of the National Academies, Washington, DC (2004).

APPENDIX A

Transportation Agency Examples of Corridor-Based Planning

This section presents real-life examples of how transportation agencies have undertaken the steps for a corridor-based approach to systems-wide transportation planning. All but one example are focused on state DOTs, with one additional example from an MPO.

Establish Corridor Network

Some examples of this initial step in the SWCP process are presented herein.

Indiana

The Indiana long-range plan is based on a simplified planning-level corridor classification system (see Figure A-1), which includes

- Statewide mobility corridors, which are defined as corridors that provide "safe, free-flowing, high-speed corridors" serving major metropolitan areas and surrounding states;
- Regional corridors designed to provide mobility within regions of the state; and
- Local access corridors, which include the remainder of the highway system.

The Indiana DOT through the INDOT 2030 Long Range Plan defines the state's transportation system by the level of system management responsibility—state, MPO, and small urban and rural areas.

The state system is focused on those routes that move people and goods between the major activity centers that are considered important to the state's economy. Potential highway corridors are evaluated on the basis of

- Accessibility measures between major urban areas focusing on connecting urban areas of 25,000 population or greater;
- Designation as a principal arterial on the FHWA functional classification system;
- Designation as part of the National Highway System;
- High volumes of commercial traffic and commodity movements; and
- Concentrations of high passenger-vehicle traffic volumes.

Virginia

The Virginia DOT (VDOT) used the following criteria to identify statewide multimodal transportation corridors. Such corridors included those that

- Involved multiple modes (i.e., highway, rail, inter-regional transit, airport, port) or is a freight corridor and extends beyond an individual region;
- Connected regions/states/major activity centers;

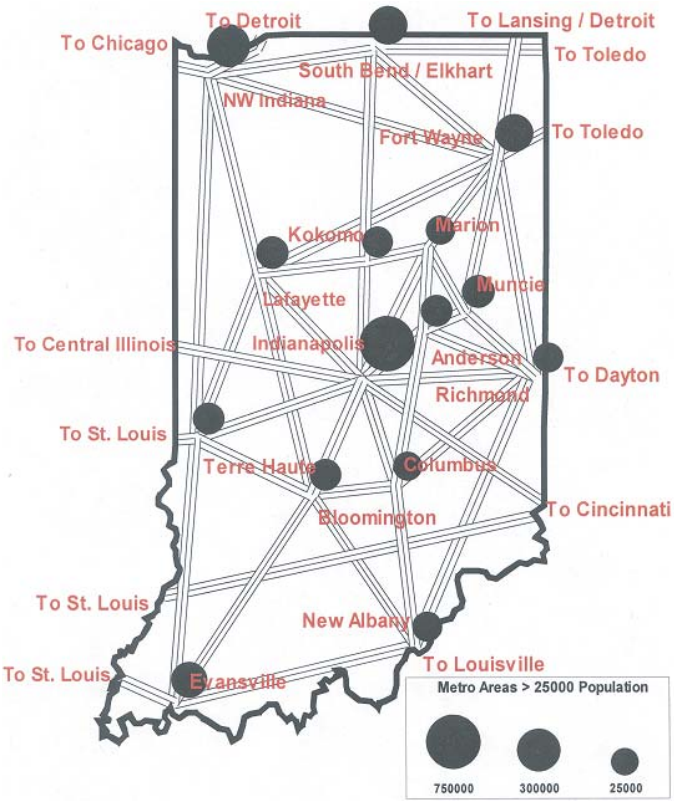


Figure A-1. Indiana's statewide mobility connections among population centers.

Source: *The WDOT Twenty-five Year Plan, As Amended November 2003.* Indiana DOT, Division of Environment, Planning and Engineering, p. 100, Figure 5.

- Provided a high level/volume of transport for
  - Class I rail,
  - Commercial and/or reliever airports,
  - Inter-regional public transportation and stations,
  - Interstate/NHS/Primary facility,
  - Major shipping channel,
  - Major port,
  - Gateway of national or international significance, and
  - Major freight corridor.
- Provided a unique statewide function and/or addresses statewide goals related to
  - Evacuation route or critical redundancy,
  - Security (military access, STRAHNET, STRACNET),
  - Tourism,
  - Truck route,
  - State bicycle route or inter-regional trail, or
  - Economic development.

As noted in the guidance for identifying these corridors, the perspective of the state may differ from that of regional planning bodies in that the state is concerned with transportation throughout the Commonwealth, whereas MPOs and PDCs appropriately focus on regional interests. The state must also ensure that regions are connected and that interstate needs are addressed. As further noted, the intent of the statewide multimodal networks is not to replace regional plans, but to "connect the dots" among regional and modal agency plans.

Michigan

In updating its statewide transportation plan, the Michigan DOT (MDOT) examined travel flows in the state and how these flows related to and affected economic development. Major corridors were identified that connected the state's most important economic centers and served the majority of the state's population. Figure A-2 shows how MDOT used a geographic information system (GIS) to illustrate the extent to which the state's population was within 20 miles of the state-identified corridors.

In this particular example, the "universe" of potential statewide corridors related directly to the linkage between transportation and other state goals, in particular, economic development. This approach is not as complex as that found in Indiana and Virginia, but it serves a very important purpose in illustrating to state and local officials how important the state's transportation system is to the economic well-being of the state. In addition, the Michigan example shows the usefulness of using GIS in identifying statewide networks or potential corridors for SWCP analysis.

Minnesota

Minnesota is another example of how states define the potential corridors for state transportation investment. Minnesota DOT (Mn/DOT) defines a system of interregional and regional travel corridors as part of the state highway network. These corridors were designed to connect key trade centers in the state based on population and business density. The state transportation plan defined a hierarchy of high-priority and medium-priority inter-regional and regional corridors.

The plan (2003) also identified the "state of the system" for other modes, including transit, intercity passenger and freight movement for the state, aviation, and waterways. The role of the state in these other modal areas was one of supporting and encouraging their use. For example,

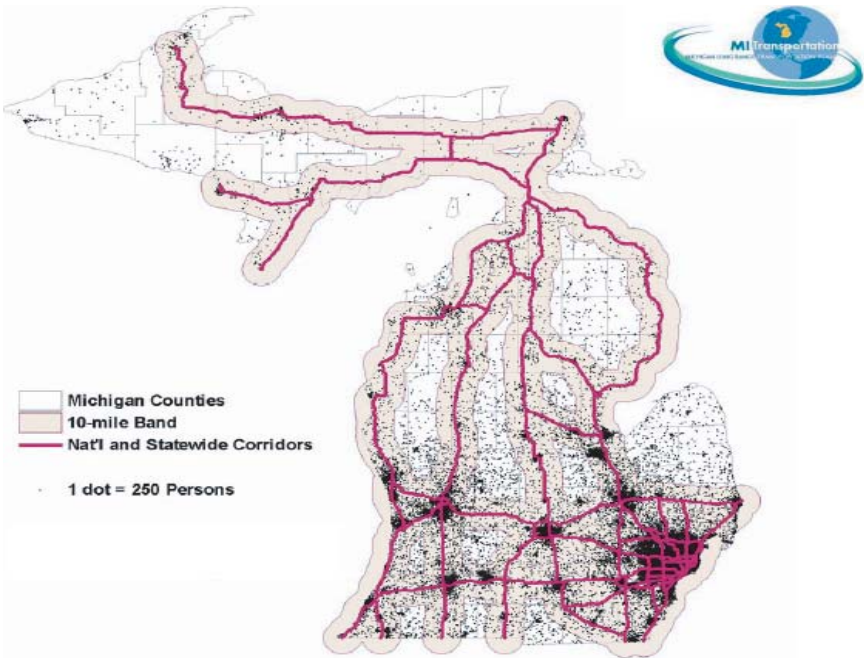


Figure A-2. Corridors of statewide significance and population location, Michigan.

Source: *State Long-Range Transportation Plan 2005–2030, Corridors and International Borders Report.* Michigan DOT, March 1, 2007, p. 18, Figure 6-1.

Mn/DOT's role in rail and waterways included the development of plans that guide funding allocation, administer highway/railroad construction projects and develop freight-related data sources. In aviation, the state was to serve as a promoter of both general and commercial aviation through technical and financial assistance, educational activities, and statewide planning and research.

Florida

Florida's Strategic Intermodal System (SIS) was formally established in 2003. The SIS includes all forms of transportation and integrates individual facilities, services, modes, and linkages into

Criteria for Identifying Statewide Corridors—Florida

Mobility/Connectivity
- System connectivity
  - Gaps in existing system
  - Intermodal connectivity
  - Connectivity to Strategic Intermodal System
  - Connectivity to regional systems
- Congestion/delay/reliability
- Freight and visitor flows
- Emergency evacuation and response
- Safety

Economic Competitiveness
- Access to industry clusters and international trade gateways
- Access to fast-growing areas
- Access to economically distressed areas
- Economic development benefits
- Economic disruptions

Community Livability
- Land use and development
- Comprehensive planning and visioning
- Multi-use facilities
- Historic and archaeological resources
- Noise and aesthetics
- Degree of community support

Environmental Stewardship
- Conservation lands
- Surface waters
- Wetlands
- Coastal and marine
- Threatened/endangered habitat
- Air quality
- Energy consumption

Source: *Florida's Future Corridors Adopted Action Plan.* Florida DOT, Central Office, December 2006, p. 16.

a single, integrated transportation system. The SIS is a statewide network of high-priority state and regionally significant transportation facilities and services, including the state's largest and most significant commercial service airports, deepwater seaports, freight rail terminals, passenger rail and intercity bus terminals, rail corridors, waterways and highways, as well as a spaceport.

Multimodal SIS hubs, corridors, and connectors rely on connectivity and volume thresholds to designate these facilities as primary to Florida's mobility network. Facilities may be designated as of statewide/interregional, regional, or local significance. The SIS helps FDOT to

- Target expenditures to help the state's economic competitiveness, including increased corridor emphasis in planning and funding projects;
- Apply innovative policies and technologies, including ITS; and
- Clarify the state's roles and responsibilities on and off this system.

