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# **1.0 Introduction**

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## ■ 1.1 Purpose and Audience for the Guidebook

This guidebook is intended to assist transportation planners and others in conducting a variety of different types of analyses involving freight demand. These include analyses to support any type of decision-making situation for which changes in demand for freight transportation are a potentially significant issue. Changes in freight demand might include any of the following:

- Forecasts of increases or decreases in flows over time as a result of economic growth, changes in the economy, or changes in the transport system;
- Diversion of flows to new or expanded facilities;
- Diversion of flows among modes due to regulatory actions, pricing policy, capacity changes, or changes in service level; and
- Analyses of future scenarios.

The guidebook is intended to be used as a reference document by transportation planners, economists, and other analysts. It provides examples of these types of analyses from actual planning studies, all of which have been selected as illustrations of good planning practice. Frequent references are provided to other documents for more detailed information on procedures and data sources.

## ■ 1.2 The Need for Greater Attention to Freight Transportation Demand

This guidebook has been prepared in response to the rapidly growing need for freight transportation planning in the public sector and in various types of public-private initiatives. It fills a large void because very little material is available in existing documents designed to provide guidance for freight transportation planning.

One of the main reasons for the growing need for guidelines in this field is the new planning and monitoring system requirements of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. This legislation instituted entirely new requirements for both comprehensive statewide transportation planning processes and metropolitan area transportation planning processes to address issues relating to freight and intermodal transportation. Moreover, these planning requirements have been made more relevant for real decision-making because adopted plans and Transportation Improvement Programs (TIPs) now are required to be financially feasible, rather than the "wish lists" that were routinely adopted without the need for serious choices in many previous planning processes.

These new ISTEA requirements reflect not only an effort to reduce or eliminate shortcomings from previous planning programs, but also a recognition that freight and intermodal transportation are growing rapidly and becoming a more important part of metropolitan, state, national, and world economies. International trade is an ever-increasing proportion of the national economy, and most of this trade involves changes in mode of transportation between the domestic and international legs of shipments. The increasing flows of freight through terminals, their access facilities, and many of the line-haul facilities are creating congestion, time delays, expansion needs, and a variety of other challenges to old, single-mode operating systems.

Thus, this guidebook attempts to respond to planning needs that will be increasingly important in the future – and not merely just a response to new federal mandates.

### ■ 1.3 Scope of this NCHRP Project and Its Products

The objective of the current research has been to examine the changing character and composition of U.S. freight transportation demand across all modes and to develop a process to effectively forecast future demand. This involves macro-level analyses over time of the characteristics of freight transportation demand and its changes, the key economic, technological, political, and social factors that contribute to those changes, and the interaction effects between freight transportation demand and system supply. Information compiled in this project to characterize freight transportation demand and its changes over time is expected to: (a) serve other research in this area; and (b) provide the basis for developing a freight transportation demand forecasting process. The research products will primarily serve public decision-makers, but they may be useful to the private sector.

## ■ 1.4 Organization of this Report

The remainder of the body of this report contains four chapters that provide guidance for freight demand analyses and forecasts in four different contexts, each of which places quite different types of requirements on the analysis.

Chapter 2 deals with freight transportation demand forecasting for existing facilities. This type of work tends to focus on forecasting of trends, potential changes in past trends, analysis of capacity constraints and expansion requirements to meet projected demand. Sections of this chapter describe various techniques and sources to use when making forecasts in this context. One section of Chapter 2 describes techniques for analyzing alternative futures, which is a topic that has potential applicability in each of the other three contexts/chapters.

Chapter 3 deals with demand forecasting for new facilities. This type of work tends to focus on predicting diversion from other routes and other modes of transportation and analysis of changes in flows through networks. Very different techniques are required compared with those described in Chapter 2.

Chapter 4 deals with policy analysis. This type of work tends to require very different procedures for different types of policy issues. Therefore, this chapter emphasizes a structured approach for defining, analyzing, and evaluating issues in a systematic manner to assure that all critical factors are given appropriate attention. Although the evaluation processes are likely to vary widely depending on the policy options being analyzed, changes in freight demand are almost always important considerations in the evaluation process because many impacts of importance are directly affected by changes in demand (e.g., revenues and environmental impacts).

Chapter 5 deals with strategic planning for freight transportation. Since relatively few examples of this type of work have been documented, this chapter is primarily a survey of the limited experience in this area. Because few examples have involved freight transportation demand analysis, it is difficult to provide guidelines in this area.

The appendices contain additional information covering several areas. Appendix A contains an extensive discussion of key factors that influence freight demand. Appendix B contains reviews of several previous freight-demand forecasting and modeling studies. Appendix C contains descriptions of approximately 50 freight databases of interest to users of this Guidebook. Appendix D discusses survey procedures, and Appendix E addresses statistical forecasting techniques.

Appendix F presents procedures and data for estimating transport costs. Appendix G reviews available information on rail/truck modal diversion and presents some simple procedures for developing order-of-magnitude diversion estimates. Finally, Appendix H reviews three rail/truck diversion models of current interest.