The SIS assisted FDOT in the recent update of the Florida Transportation Plan (FTP). The FTP directs full implementation of the SIS Strategic Plan and update of the SIS designation and Strategic Plan at least once every 5 years based on guidance provided by the initial SIS Strategic Plan and the FTP.

Wisconsin

Connections 2030 is the Wisconsin DOT's long-range multi-modal transportation plan, which is currently under development. It sets forth a blueprint for Wisconsin's transportation system through 2030. *Connections 2030* identifies 37 corridors of statewide significance. The 37 corridors of statewide significance build on a corridors approach used in a previous statewide planning effort established in 1988 and updated in the 1990s. This initial effort, called *Corridors 2020,* identified a system of priority two-lane and multilane highways. The network was categorized into two subsystems:

1. Backbone system: 1,500-mile (approximate) network of multilane highways connecting all major population and economic regions of the state.
2. Connector System: 2,100-mile network of high quality two-lane highways directly linking significant economic and tourism centers to the Backbone system.

For the *Connections 2030* plan update, each corridor identifies routes and/or multimodal services (e.g., highways, local roads, rail, air, transit, etc.). When completed, the multimodal corridor studies will (1) highlight key *Connections 2030* recommendations; (2) prioritize investments; and (3) assist the Wisconsin DOT (WisDOT) transportation staff in prioritizing regional- and corridor-level planning needs.

Identify Study Corridors

The following examples illustrate some of the approaches that could be used by transportation agencies to identify potential corridors for inclusion in the SWCP.

Colorado

The current statewide transportation plan, *Moving Colorado—Visions for the Future,* is a policy-level, corridor-based plan in which the DOT defines corridors, identifies specific need categories established by public input for each corridor, and reviews financial abilities and limitations. *Moving Colorado—Visions for the Future* was published in February 2005 and has a planning horizon through year 2030.

The 2030 plan includes corridor visions for about 350 transportation corridor segments. CDOT established corridors in collaboration with the Transportation Planning Regions (TPRs), by segmenting Colorado's highway system into sections, including all modes and facilities within a given geographic area. In this process, logical corridor boundaries are defined by "travelsheds." Travelsheds are not based on a given corridor width that is a specific distance from the major facility on which the corridor is based. Rather, boundaries are based on a subjective assessment that determines which locations are dependent on that facility for access and mobility outside the immediate area. Therefore, travelsheds can be wide in some places if no other major facilities are located nearby or narrow in some places if other nearby facilities are available to provide additional access or mobility to a given region.

East-West Coordinating Council of Governments (St. Louis)

The East-West Gateway Council of Governments is the MPO for the St. Louis, Missouri/East St. Louis, Illinois metropolitan area. The regional transportation plan, completed in August 2005, is a corridor-based plan in which the MPO defines major corridors and uses major corridor studies to identify investments for inclusion in the long-range plan. There are no pre-established criteria to define corridors of regional significance. Rather, the MPO defines corridors based on the identification of needs as part of the normal transportation planning process.

Through the transportation planning process, the MPO identifies the locations of major needs along all routes in the study area. These needs are then examined in greater detail for corridors where problems exist, if warranted. Any route or facility may be identified as a corridor for this more detailed analysis. This analysis is undertaken for both transit and highways. As an example, the MPO has worked with the regional transit provider to identify a dozen potential light-rail lines located in six corridors. In addition to the typical factors such as line capacity, ridership, travel times, service area, and so forth, the transit systems analysis also recognized potential economic development impacts.

Florida

Florida's Future Corridors Action Plan was developed to identify a vision, goals, objectives, planning processes, and implementation strategies for statewide multimodal transportation corridors for the next 50 years. The evaluation criteria in the Florida Transportation Plan were used to guide decisionmaking for the Future Corridors Program. The Future Corridors Action Plan identified three types of statewide corridor improvements for highways, railways, and waterways to fill gaps:

1. Transformation of existing facilities,
2. Development of new parallel facilities, and
3. Development of new facilities.

Existing corridors may be enhanced with the addition of other modes within or near the right-of-way, while new corridors would be planned for multimodal uses.

Four broad policy goals, along with corresponding policy objectives and criteria for corridor evaluation, were developed for the Future Corridors Program:

1. Mobility/connectivity,
2. Economic competitiveness,
3. Community livability, and
4. Environmental stewardship.

A three-step planning process for future corridors was developed that included the following stages of development:

1. **Concept Stage**—High-level screening of the concept (1) to identify potential corridors and validate whether statewide connectivity or mobility needs exist in the study area and (2) to determine whether a transportation investment is consistent with regional and state plans, including the State Transportation Plan.
2. **Feasibility Stage**—Study of corridor feasibility to develop consensus in defining the corridor and corridor issues, resulting in specific and feasible improvement alternatives for the corridor.
3. **Efficient Transportation Decisionmaking/Project Development and Environmental (ETDM/PD&E) Stage**—This defines the effects and impacts of the alternative corridor improvement projects to address a full range of engineering, community, and environmental issues.

Figure A-3 shows the candidate corridors identified for Florida's Future Corridors process. Figure A-4 illustrates the steps involved in the Florida DOT corridor development decision process.

Wisconsin

Candidate corridors were identified that focus on enhancing Wisconsin's economic development and on highway mobility needs, safety, and development pressures. In particular, corridors were chosen that have the potential to address the majority of the criteria specified in the state's long-range plan, including the following:

- Corridors serving crucial sectors of the economy or major population centers;
- Corridors producing significant travel activity for both passenger and freight traffic;
- Corridors that show significant growth in travel or economic development; and
- Corridors that serve an important role for transportation modes, other than automobile.

Local land use and development plans have also influenced corridor selection.

Conduct Corridor Studies

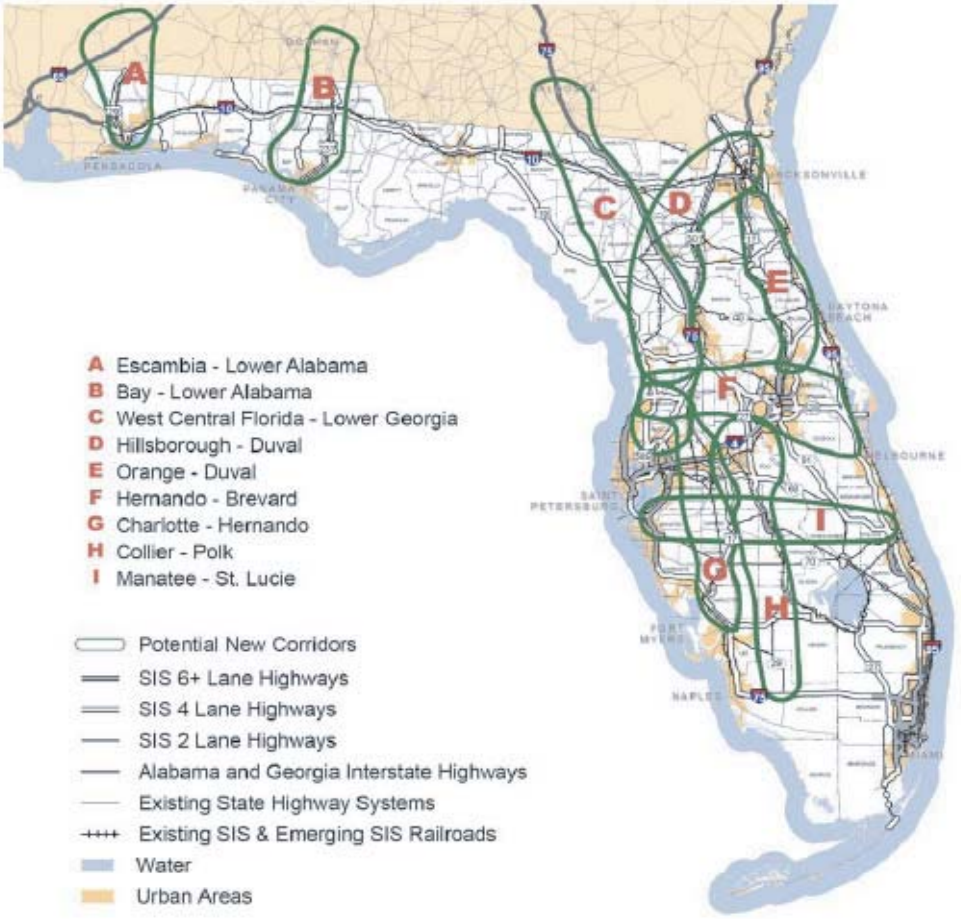
The following cases illustrate some transportation agencies' efforts to provide consistency across corridor studies.

Colorado

The CDOT works with the state's designated TPRs, which include both MPOs and RPOs, to define a vision for each of the 350 corridor segments in the state. CDOT provides policy and guidance—and has even developed a CD-ROM Corridor Vision Toolkit—to assist the TPRs in this effort.

The State Transportation Commission identified four investment categories to guide funding decisions by CDOT: mobility, safety, system quality, and program delivery. Specific performance measures and objectives have been developed for each investment category, allowing the Transportation Commission and CDOT to make informed trade-offs as they decide how best to allocate limited financial resources. These categories are applied to available funding and matched to corridor needs outlined in the corridor study vision statements.

Some of the data requirements for comparing corridors and needs include bridge and pavement condition inventories, safety information, congestion levels, AADT, VMT, and maintenance level



Important Notes: These specific potential study areas and their boundaries have been identified using existing information and prior analyses. The boundaries may change, or study areas may be added or deleted, based on additional information and analyses performed by FDOT and its statewide, regional, and local public and private partners. The boundaries at this point only represent an approximation of where mobility or connectivity needs exist, and are not intended to represent the economic or environmental "impact area" of any potential corridors within those boundaries. The identification of these study areas does not constitute any type of designation that could affect future funding.

Figure A-3. Florida's future candidate corridors (Dec. 2006.)

Source: *Florida's Future Corridors Adopted Action Plan.* Florida DOT, Central Office, December 2006, p. 11, Figure 5.

of service. Corridors are fit into a tiered priority system based on systems designation: Interstate, non-Interstate NHS, and other state highways.

Common tools that are used in the project identification/prioritization process include

- A pavement management system (PMS) that creates annual pavement condition reports and estimates of future needs in an attempt to maintain the pavement network according to specified performance goals. The PMS recommends the most cost-effective pavement surface treatments and maintenance activities.
- A congestion relief program that highlights sections of roadways where the volume/capacity ratio is greater than 0.85.
- A travel-time mobility demand measure that is being developed to rank congestion relief projects.

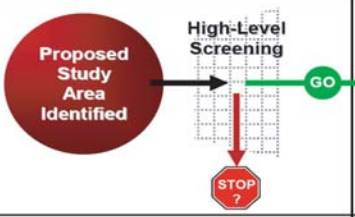
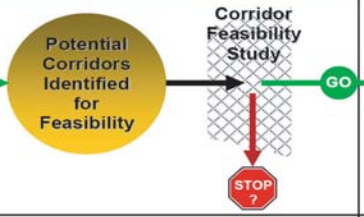
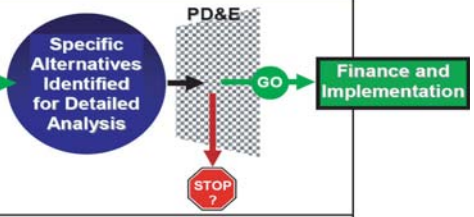
Stage	Concept	Feasibility	ETDM/PD&E
			
Study Area and Alternatives	• Broad areas (multiple counties) connecting origins and destinations • All modes, many options	• More focused portion of Study Area connecting more narrow beginning and end points • Multiple routes and modes	• Specific alignments (or segments)
Screening Criteria Based On	• Statewide mobility or connectivity need • Statewide and regional policy objectives – Growth management – Economic development – Environmental stewardship and investment	• Mobility/connectivity impacts • Compatibility with existing and envisioned land uses (emphasis on adopted regional visions) • Potential benefit to existing and future economic activities • Community and environmental "must save", avoidance, minimization, and mitigation areas • Costs, benefits, and financial options	• Detailed mobility impacts of specific alignments • Consistency with MPO and local government plans • Detailed economic impacts (regional and localized) • Impacts on social, cultural, and natural resources – Established ETDM planning and programming screens – Established PD&E process
Products	• Concept report summarizing initial findings and identifying a framework for further study if warranted	• Corridor Purpose and Need Statement • Feasibility Report – Potential viable routes/modes and proposed typical sections – Potential corridor segmentation/prioritization • Action plan for moving segments forward	• Approved environmental documents • Preferred alternative for design and engineering • Preliminary financial plan
Decision Process: Move Forward if *(typically must meet all requirements listed for each stage)*	• Statewide mobility/connectivity need is identified • Study area is consistent with 2025 FTP goals • Concept is consistent with regional vision or equivalent • Sufficient information is available to scope future stages • Sufficient support from regional and local partners to continue study	• Corridor or segment meets mobility/connectivity need • Corridor or segment is consistent with regional vision or equivalent • Initial analysis suggest that significant negative impacts can be avoided, minimized, or mitigated • Potential financing options are identified • Estimated benefits justify estimated investment of public funds • Sufficient regional and local support to move forward	• Project(s) received approved Record of Decision or equivalent • Financing of corridor improvements appears feasible

Figure A-4. Florida's Future Corridors Project screening matrix.

Source: *Florida's Future Corridors Adopted Action Plan.* Florida DOT, Central Office, December 2006, p. 17, Table 2.

Example Corridor Vision Statement, U.S. 491, Colorado

Goals

- Provide for tourist-friendly transit
- General safety improvements
- Plan for increased oil and gas production impacts to the road system
- Support economic development and maintain traffic operations
- Accommodate growth in freight transport
- Reduce fatalities, injuries, and property damage crash rate

Strategies

- Add acceleration/deceleration lanes and turn lanes
- Eliminate shoulder deficiencies and improve hot spots
- Add surface treatment/overlays
- Improve ITS traveler information, traffic management, and incident management
- Add drainage improvements
- General safety improvements
- Retain natural and cultural resources and viewsheds
- Add passing lanes where feasible
- Improve wildlife crossings

Source: *Moving Colorado, Vision for the Future, 2030 Statewide Transportation Plan.* Colorado DOT, Division of Transportation Development, Planning Section, Regional Plans, Southwest Region, US 491 Corridor.

Each DOT region undertakes public involvement activities with TPRs to identify high-priority projects at least every 2 years. These projects are screened against the corridor visions, goals, strategies, and available funds before going into the STIP. Any differences between CDOT and the TPRs are negotiated, and differences between TPRs are reviewed and resolved by a legislatively created Transportation Advisory Committee. Some funds are distributed to TPRs by DOT region.

Of special importance, CDOT has made significant efforts to link corridor planning to the STIP, particularly by combining planning and environmental analysis. Early environmental planning is done on corridors to reduce the time it takes to get a project into construction. However, this has met with mixed results, primarily having to do with endangered species. CDOT is using habitat banking as a strategy for more programmatically approaching environmental stewardship. CDOT works with Colorado's Environmental Resource Council by providing data and assisting with Resource Management Plans for corridors where future projects might be contemplated.

Virginia

Guidelines were developed by VDOT that provide a template for analyzing the corridors that were part of the statewide system. This information and analysis tools included the following information.

Analysis of Existing Corridor

The purpose of the analysis of the existing corridor is to compile information on the current state of the facility/corridor. Items that should be discussed include

- The existing facility type(s)/cross-section(s);
- The current travel demand along the facility, including the traffic volumes of passengers vehicles and trucks, and, depending on the level of analysis, bikes and/or pedestrians;

- The degree and type of freight movement (if applicable);
- A level-of-service (LOS) and capacity analysis along the existing corridor;
- A safety/crash analysis;
- Manner by which the facility fits within and connects to the rest of the transportation system; and
- Other existing non-highway modes of transportation (such as a nearby rail facility).

Needs Assessment

The purpose of the needs assessment is to develop the purpose and need for improvements along the corridor. Items discussed include

- The specific goals of the study;
- The selection of the facility as a Strategic Highway Corridor;
- The need for improvements along the facility as they relate to the corridor's function as a Strategic Highway Corridor;
- The future travel demand along the corridor (autos, trucks, and/or freight movement, and depending on the level of analysis, bikes and/or pedestrians); and
- A LOS and capacity analysis of the future travel demand.

Alternatives Development and Analysis

The purpose of this analysis is to develop and analyze alternatives that meet the goals, intent, purpose, and need of the corridor study. This task will be performed in coordination and collaboration with the key stakeholders and the general public. Depending on the purpose and need and the intent of the study, the level of effort will vary. For example, if the primary focus of the study is determining the appropriate access management techniques that should be implemented along a corridor, alternatives may be developed solely for accomplishing this goal. Likewise, if the corridor study is a Tiered Environmental Impact Statement (Tiered EIS), alternatives developed might be approximately 100 miles long and 2,000-ft wide. Alternatives include a No-Build alternative along with potentially several Build alternatives. In addition, other modes of transportation may be examined as necessary, depending on the intent of the corridor study, such as a Tiered EIS.

An analysis of each of the alternatives developed will occur to determine the best solution(s) that meet(s) the purpose and need and goals of the study. The analysis may include items such as

- Mobility benefits;
- Economic benefits;
- Environmental impacts;
- Indirect and cumulative impacts;
- Cost effectiveness benefits;
- Effects on other components in the transportation system; and
- Travel forecast (if applicable).

Indiana

As noted earlier, Indiana DOT (INDOT) has identified a tiered system of corridors based on their relative role in the state's transportation system. With respect to the planning tools that are part of the technical analysis that occurs in each corridor, the DOT has used the following models and analysis techniques:

- Statewide travel demand model and GIS that provides system-level travel demand estimates;
- Major Corridor Investment Benefit Analysis System (MCIBAS);
- Corridor travel demand modeling;
- Benefit/cost analysis frameworks applied to specific types of projects;
- Economic impact models that have focused on business attraction, business expansion, tourism, etc.;

- REMI Economic Requirements System–State Version (HERS–ST); and
- INDOT management systems (in particular results from the pavement, bridge, public transportation, intermodal, congestion and safety management systems).

Multi-jurisdictional project issues are resolved through coordination meetings among the DOT district offices, MPOs, and Regional Planning Organizations.

Identify Statewide Investment Program

This research project did not identify many cases where there have been many years of experience in this step of the SWCP approach. Thus, the following examples are limited in number, but nonetheless illustrate a few examples of how the SWCP prioritization process can occur.

Indiana

One of the significant aspects of the INDOT statewide planning process is the creation of a scoring system based on congestion relief, roadway system importance, and project priority:

- For congestion relief, a pre-set number of points are established for specific thresholds relating to AADT, volume-to-capacity ratio, and LOS improvement derived through the use of the travel demand model for future build scenarios in each corridor.
- For roadway system importance, pre-established points are assigned based on functional classification, mobility corridor classification, and NHS designation.
- To adjust for political and/or public opinion, the scoring includes a project priority index that assigns additional points depending on whether a project is already committed and on various levels of project support.

This scoring process was used to determine which projects were to be included in the 2030 Long Range Transportation Plan, based on available funds derived from funding forecasts and geographic allocations, based largely on historical funding and expenditures.

Ohio

ODOT based its previous statewide transportation plan on a macro highway corridor system that provided targeted investment opportunities on those projects that best met statewide goals. The most recent transportation plan defines a macro corridor completion as "corridor segments achieving safety, operational, and design adequacy standards" as defined below:

- Safety—adequacy is achieved when the crash rate, accidents per annual million vehicle-miles and the crash density per mile are less than 2.5 and 75, respectively.
- Operational—adequacy is achieved by a roadway traffic volume-to-capacity ratio of 0.9 or less.
- Design—adequacy is achieved by optimum lane widths, shoulder widths, curves, grades, bridge approach widths, and bridge vertical clearances as defined in the current ODOT sufficiency rating system.

The use of the macro highway corridor designation in establishing statewide priorities was also identified by ODOT in the recent transportation plan. As noted,

> Designation as a macro highway corridor means that ODOT will give priority to needed improvements in the corridor, relative to similar needs to other roads in the region. . . . However, (such) designation does not mean that every project or need in the corridor will be addressed prior to the needs on other roadways or other projects prioritized or selected based on system conditions, safety or congestion needs identified through statewide systems analysis.

The plan goes on to describe the constraints that limit total completion of the macro highway corridor plan, stating that

> While ODOT will strive to complete all macro highway corridors to meet the safety, operational, and design criteria, total 'completion' is limited by financial constraints and the need to maintain a balanced program that distributes funding to: maintenance of the existing infrastructure; safety and congestion improvements; additional capacity; and other programs.

Colorado

Four investment categories have been identified to guide funding decisions by CDOT: mobility, safety, system quality, and program delivery. Specific performance measures and objectives have been developed for each investment category, allowing the Transportation Commission and CDOT to make informed trade-offs as they decide how best to allocate limited financial resources. These categories are applied to available funding and matched to corridor needs outlined in the corridor vision statements.

Changes can be made to investment category funding allocations through a formal approval process for (1) a different purpose; (2) a different amount (generally, an increase); (3) a different mode (e.g., trading dollars from a highway project to a transit project, perhaps with a required local match); (4) retaining a project over time if the TIP allocates only a part of the total cost (with cost adjusted for inflation over time); and (5) consideration of a non-plan project that does not meet the corridor vision.

CDOT has implemented an agency-wide, integrated enterprise resource planning computer software application called SAP, pioneered by the SAP Corporation, an international software vendor. This new database package provides department-wide project/programming data and information and merges previously separate databases to create seamless integration. As part of these information modules, SAP includes all regional plan corridors and costs; reports on corridors by investment categories (mobility, safety, system quality, and program delivery); and electronically links STIP projects to a respective corridor to ensure there is money available for that corridor to implement the project.

APPENDIX B

Levels of Corridor Analysis for Statewide Corridor Planning

Once transportation corridors of significance have been identified and prioritized, various methods of corridor analysis could be used for the statewide transportation planning process. Some typical methods include the following, categorized by the following three levels of effort: overview, preliminary studies, and corridor planning studies.

Level 1—Overview

The simplest and quickest level of corridor analysis is to use and analyze available data to give a quick overview of the major state corridors. However, this method is dependent on the maintenance and/or acquisition of appropriate data so that it will be available when needed because this overview requires basic inventory and performance data of transportation facilities and systems. Review, analysis, and evaluation of the following types of data and information can help to identify problem areas and to make relative comparisons between corridors or corridor segments:

- **For highway corridors,** data and analysis could include such things as traffic volumes, level of service, crash data, pavement condition indices, adequacy ratings, and travel times. Such data and information could be derived from existing DOT databases, field reviews, regional and local agency or government input, and the use of analytical tools (e.g., travel demand models, highway capacity analysis, critical rate factors for crashes, and highway user cost-benefit analysis).
- **For dedicated transit or passenger rail corridors,** data and analysis could include such things as passenger volumes; potential headways; trip frequency, transport mode (commuter rail, light rail, busway, or people mover); vehicle passenger capacity; and calculated travel times. Such data and information could be derived from existing databases field reviews, regional and local agency or government input, and previously developed input from special surveys, agency interviews, expert interviews or panels, and the use of analytical tools (e.g., transit ridership models, cost-benefit models, and travel demand models).
- **For dedicated freight corridors,** data and analysis could include such things as freight volumes by commodity; federal and state operator/driver restrictions; delivery schedules; trip frequency, transport mode (e.g., rail, barge, or dedicated truck lanes); vehicle type and capacity; weight restrictions; off-loading transfer station locations; off-loading transfer time; and calculated travel times. Such data and information could be derived from existing databases; field reviews; regional and local agency or government input; and previously developed input from special surveys, agency interviews, expert interviews or panels, and the use of analytical tools (e.g., REMI Model, cost-benefit models, travel demand models, and commodity code information from private sectors).

Level 2—Preliminary Studies

For the initial statewide transportation planning efforts, it may not be necessary to develop a full corridor planning study for all major corridors. Instead, a time-limited, concentrated "programming study" could be undertaken for a large number of corridors simultaneously to define the problem and propose a likely solution. These preliminary studies would rely on readily available information, and they would not include extensive public involvement, agency coordination, or environmental assessments for this statewide planning level. Instead, they would be used to define transportation problems; develop preliminary project goals; evaluate existing conditions (including preliminary "red flag" environmental or community concerns); estimate future conditions; consider possible solutions to the problems; and formulate potential capital improvements, other potential strategies, and preliminary cost estimates. If desired, the study process could include an initial meeting with local officials, agencies, and/or stakeholders to help with problem definition and to get early input on project purpose and need, potential issues, project alternatives, and possible impacts.

The Kentucky Transportation Cabinet has used this approach on 44 defined "economic development" highway corridors—using two consultants to complete all of the 44 preliminary studies in about a year. The results of these studies were used as input to a project-based long-range Statewide Transportation Plan and the programming process. The studies also provided a starting point for later project development efforts.

Level 3—Corridor Planning Studies

The highest level of effort is a complete and detailed corridor planning study that would be part of, or compatible with, the NEPA process. This Guidebook and the final research report both present information on the steps that would be included as part of corridor planning efforts. Such studies may eventually be needed on all high priority corridors to ensure that all issues are properly addressed and that local officials, resource agencies, and the public have a chance to participate in the decisionmaking process

The statewide planning process should undoubtedly use input from studies that have already been completed for high-priority corridors. However, new studies are time consuming and somewhat expensive, so the depth of effort may not be feasible in the timely development of a statewide transportation plan. Instead, the statewide plan could establish policies to define study priorities and then to use them to establish schedules and to program funding for future studies on corridors of statewide or regional significance.

APPENDIX C

Analytical Tools for Corridor Analysis

Current Practice

States currently including corridor analysis in the development of statewide plans were surveyed to determine the tools being used to support planning decisions. Figure C-1 shows the tools currently in use in the sixteen states responding to this question, with some states using several of the tools listed.

Ten states reported using statewide travel models. These models produce forecast year traffic volumes, vehicle-miles traveled, vehicle-hours traveled, levels of service (LOS), and other variables needed to drive many of the evaluation measures used in comparing candidate projects. They are intensive in terms of data requirements and resources required to develop and maintain them.

Six states use GIS-based tools to overlay future development expectations on the existing transportation system and to identify corridors that can be expected to have capacity needs. Data to support such analyses are generally available from existing sources.

Several states (three to seven, depending on the tool) reported using tools originally developed to support maintenance needs analysis (i.e., pavement management and bridge condition analysis, HERS, HPMS, current LOS/traffic counting/observed traffic growth trends) to provide information (primarily traffic forecasts) to evaluate corridor needs. Data to support these tools are for the most part collected as normal operating activities of state DOTs.

A total of eight states use either project scoring or benefit/cost models to evaluate projects (e.g., Arizona uses both). Four states use a customized REMI model to estimate the economic impact of system improvements.

Several conclusions might be reached from reviewing the state responses:

- To a large extent, corridor planning seems to be oriented to find the best ways of maintaining the existing system (and/or resolving capacity deficiencies that exist now). Analytical processes seem to be oriented towards finding the best solutions to existing problems (or expected physical deterioration of the existing system).
- States have developed individual analysis tools focused on meeting their own planning needs and priorities (e.g., pavement and bridge management, safety, project scoring, GIS-based mapping, and statewide forecasting models). While a toolkit of analysis techniques might be useful, it could be difficult to provide tools that meet the needs of all states.
- States also use existing government-sponsored analysis procedures (e.g., HPMS, HERS, MOBILE 6) to develop corridor evaluation measures. These techniques are cost effective but may not provide sufficiently corridor specific or detailed evaluation measures for use as the sole basis for corridor comparison and prioritization.
- With the possible exception of statewide traffic forecasting models, none of the currently used tools deal with intermodal issues.

52 A Guidebook for Corridor-Based Statewide Transportation Planning

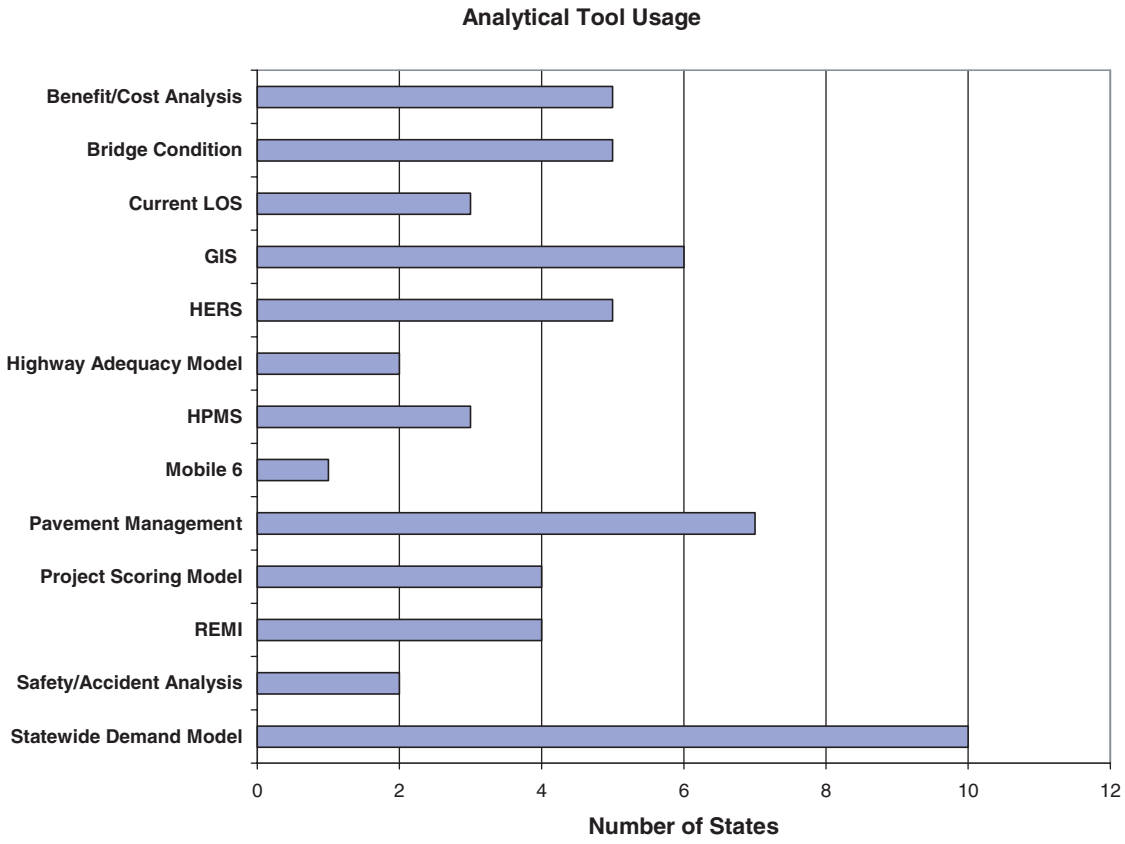


Figure C-1. Planning tools.

Potential Analytical Methods

There appear to be several areas in which standardized methods might be developed that could

- Provide corridor-specific estimates of evaluation measures useful to corridor prioritization;
- Allow better assessment of intermodal freight issues and opportunities;
- Make use of available or easily obtainable data; and
- Optimize improvement programs with respect to available resources (considering multiple funding sources and constraints).

Methods or procedures might be developed to provide the following capabilities:

- Traffic Growth Estimation—these could include such methods as
  - Simple trend-based growth-factor calculations to GIS-based procedures for estimating traffic growth (from observed values) as a function of growth in selected socio-economic indicators adjacent to or served by transportation corridors;
  - Simple procedures for developing a statewide network and passenger/freight vehicle trip tables (and growing base year demand to a future year); and
  - A summary of issues, data needs, resource costs, expected performance, and other states' experience to date with full-blown statewide travel modeling.
- Roadway Operations Analysis—these would include standardized procedures for estimating individual roadway capacity; traffic distribution by time of day; vehicle speed; delay and operating costs (by vehicle mix and congestion levels that are estimated to exist by time of day); accident occurrence; and noxious emissions.

- User Benefit Estimation—reliable procedures for estimating the benefits accrued by improvements to existing roadways including vehicle-operating costs and travel times, accident reduction, and noxious emission impacts.
- Benefit/Cost Analysis—standardized procedures for collecting, organizing, and analyzing time-series benefits and costs associated with specific transportation improvements.
- Freight Movement Analysis—using federally compiled FAF-2 and or commercially available data, develop procedures for displaying and analyzing modal freight flows across a state (along specific corridors). Provide a means of examining and/or reporting freight flows by commodity type, mode, and origin/destination city pairs.
- Investment Program Optimization—funding sources of varying amounts and restrictions on their use may be available to pay for proposed transportation system improvements. Goals for spending funds by geographic area may also be important from an equitable-distribution-of-resources perspective. Candidate projects may be proposed having different benefits, costs, and other evaluation criteria. It may be useful to develop procedures to optimize expenditures (from a project selection, timing, and/or staging standpoint) in a way that will fully expend available resources, maximize user defined benefits, and meet other political and/or geographic constraints that may exist.

Figure C-2 illustrates options that are available to states for conducting some level of corridor analysis. As shown, decision opportunities are offered to apply different strategies for analysis based on the presence or absence of

- Multimodal options,
- A statewide travel demand model, or
- Limited resources.

The chart is followed by a description and discussion of some of the analysis tools.

Statewide Models

Statewide travel-demand models are the most frequently used tool for corridor study applications. While the survey only reported 10 states using statewide models, *NCHRP Synthesis of Highway Practice 358: Statewide Travel Forecasting Models* reported that 26 states have developed a statewide model and that corridor studies are the most common application of this tool. Since this 2006 report was issued, several other states have begun developing this valuable tool.

If a state has developed a statewide model, then traditional traffic forecasting and assignment procedures can be used to generate the various evaluation measures needed to estimate user and development benefits. If freight movements are included in the statewide model, then multi-modal analyses can be undertaken. These would include potential diversion between rail and highway modes and throughput assessment at intermodal terminals. Statewide models can be developed at varying levels of detail and complexity. However, even the simpler models (e.g., those using matrix estimation to generate base year road trip tables and FRATAR growth-factoring procedures) can be expected to provide reasonable relative performance measures for competing alternatives.

The process of adding freight movements to a statewide highway-based private vehicle (or total vehicle) model does not need to be a hugely expensive undertaking. County-to-county flow data (for both base and future years) are available through private vendors (e.g., Transearch) and public sources (e.g., FAF-2). These flows can be converted to trip tables and assigned (as separate "vehicle classes") to the road network (and to the rail network, if one has been coded).

Statewide model accuracy in a given corridor can be enhanced by focused data collection programs. For example, travelers might be surveyed on existing roads in the corridor. Survey

54 A Guidebook for Corridor-Based Statewide Transportation Planning

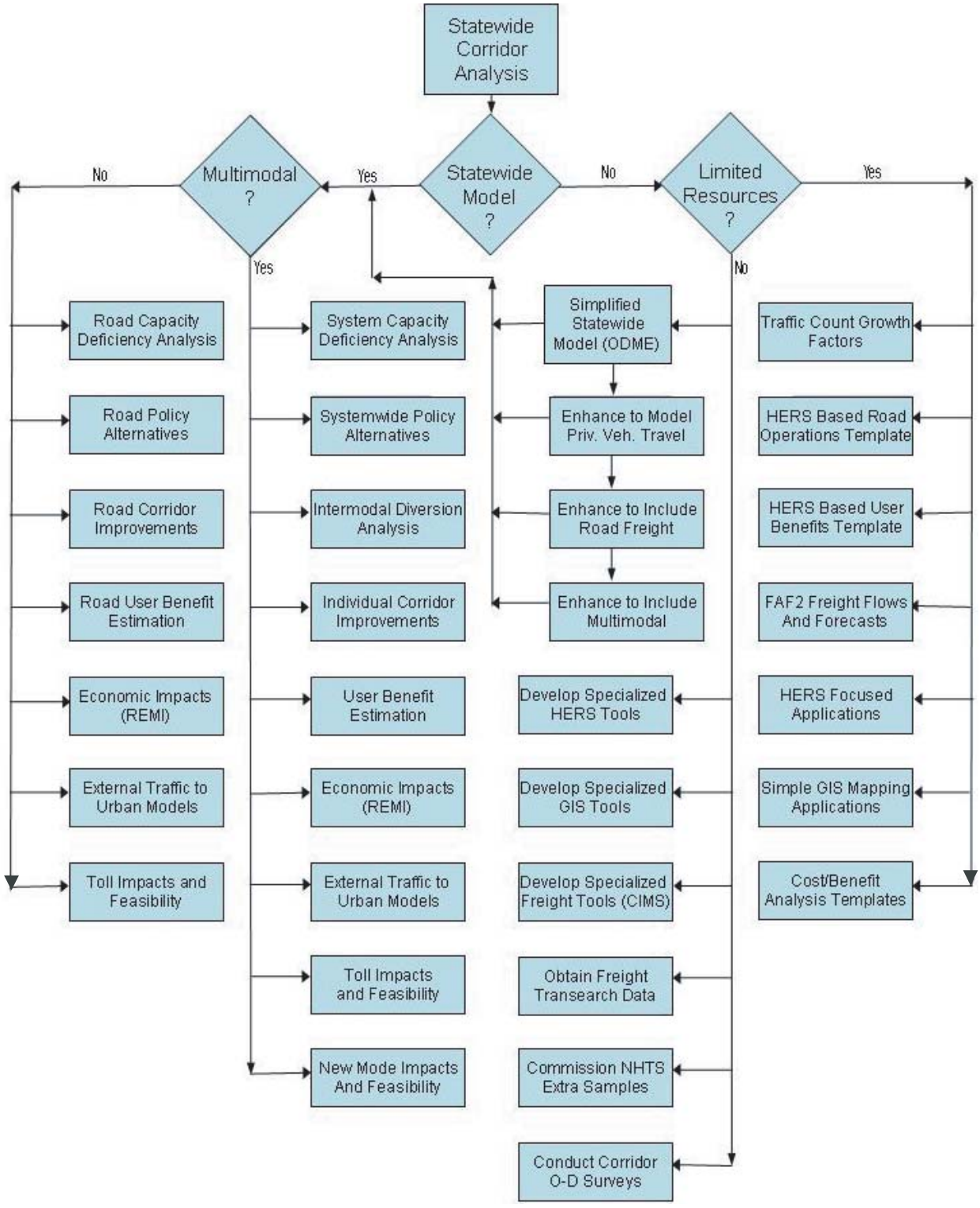


Figure C-2. Corridor analysis options.

data could be expanded and used to replace portions of the model estimated base year trip table. These trips could then be grown to a future year using existing model procedures. Having an actual representation of origin-destination movement magnitudes would improve both base and forecast year analyses.

States may also arrange for add-on samples to the U.S. Bureau of Census National Household Travel Survey (NHTS). These can be focused geographically to provide additional detail within a given area. The opportunity to collect this data comes at roughly 5-year intervals.

Statewide models also provide planners with at least two other analysis tools:

1. The statewide trip tables can be used to estimate external travel at urban model area boundaries (or at least provide another estimate for comparison to existing external traffic estimation procedures) and
2. The models also provide the framework for determining the impact of tolls or other user fees and for examining the feasibility of new transportation modes (e.g., providing intercity passenger rail service) within a corridor.

Alternatives to Statewide Modeling

Many states do not currently have a statewide traffic forecasting model due to financial considerations and/or concerns about its utility and/or accuracy. However, there are also analytical techniques that may be employed to evaluate alternative single corridor improvements or compare corridor-versus-corridor improvements.

Traffic growth estimation often is accomplished as a simple trend extrapolation from prior counts. More sophisticated procedures are sometimes used to provide additional sensitivity to adjacent area development and regional growth expectations.

The combination of HPMS data and HERS analytical software provides a means of conducting several performance analyses on a state's road system. These may include

- Traffic growth and roadway LOS,
- Pavement deterioration impacts and maintenance cost estimation,
- Improvement cost estimation,
- User benefit estimation,
- Roadway deficiency analysis, and
- Benefit/cost ratio estimation and ranking.

The HERS user may also conduct analyses focused on particular corridors or regions. This may be accomplished by selecting portions of the HPMS data base for inclusion. HPMS traffic growth estimates may be supplemented with truck movement data from FAF-2. Base and forecast flows of heavy trucks are available along individual roadways. These may be used to identify corridors of large truck traffic growth that may need capacity increases, require additional maintenance, or identify opportunities for modal diversion.

Relatively simple GIS applications may also be used: first, to organize and display development data (e.g., population and employment, major industrial developments, major tourist areas, or intermodal transfer facilities) superimposed on the corridor, regional, or statewide transportation system and second, to identify areas underserved by multi-lane, high-quality roadways or alternative modes. If underserved areas are forecast to have large existing development densities or growth in development, corridor improvements may be warranted.

In the 1980s, FHWA developed a planning tool called the Highway Investment Analysis Package (HIAP). The system was a FORTRAN–based series of mainframe computer programs that might

be considered quite primitive given today's computer/user interaction possibilities. However, the system contained components dealing with most of the above analysis needs (i.e., traffic growth, roadway operations, benefit estimation, benefit/cost analysis and investment program optimization). The underlying procedures used in HIAP might be used to form the basis for a new group of analysis tools, as set out above.

Transit Models

A number of mode-choice models have been developed for transit planning purposes, particularly in major urbanized areas. Such models are usually relatively expensive, largely due to the high costs of data collection and the time and effort for model validation. There are no national sources of location-specific transit data, so all data has to be gathered locally—for example, origin-destination data gathered by onboard surveys of existing transit riders. However, there are some relatively low-cost planning tools available that utilize readily available data.

Emerging Tool: National Travel-Demand Model

Scoping work has begun on a national model under the auspices of NCHRP Project 8-36/Task 70, "Scoping Study for Statewide Travel Forecasting National Model." The objective of this research is to carry out a scoping study to estimate potential usefulness, scope, purposes, costs, and administration of a national travel-forecasting model that can assist states in estimating external trips. Although just the first phase of this study is underway, the national model will be very useful in providing uniform traffic flows from state to state as well as provide a large building block for developing a statewide model. States opting to forego a statewide model can still use the national model as a sketch planning tool with an available network and traffic flows that have gone through a quality-assurance process. Ideally, this tool will incorporate freight flows so that it can be used for multi-modal analysis.

APPENDIX D

Public Transit in Statewide Corridor Planning

Transit can be considered as part of the statewide planning process on a statewide, regional, or local corridor basis and in conjunction with existing public transportation systems and operations. The potential benefits of transit service in a corridor can range from "nothing" to being the most important or the only option for adding person capacity to the corridor.

Transit in the corridor sense is any mode that allows for high-occupancy vehicles that are not private automobiles. This would range, therefore, from vanpools to mass transit rail systems. Generally the modes (or technologies) fall into the categories of

- Rail (heavy-rail rapid transit or HRT);
- Automated guideway transit (AGT) such as monorail or maglev;
- Light rail transit (LRT) and commuter rail transit (CMT); or
- Bus, including local, express, and bus rapid transit (BRT).

Each of these also falls into one of three categories for the location and operation of the service:

- Exclusive transitway, including rail, bus-only lanes, bus use of shoulders, high-occupancy-vehicle lanes (HOV) or high-occupancy toll lanes (HOT);
- Shared use (shared roadways with other vehicles, such as bus or LRT); or
- Mixed use (a combination of exclusive and shared use segments).

Needs Analysis

Determining the potential need for and role of transit in a corridor can require several steps that ultimately may lead to conducting an Alternatives Analysis as outlined by FTA. The first step is to determine whether transit can play a role in addressing corridor needs. Questions that could help to determine this include

- Is there existing transit service in or near the corridor?
- Do the corridor demographics (population density, race, gender, income, and automobile ownership) identify potential opportunities for transit usage (transit propensity)?

The first question is fairly straightforward but is often overlooked. It is important to consider the potential benefits to the corridor by enhancing or expanding transit capacity or by providing connections to existing transit facilities. The second question can be evaluated using various methodologies, including those described in the following:

- *TCRP Report 100: Transit Capacity and Quality of Service Manual* (2003) or *TCRP Web Document 6: Transit Capacity and Quality of Service Manual* (1999);
- *TCRP Report 28: Transit Markets of the Future: The Challenge for Change* (1998); and
- *TCRP Report 27: Building Transit Ridership: An Exploration of Transit's Market Share and the Public Policies that Influence It* (1997).

If one or both of these questions are answered in the positive, then more detailed analysis of transit opportunities should be included in the next level of corridor analysis. This analysis also offers additional information that can be added to the project purpose and need such as providing mobility for environmental justice populations, providing commuter service in high-density areas, and meeting the needs of other special communities identified as part of this evaluation.

Alternatives Development and Evaluation

The next step would be to include transit alternatives in the initial development of corridor alternatives that address project purpose and need. This could begin with the development of Transportation System Management (TSM) alternatives. TSM alternatives could include such initiatives as park-and-ride facilities; transit hubs; optimal bus-stop locations (near-side/far side); service branding; next bus information; traffic-signal priority; and other strategies identified during the corridor study. For example, the location of bus stops and shelters should also be considered as part of this analysis as the ability of the bus to work in concert with the traffic will help improve traffic flow and optimize the capacity that is already there.

Additional major facility and system alternatives should also be considered for a corridor such as express bus service, BRT, and other exclusive guideway options (i.e., HRT, AGT, and LRT). Using traffic volumes, congestion levels, available right-of-way, and population density, some of these alternatives may be eliminated early in the screening process, while others may proceed further through the process and receive an equal level of detail as any other alternative. This analysis may conclude that new or enhanced transit alone may not be the primary solution to congestion problems, but it may be a contributor to the ultimate solution. Transit may also provide mobility choice and access that is not otherwise available for transit-dependent populations.

If transit continues to be a viable alternative through initial screening, the integration of FTA's Alternatives Analysis (AA) methodology should be considered. This process includes criteria for measuring the success (or lack of success) of a particular transit alternative. This methodology includes a review of the capital and operating costs, ridership, and impacts on the remaining roadway network. While the full AA package of analysis may not be performed, one of the elements is the use of a travel-demand model not only to determine the ridership and air-quality benefits, but also to calculate the potential user benefits for each alternative. Analytical tools are available to assist with this analysis, such as the Transit Route Optimization Tool described in Appendix C.

Evaluating transit as part of existing corridor optimization can also provide benefits to both the transit operator and the existing and future traffic using the facility. To truly understand proposed transit improvements requires a more-detailed look at operations including buses, bicycles, and pedestrians. This may provide additional insight for DOT planners and a public transit provider to recognize previously unidentified operational problems and to formulate more effective ways of addressing those problems.

Incorporating Public Transit into the Statewide Corridor Planning Process

Ultimately, if transit initiatives, strategies, or improvements are chosen for a corridor, the proposed improvements must be incorporated into the state's prioritization process and the costs must be financial planning efforts. At this point, most state DOTs face a major challenge in identifying funding for the implementation of proposed transit solutions.

To address properly the potential transit alternatives for statewide corridors of significance, it is important to actively engage and involve transit interests in the statewide corridor planning

process to help identify needs and provide input on potential solutions for local, regional, and intercity transit service. For some states, this has been very successful. However, in other states, involving transit interests in the statewide planning process has proven to be a challenge.

In many states, most transit systems are local, not intercity or statewide, so planning efforts are seen as the responsibility of a local or regional planning agency such as an MPO, not of the state DOT. Also, the statewide planning process for many DOTs primary focus is transportation needs for the state highway system. Therefore, transit providers feel that they are wasting their time because the DOT will not seriously consider their input for non-highway solutions or because the DOT planning efforts are related to highways and, therefore, are not relevant to transit operations.

From a statewide transportation policy perspective, however, the most important step for a state transportation agency is to make a strong commitment to seriously consider public transit as a legitimate alternative by identifying selected corridors where transit may be appropriate and viable. While this may necessitate a culture change for some, DOTs must send a clear message by words and action that they are open and interested in proactive input and participation from the public transit community.

APPENDIX E

Freight Transportation in Statewide Corridor Planning

Freight transportation has significant impacts on the nation's transportation system, not only in terms of capacity, but also in terms of operations and maintenance. These impacts generate direct travel time, operations, reliability, accessibility, or safety benefits or costs to those carriers. The ultimate impact of freight transportation operations is on business productivity, which directly impacts profitability and consumer prices. Freight transportation demand also impacts society as a whole through its environmental and safety impacts.

The demand on the U.S. freight transportation system has been increasing, and this trend is anticipated to continue. By 2035, freight tonnage is expected to almost double, with domestic shipments growing somewhat slower than international shipments. The need to manage the demand on the U.S. freight transportation system and to monitor the volume of freight handled by each mode is and will remain crucial.

Over the past several decades, there have been a growing interest and understanding among federal, state, and local governments regarding the impact of freight movements on the nation's transportation system and economic competitiveness. Due to a myriad of issues and barriers, state and local transportation agencies have struggled to identify, incorporate, and implement freight-supportive projects into their planning and programs.

Federal Freight Planning Requirements

Passed in 2005, SAFETEA-LU is the federal legislation that authorizes the federal surface transportation programs for highways, highway safety, and transit for the 5-year period from 2005 to 2009. SAFETEA-LU significantly expanded the consideration of freight by local, state, and federal transportation planning agencies by including freight issues in existing programs and establishing new sections specifically related to freight.

Of special note, federal planning requirements for state DOTs and MPOs were expanded to explicitly include freight considerations. Specifically, Section 6001 was modified to require that decisionmakers consider whether an improvement would enhance economic vitality (especially by enabling global competitiveness), productivity, and efficiency; increase mobility for people and freight; and enhance the integration and connectivity of the transportation system for both people and freight. Section 6001 also directs agencies to expand participation by interested parties in the planning process to include freight shippers and providers of freight transportation services.

Several new provisions related to freight were also added in SAFETEA-LU including the following:

- Section 1306: Freight Intermodal Distribution Pilot Grant Program;
- Section 1305: Truck Parking Facilities;

- Section 5204: Training and Education, including the Freight Planning and Capacity Building Program; and
- Section 5209: National Cooperative Freight Transportation Research Program (NCFTRP).

Integrating Freight into the Transportation Planning Process

Freight planning should reflect similar planning processes to those exercised for other modes of transportation, including

- Setting statewide and corridor goals and objectives by working with private- and public-sector freight stakeholders;
- Conducting technical analysis of existing and future freight mobility and freight needs;
- Identifying and evaluating potential alternatives to select solutions and approaches, including policies, projects, programs, system management strategies, funding options, and implementation plans;
- Prioritizing and programming projects and strategies; and
- Measuring performance to evaluate how well the plan is doing in regards to meeting the stated goals and objectives.

Even though freight planning involves similar steps, freight transportation does have unique attributes as compared with passenger travel. Freight planning requires a few new and different tactics to complete the traditional steps involved in transportation planning. The following sections will focus on four elements of freight planning that can be incorporated into the SWCP process: engaging the private sector in freight planning, collecting freight data, analyzing and forecasting freight data, and measuring performance relative to freight goals and objectives.

Engaging the Private Sector in Freight Planning

Most planning agencies have developed guidelines for the public involvement process, but traditional public involvement techniques often hold little relevance for the goods movement elements of a transportation plan. To date, techniques for public involvement have had limited success at gaining freight stakeholder involvement; yet, the freight community relies on the transportation system to access raw materials, bring goods to market, and gain access to workers. Therefore, their participation and input are crucial to addressing freight transportation issues in the SWCP process.

Many public agencies that have engaged the private sector in the transportation planning process have realized a number of ancillary benefits, including the following:

- **Mutual understanding:** All organizations, both public and private, must plan for the future. For public-sector transportation planning organizations, this includes planning for future demand on the transportation system. However, there is a mismatch between public- and private-sector planning that often impedes cooperation. This mismatch arises due to different planning horizons and a general lack of understanding of each other's planning processes. By engaging the private sector, public-sector planners gain insight into private-sector needs that can be addressed in the planning process and vice versa.
- **Political and public support:** In many cities and states, the business community has become involved in lobbying decisionmakers on the need for higher levels of investment for transportation, as well as specific corridor or project improvements. Engaging the private-sector freight community facilitates their understanding of the funding process and may potentially lead to increased support for agency activities.

- **Data and information:** Some private-sector companies may have concerns about government oversight, but there are also many examples of companies who have shared operating information, especially when they believe the information will ultimately be used to resolve issues and problems that will help them be more efficient.

There are a wide variety of private-sector freight stakeholders. Some of the most important categories include

- **Freight shippers and receivers:** These businesses and industries are concerned about the condition and performance of the local transportation system. Also, many that handle goods in national and international markets are also concerned with how well state and regional networks link to national and international gateways.
- **Freight transportation service providers:** This includes both carriers (such as trucking, airlines, and railroads) and logistics providers (who are often brokers between shippers and carriers).
- **Owners and operators of freight facilities:** These can be private (e.g., railroads) or quasi-public (e.g., airports and port authorities).
- **Private developers:** This includes developers who focus on freight-intensive development such as industrial parks, warehousing and distribution centers, and integrated logistics parks.

There are varying levels of engagement for private-sector freight participants in the SWCP process, ranging from information exchange to policy guidance to programmatic input, described as follows:

- Information exchange represents the most basic level of engagement and can range from simply being informed about business operations to data exchange.
- If private-sector engagement is viewed as a continuum of practice, policy guidance is probably the next logical step. Private-sector engagement for policy guidance typically requires specific, discrete activities designed to gather input from private sector stakeholders.
- Programmatic input may be viewed as the most advanced level of private-sector engagement. In general, interaction between the public and private sector is undertaken through an established process that seeks to provide businesses with meaningful input to project investment and selection criteria.

Collecting Freight Data

In broad terms, gathering freight data entails capturing freight traffic volumes in three dimensions: the points where freight begins, ends, and is handled; the directions and means by which freight flows; and the routes that freight follows.

Point volumes are the traffic that enters into and exits out of an "address location," such as a plant or port. The address is a business or institution that can be classified by industrial type, and the business may be contacted for further information. An establishment is typically surveyed to obtain inbound and outbound volumes and a summary picture of freight movements, including time-of-day and day-of-week patterns; types of equipment used; and important travel routes. A common use of point volume data is as an input to travel-demand modeling.

Freight flow data represent traffic moving between locations and the modes used. The beginning and ending locations may be specific origin and destination points, but typically these are assigned to zones. Examples of zone types include zip codes, traffic analysis zones, counties, metro markets, or larger geographic regions. Typical examples of freight flow data include the U.S. Census Commodity Flow Survey, the U.S. DOT's Freight Analysis Framework (FAF) data, or commercial sources. In addition to origin and destination, additional attributes of flow data may include industry (or commodity), mode, and route. This information is important for many purposes, such as travel-demand modeling, evaluating adequacy of truck parking, designating priority freight facilities, and providing insight into the operational requirements of specific transportation

facilities. Freight flow data may also be used to provide information on trip staging, trip form, and time profiles—all useful for freight-demand modeling. Both flow and point-volume data capture industry activities. Flow data typically provide better insight on mode, equipment, and route.

Route volumes, or the traffic borne by a segment of infrastructure, are the third category of freight data. These data normally are obtained by various forms of direct observation. The best recognized example is highway traffic count data. Route volumes can provide good information temporality if the counts are continuous, and it can also provide indications about the type of equipment used.

In addition to the secondary data sources, there are a variety of methods for collecting primary freight data, including origin-destination surveys, traffic counts, stakeholder interviews, focus groups, and field observations. A common issue with primary data collection is getting enough of it. A common solution is to use public and commercial data sets to establish the universe, and then fill in particulars with local work. For example, one may acquire secondary data sets to cover external trips and perform surveys for more information concerning the internal trips. Highway traffic counts can range from temporary tube counts to pulling information from permanent weigh-in-motion or toll stations. One use of traffic counts for freight planning is to position tube counters inside industrial parks, with the objective of estimating traffic generation.

Again, engaging the private-sector freight stakeholders is crucial for freight planning. Stakeholders can be surveyed by mail, by phone, and by web. Intercept surveys are another method in which field interviews are conducted face-to-face with stakeholders. These surveys are relatively expensive but can be highly productive because they reveal systematic and strategic issues, as well as traffic and route information. The target should be a cross section of the regional economy and the carrier community.

Frequently in freight planning, when data is insufficient, a good alternative is some kind of expert system. This can be as simple as seeking the advice of seasoned industry professionals or consulting a Freight Advisory Council within a local organization or formed especially for the planning process. Professionals with local freight expertise can provide helpful rules of thumb, such as "the average payload for a 53-ft dry van is about 30,000 lbs." Another practical step is for planners to simply go out in the field and look at things—there is no substitute for observation, and no better way of getting grounded in the issues.

In practice, freight planning is done using a combination of information sources, including mixtures of data. A combined approach covers multiple facets of an issue and can result in one kind of information shoring up or reinforcing another.

Freight Forecasting and Analysis

Three commonplace and important uses for freight data include demand forecasting, planning models, and performance measurement. Freight investments have long lives and should anticipate future conditions. Even operational adjustments should be forward-looking. Forecasting techniques range from the simple to the sophisticated. Forecasts are typically applied to a base-year data profile, but it is important to remember that freight activity derives from market activity. This implies that demographic projections that may suffice for passenger travel will not be adequate (although they are not irrelevant). The most common freight demand forecasting methods are summarized below.

- **Trend projection** is a simple method that can be applied to forecast freight demand. A common application is traffic trends at facilities like terminals and airports. Economic drivers take that one step further to future projections of elements like employment levels, which in turn will influence traffic levels.
- **Input cost factors** are crucial to forecasting demand for freight transportation. Fuel and labor are two major costs, and both are rising. They affect mode choice, and ultimately they can affect the design of supply chains.

- As **foreign trade** approaches one-quarter of United States' GDP, it has become a very important factor for freight projection—and by no means just at the coasts and borders. Still, it is essential to project foreign trade by trading partner to know which ports and gateways will be affected and, therefore, which infrastructure improvements will be necessary. However, foreign trade projection can be quite complex, relying upon econometric forecasting to combine and allow for the interplay of multiple factors. These econometric models account for input costs, foreign trade and trade barriers, industrial mix and competition, and, in some cases, freight traffic trends. These models capture the dynamics of markets and geographic shifts, although usually not regional land-use trends.
- Last, **local considerations** obviously matter. If a major freight generator (such as an auto plant) is expected to open or close, this information should be accounted for in the demand forecast.

Freight modeling is another important use of freight data to help portray, understand, and anticipate the major elements of the freight system: markets, infrastructure, and operations. Furthermore, a number of additional techniques that were developed for business purposes can also help with public planning. Typically, these techniques are applied as sub-models within a traditional four-step travel demand modeling framework. Examples of these sub-models include the following:

1. **Business demographic and trade models** can supplement and extend point- and flow-volume data. Diversion models utilize total logistics cost, market shares, or stated preferences. Dispatch routing models can be used alongside assignment processes to capture the effects of tolls or congestion.
2. **Market segmentation approaches** are being developed to adapt a four-step understanding to supply chain relationships. Freight markets can be broken down into major components, each of which will have characteristic distribution methods. Staging and modal patterns can be depicted as a supply chain. Data will be generally available in segments such as manufacturing, and modeling will be more necessary in segments such as local distribution.
3. **Capacity models** have become more important as capacity is further constrained. Highway capacity–constrained models are the most familiar to transportation planners, but there are models for rail and port capacity as well. These types of models need a lot of data when the relationships portrayed are very complex.
4. **Modal cost models** are also useful as inputs to other assessments. Diversion modeling between modes or between ports or terminals is essentially competitive analysis, and costs are a principal determinant of competitive position. Tolls have a greater effect when they are a material component of total cost. Similarly, as expense trends for inputs like fuel become worrisome, understanding their contribution to the total cost structure becomes crucial.

Incorporating Freight Transportation into Planning and Programming

In addition to data collection and modeling, freight should be integrated into the project selection and prioritization process. Any project that enhances freight mobility will also enhance passenger mobility, just as any deficiency that impairs freight movement will have also have an impact on passenger mobility. Therefore, projects and other recommendations should be evaluated and prioritized based on their impact on freight mobility.

Prioritization criteria can be applicable to a variety of planning activities undertaken by any agency. Examples include those for corridor planning, statewide and regional long-range planning, and transportation improvement programs. Therefore, the prioritization criteria should be flexible and adaptable so that variations of the criteria can be used for alternative applications. The level of detail and specificity will vary across the different planning applications, but the overall goals and objectives generally remain the same.

APPENDIX F

Economic Development in Statewide Corridor Planning

Transportation Investment and the Economy

Transportation is the backbone of the economy—it connects markets and provides for the movement of people and goods. Maintaining and increasing the level of service of the transportation system through the efficient and intelligent investment of transportation capital is necessary to retain existing businesses and attract new ones. As shown in Figure F-1, investments that lead to efficiency gains (i.e., reduced travel times and costs) lower business costs and increase market access. This gives rise to productivity gains, which enhance economic competitiveness.

In today's business environment, cost-effective and time-sensitive multimodal transportation services have increasingly become part of the competitive advantage in manufacturing and service-oriented industries. A state's transportation system includes highway, rail, transit bus, intercity passenger rail and bus, airports, and potentially water ports and international border crossings. They all provide crucial transportation services to residents and businesses.

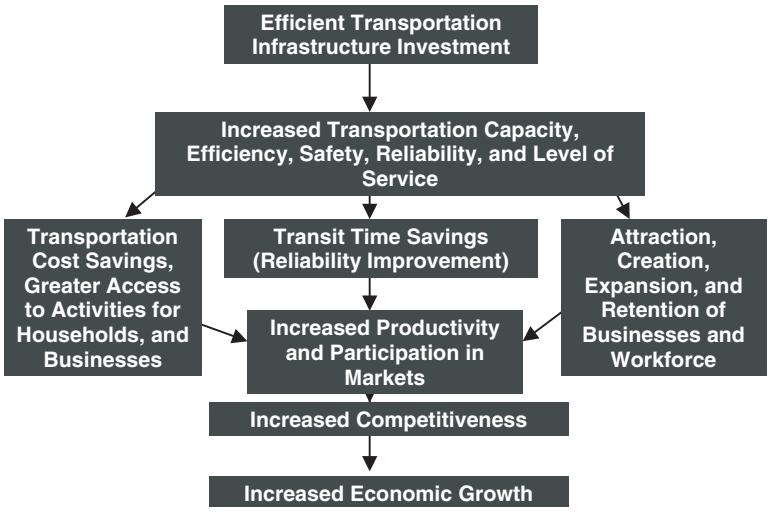
Measuring Economic Impacts of Transportation Investments

The purpose of economic impact analysis is to study economic trends and the impacts of a state's transportation system on the state economy. The analysis should also identify any gaps in the transportation infrastructure that may be adversely affecting the state's economy and provide a context for understanding key changes and decisions in the transportation system with respect to the state's economy.

The economic impact analysis will conceptually identify key elements of the transportation system from an economic perspective and estimate the comparative impacts of different improvement scenarios. A model might consist of the following:

- Defining the study regions,
- Analyzing transportation system impacts on the state's economy,
- Identifying strategic corridors and facilities,
- Analyzing comparative advantages and challenges,
- Identifying gaps in the transportation system,
- Analyzing mode and freight movements,
- Evaluating alternatives, and
- Identifying technical linkages between modes.

66 A Guidebook for Corridor-Based Statewide Transportation Planning



Source: Adapted from FHWA Office of Freight Management and Operations, 2004.

Figure F-1. Transportation and the economy.

Defining Study Regions

For the purposes of economic impact analysis, a state should be divided into distinctive analysis regions based on both geographic and economic considerations. Dissecting the state into "regions" will facilitate the analysis and presentation of different regional and inter-regional dynamics that may be affected by transportation system development.

Analyzing Current Transportation Impacts on the Economy

The initial overview of the economic significance of the transportation system should provide context for the subsequent assessment of impacts of different future investment scenarios and should support intuitive interpretation of the overall economic outlook from a transportation perspective. This element of the economic analysis will include the following three sub-elements:

1. **Economic and demographic trends and outlook:** a synopsis of trends in employment, population, personal income and tax revenues for a state with respect to the United States as a whole.
2. **Defining key supply chains:** a brief assessment of the state's industrial base and an examination of the supply chains necessary to the economic competitiveness of these key industries. Understanding the multimodal global supply chains of key industries within the state will provide insight into the private-sector system needs and requirements.
3. **Transportation and travel demand:** mapping trends in population and industry employment in a GIS environment, using available economic forecasts, as well as future no-build travel demand forecasts to pinpoint emerging sources of personal and commercial transportation demand throughout the state.

Identifying Strategic Economic Corridors and Multimodal Facilities

The next step involves extracting trip and commodity flow distribution patterns from the statewide traffic model (or other source) and information regarding key supply chains. This will

help identify major trade flows and workforce commuting patterns not only within the state, but also between state trade centers and the remainder of the United States. For U.S. border states, this also includes patterns between the state and international trading partners. When mapped in conjunction with the location of major transportation corridors, intermodal facilities, and employment centers, these flows will highlight key corridors and facilities of strategic significance to the state's economy.

Analyzing Comparative Advantages and Challenges

Information assembled from the above economic sub-tasks will provide a basis for comparing trends, industry supply chains and economic transportation needs among the state's regions and between the state and points outside the state. These comparisons will form the basis for identifying the state's regional and statewide economic strengths, weaknesses, threats, and opportunities (SWOT) from a transportation perspective. The SWOT evaluation will be an important tool for understanding how economic changes are leading to decisions by major participants in addressing the emerging role of the state's transportation system in relation to the overall economic competitiveness of the state.

Identifying Gaps in the Transportation System

From the SWOT evaluation, key emerging weaknesses associated with a state's changing economic needs will become evident. This information could be useful as an input for the stakeholder involvement process and for the overall needs and performance assessment of the overall plan-development process.

Analyzing Mode and Freight Movements

Using freight/commodity flow data and models, the comparative tonnage and value of freight moving into, out of, and through a state by mode can be estimated. The tonnage and value of top commodities and origin and destination (O-D) pairs for each mode should be identified and quantified in this process, along with changes in tonnage and value by mode forecast through the time horizon of the study. These movements will then provide insight into the context of key changes, decisions, and participants pertaining to intermodal and multimodal freight transportation needs in a state.

Evaluation of Alternatives

Using economic analysis, the economic impacts of corridor improvement scenarios can be evaluated. Each scenario should be compared against a baseline (no-build) economic forecast. Economic impacts will be derived by comparing anticipated levels of earnings, output, and employment for the state and its respective economic analysis regions under each scenario against anticipated conditions under a no-build baseline.

Using the comparative congested VMT and VHT estimates from the scenarios, a regional economic model will be used to estimate economic impacts. The economic analysis will yield future estimates of earnings, output, and employment under each of the four scenarios in comparison to a "no-build" baseline scenario. This information can then be used to identify which of the improvement scenarios will yield the greatest benefits. Figure F-2 demonstrates the basic economic analysis approach linking VMT and VHT estimates of the scenarios to the economic impact analysis methodology.

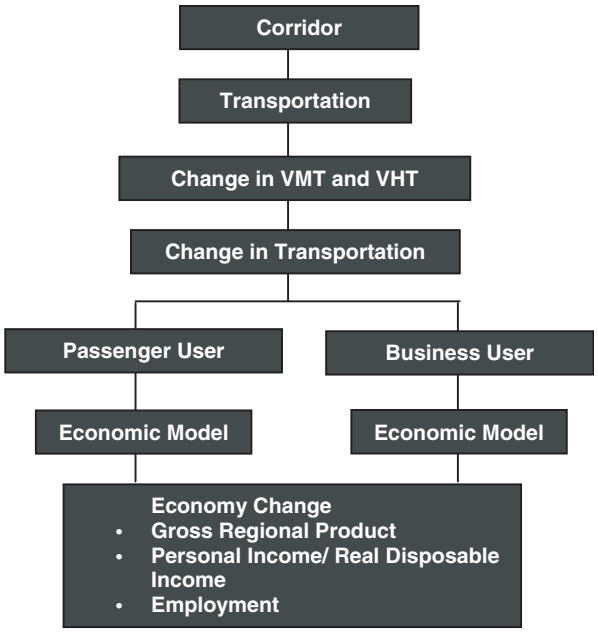


Figure F-2. Modeling economic impacts of transportation investments.

Abbreviations and acronyms used without definitions in TRB publications:

AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	Air Transport Association
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation