Southwest Region University Transportation Center

Towards the Future: The Promise of Intermodal and Multimodal Transportation Systems

SWUTC/95/60017/71249-3

Center for Transportation Research
University of Texas at Austin
3208 Red River, Suite 200
Austin, Texas 78705-2650

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
SWUTC/95/60017/71249-3		

4. Title and Subtitle	5. Report Date
Towards the Future: The Promise of Intermodal and Multimodal Transportation Systems	February 1995
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
S.E. Anderson, R.B. Easley, T.M. Fowler, W.L. Gabler, S. Govind, A. Johnson, Y. Minas, C.J. Oswald, J.M. Ruiz, B.P. Shefferly, D.D. Vasavada, D.L. Venable, and C.M. Walton	Research Report 60017 and 71249

9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Center for Transportation Research The University of Texas at Austin 3208 Red River, Suite 200 Austin, Texas 78705-2650	11. Contract or Grant No. 0079 and DTOS88-G-0006

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
Southwest Region University Transportation Center Texas Transportation Institute The Texas A&M University System College Station, Texas 77843-3135	14. Sponsoring Agency Code

15. Supplementary Notes

Supported by grants from the Office of the Governor of the State of Texas, Energy Office and from the U.S. Department of Transportation, University Transportation Centers Program

16. Abstract

Issues relating to intermodal and multimodal transportation systems are introduced and defined. Intermodal and multimodal transportation solutions are assessed within the framework of legislative efforts such as Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), Clean Air Act Amendments of 1990 (CAAA), and North American Free Trade Agreement (NAFTA). Effects of the shift in federal funding priorities are discussed, and catalysts for intermodalism in the public and private sector are identified.

Federal involvement in state intermodal transportation systems, and state responses to the growing intermodal and multimodal trends are also reviewed. Innovative intermodal and multimodal programs are studied. The roles and responsibilities of the Metropolitan Planning Organizations (MPO) in the post-ISTEA world is examined and the impacts of legislative mandates considered. As a case study, the workings of the Houston MPO are examined. Private sector intermodal and multimodal involvement is addressed, including issues in management, regulatory, financial, economical, environmental, and even physical constraints. Effects of regulation on private sector intermodalism are discussed, as are case studies in partnering and management. This report summarized the potential and the possibilities that intermodalism and multimodalism have at national, state, and local levels in both the public and private sectors, and concludes with a look at the possible future of intermodalism.

17. Key Words	18. Distribution Statement
Intermodal, Multimodal, ISTEA, NAFTA, CAAA, MPO, Transportation Systems	No Restrictions. This document is available to the public through NTIS: National Technical Information Service 5285 Port Royal Road Springfield, Virginia 22161

19. Security Classif.(of this report)	20. Security Classif.(of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	107	

TOWARDS THE FUTURE: THE PROMISE OF INTERMODAL AND MULTIMODAL TRANSPORTATION SYSTEMS

by

Susan E. Anderson
Richard B. Easley
Thomas M. Fowler
William L. Gabler
Shekhar Govind
Ashby Johnson
Yohannes Minas
Christopher J. Oswald
Jose M. Ruiz
Bradley P. Shefferly
Dhruti D. Vasavada
Diane L. Venable
C. Michael Walton

Research Report SWUTC/95/60017/71249-3

Southwest Region University Transportation Center
Center for Transportation Research
The University of Texas
Austin, Texas 78712

FEBRUARY 1995

DISCLAIMER

ACKNOWLEDGEMENT

The authors recognize that support for this research was provided by a grant from the U.S. Department of Transportation, University Transportation Centers Program to the Southwest Region University Transportation Center.

This publication was developed as part of the University Transportation Centers Program which is funded 50% in oil overcharge funds from the Stripper Well settlement as provided by the Texas State Energy Conservation Office and approved by the U.S. Department of Energy. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

EXECUTIVE SUMMARY

The transportation planning environment is evolving due to the diminishing pool of resources to fund transportation systems, strong public demand for improved mobility, and the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). New transportation priorities are emerging in the face of these factors, priorities emphasizing connectivity and modal choices. The underlying goal is to coordinate the network of transportation systems to enhance the mobility of goods and people by efficiently utilizing existing resources.

This report examines the impact of intermodal and multimodal planning at state and local levels in the public and private sectors. Requirements, organizational structures, and possible benefits are discussed, as well as issues and causes leading up to the passage of ISTEA.

ABSTRACT

Issues relating to intermodal and multimodal transportation systems are introduced and defined. Intermodal and multimodal transportation solutions are assessed within the framework of legislative efforts such as Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), Clean Air Act Amendments of 1990 (CAAA), and North American Free Trade Agreement (NAFTA). Effects of the shift in federal funding priorities are discussed, and catalysts for intermodalism in the public and private sector are identified.

Federal involvement in state intermodal transportation systems, and state responses to the growing intermodal and multimodal trends are also reviewed. Innovative intermodal and multimodal programs are studied. The roles and responsibilities of the Metropolitan Planning Organizations (MPO) in the post-ISTEA world is examined and the impacts of legislative mandates considered. As a case study, the workings of the Houston MPO are examined.

Private sector intermodal and multimodal involvement is addressed, including issues in management, regulatory, financial, economical, environmental, and even physical constraints. Effects of regulation on private sector intermodalism are discussed, as are case studies in partnering and management. This report summarized the potential and the possibilities that intermodalism and multimodalism have at national, state, and local levels in both the public and private sectors, and concludes with a look at the possible future of intermodalism.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

TABLE

CHAPTER 1. INTRODUCTION

The transportation planning environment is evolving due to the diminishing pool of resources to fund transportation systems, strong public demand for improved mobility, and the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). New transportation priorities are emerging in the face of these factors, priorities emphasizing connectivity and modal choice. The underlying goal is to coordinate the network of transportation systems to enhance the mobility of goods and people by efficiently utilizing existing resources. The purpose of this report is to examine the impact of intermodal and multimodal planning at state and local levels in the public and private sectors.

OBJECTIVES

This report seeks to achieve five objectives. They focus on the following intermodal and multimodal transportation planning issues:

- To provide a reference of terminology and legislative requirements
- To survey current (May 1993) state and regional progress and ISTEA-related implementation efforts
- To explore the nexus of opportunities for the State of Texas and its metropolitan areas
- To examine the direction of private sector involvement in integrated transportation systems
- To propose possible scenarios for the future of multimodal transportation

This report attempts to bridge the communication gap by identifying: (1) the forces responsible for bringing the above issues to the forefront, (2) the current status of intermodal activity around the country, and (3) the future directions of intermodal transportation. In pursuit of these goals, the report is divided into six chapters. Chapter 1 provides an overview of the report and its components. Chapter 2 defines critical terminology and analyzes the factors that have caused the public and private sector to consider intermodal and multimodal transportation solutions. Chapter 3 reviews State responses to the growing intermodal and multimodal trends and identifies the most innovative State intermodal and multimodal programs. Chapter 4 examines the roles and responsibilities of the Metropolitan Planning Organizations (MPO) in the post-ISTEA world. In addition, Chapter 4 takes an in-depth look at two Texas MPO's, Houston and Austin. Chapters 3

and 4 also consider legislative requirements affecting states and metropolitan areas respectively. Chapter 5 addresses private sector intermodal and multimodal involvement. Finally, Chapter 6 brings the report to a conclusion by exploring the potential intermodalism and multimodalism have at national, state, and local levels in both the public and private sectors.

BACKGROUND

Before specific intermodal and multimodal transportation issues facing state and local interests can be raised, the terms "intermodal" and multimodal" must be defined. The ISTEA states, "The National Intermodal Transportation System shall consist of all forms of transportation in a **unified, interconnected manner**. . . ." An additional definition of intermodal transportation is provided by the American Association of State Highway and Transportation Officials (AASHTO):

> Intermodalism as commonly understood involves the systematic merging of different modes of transportation into a single functional system for movement of freight or passengers. The concept of intermodalism takes advantage of inherent modal efficiencies in different segments of the shipment or journey. A familiar example can be seen in action at ports where ships laden with containers transfer their shipments to rail or truck for delivery to final destinations. Airport passengers who deboard their planes and continue an intermodal trip via bus or rail transit and commuters that collect at park and ride lots to continue a trip via bus or rail transit are additional examples of intermodalism.

The key concepts raised by these two definitions are connectivity, coordination, and cooperation.

Intermodalism focuses on connecting several different modes into a seamless transportation system with efficient intermodal transfer terminals. These connective terminals, or nodes, are perhaps the most important part of an intermodal transportation network. If intermodal transfers are slow or inconvenient users will resort to what they perceive as the more efficient unimodal system. To best utilize intermodal transportation resources, the planning of these intermodal transfer terminals requires the coordination and cooperation of all unimodal planning authorities that will utilize the terminal. Without such cooperation, inefficient modal gaps can develop. An example of such an occurrence would be if a new airport was built without the consultation of local transit authorities, which would have been able to construct a light rail line from the central business district (CBD) to the airport. Without efficient "built-in" transit service, airport users would be forced to use indirect and slow bus service, expensive taxis, or highway-congesting private autos to fill the modal gap between the CBD and the airport.

Rather than focusing on transportation system nodes, multimodal transportation systems focus on transportation system links and providing system users with a choice of modes along

those links. An example of a multimodal system would be if two cities were connected by air routes, highways, and railroads. In an urban sense, a multimodal network might consist of linking the airport with the CBD with public transit, private automobiles, and taxis. Much of the United States has such a system, but, due to federal, state, and local governments' modal bias towards highways, many modes have not been equally represented in the national transportation network. Modal bias can involve direct governmental funding of a transportation mode or can be much more subtle, such as failing to consider other modes in the planning process or failing to charge users the true cost of using a particular mode. The ISTEA has reduced some of the traditional federal highway bias by making funding programs more flexible and attuned to local needs, but it remains to be seen if state and local governments are willing to pursue multimodal networks by equalizing modal subsidies.

The bias question raises two key interrelated multimodal issues: choice and competition. These issues are interrelated because the choice of a particular mode will inevitably depend on how competitive that mode is with other modes. Governmental bias towards a particular mode usually implies that it will be more competitive than the other modes because of the "perks" that mode will receive. In such a situation, mode choice is no longer determined by the free market, but is instead pre-determined by the public sector. A "level playing field" upon which all modes can compete for traffic is a requirement for successful multimodal transportation systems.

With the terms "intermodal" and "multimodal" thus defined, one question remains: why should intermodal and multimodal transportation systems be pursued? There are many reasons why intermodal and multimodal transportation systems can improve transportation networks. These reasons can be grouped into three broad categories: (1) efficiency, (2) quality, and (3) choice.

Intermodal transportation networks improve efficiency by using modes best suited to each portion of a transport route. Intermodal efficiency gains can be illustrated with a freight shipping example. A shipment of electronic devices needs to go from a manufacturing plant in Seoul, Korea to a store in San Marcos, Texas. The shipper contacts a containerized freight company which picks up the shipment which has been loaded into a freight container. The container is lifted onto a trailer and is hauled to the port. At the port, the container is loaded onto a ship and carried to Long Beach, CA. In Long Beach, the container is loaded onto a train which transports the container to San Antonio, TX over two railroad companies tracks. In San Antonio, at a distribution center, the contents of the container are broken down into separate shipments and loaded onto trucks. One of these trucks carries the San Marcos shipment to the store. The receiver pays a single freight bill from the containerized freight company and has been able to use

the lowest cost modes, particularly containerized rail transport, for each trip leg. Assuming the intermodal transfers were handled with a minimum cost, efficiency has been improved over shipping the components overland solely by the more resource-consuming truck mode. The same type of efficiency improvement can be realized with intermodal passenger transportation. Park-and-ride transit facilities which reduce single passenger vehicle congestion, thus reducing transportation costs, are an example.

In addition to efficiency, intermodal systems can also improve transportation system quality. This gain in quality can be illustrated with the containerized freight example from above. Freight, well-packed into its container in Seoul, is much less susceptible to damage than it would be if it was shipped break-bulk on truck lines across the continental United States.

Improved quality and choice can result from an effective multimodal transportation network. Quality results from the competitive forces that underlie multimodal systems. Choice is of course inherent in an effective multimodal network. This choice allows shippers to select the mode that they believe can best serve their needs. In this way, increased choice combined with free market dynamics can lead to transportation efficiency gains.

CHAPTER 2. CATALYSTS FOR CHANGE

The emergence of intermodal and multimodal focuses in the transportation arena has not happened without provocation. In the United States, the "catalysts" that have forced transportation professionals to consider multimodal and intermodal transportation systems are multifold and come from both the public and private sectors. This chapter details these catalysts and analyzes the impact they are having on the U.S. transportation system.

PUBLIC SECTOR CATALYSTS

The public sector has several compelling reasons to pursue intermodal and multimodal transportation solutions. Many of these reasons are related to federal transportation legislation. To be effective, such legislation must promise susbtantial rewards for shifting to intermodal paradigms or impose substantial penalties for resisting change. The ISTEA is a good example of the reward approach, and the Clean Air Act Amendments are good examples of the penalty approach. Both pieces of legislation are examined in detail below. In addition to legislation, increasing global competition and shrinking public sector resources are forcing the public sector to reconsider intermodal and multimodal transportation systems.

Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA)

The ISTEA is probably the most powerful of the catalysts mentioned below. This power, however, has more to do with the ISTEA's status as federal legislation than it does with the legislation's content. With the ISTEA, the federal government gave intermodal transportation national recognition and credibility. The legislation also promised extensive funding for such systems, but, so far, few of these promises have materialized. Will the promises be enough to build intermodal and multimodal momentum? To answer such a question, the promises themselves should be analyzed.

As stated above, the goal of the ISTEA, is "to develop a National Intermodal Transportation System that is economically efficient, environmentally sound, provides the foundation for the nation to compete in the global economy and will move people and goods in an energy efficient manner." In pursuance of this goal, the ISTEA explicitly emphasizes the development of the National Intermodal Transportation System (NITS). The ISTEA envisions the NITS as a unified, combined transport network consisting of air, road, rail and sea links connected by efficient intermodal terminals. The legislation implicitly assumes that the optimization of transportation system performance inherent in the development of such a system can

simultaneously reduce resource consumption, increase network connectivity, and reduce transportation costs.

Unfortunately, the "I" in the ISTEA's has often been overshadowed by the legislation's provisions related to pre-ISTEA transportation programs. In fact, most of the ISTEA's intermodal coverage is restricted to one title, Title V, of this eight title act.

Title V authorized the creation of the Office of Intermodalism. This office, independent of the United States Department of Transportation's (USDOT) traditional unimodally-oriented organization scheme, reports directly to the Secretary of Transportation himself. It is charged with maintaining and disseminating intermodal transportation data, and coordinating federal research on intermodal transportation. Title V also authorized the Secretary of Transportation to grant states up to $3 million to develop model intermodal transportation plans. Title V also established a National Commission on Intermodal Transportation to study the status of intermodal standardization, impacts on public works infrastructure, legal impediments to efficient intermodal transportation, financial issues, new technologies, research and development needs, and relationship between intermodal transportation and productivity. However, as of September 1993, funds had not been appropriated to pay commission members' salaries. As a result, the commission has never met to resolve the issues with which it is tasked.

In addition to the explicit coverage of Title V, the ISTEA implicitly promotes intermodal and multimodal transportation systems by emphasizing funding flexibility across modes and facilities. Performance and cost-effectiveness, rather than mode selection, become the key criteria for funding appropriation. In additon, the ISTEA makes substantial progress towards eliminating cross-modal funding barriers and thus enables the development of creative multimodal and intermodal solutions to transportation dilemmas.

Another revolutionary characteristic of the ISTEA is the legislation's delegation of transportation planning and programming responsibilities to state and local governments. This delegation of authority allows those most familiar with the problems, state and local governments, to develop appropriate solutions. Metropolitan Planning Organizations (MPOs) are given the responsibility for developing long-range transportation plans and a transportation improvement plans (TIP) for the area. The planning process must now include such factors as land uses, intermodal connectivity, methods to enhance transit services and congestion management measures. Newly required under the ISTEA are statewide planning processes, statewide transportation plans, and statewide TIPs. Statewide TIPs must be consistent with both long range transportation plans and air quality implementation plans. States, in cooperation with MPOs must develop and implement management systems for highway pavement, bridges, highway safety,

traffic congestion, public transit, and intermodal transportation facilities and systems. The new flexibility provided by the Act encourages programming decisions which best reflects state, regional, and local priorities. The management systems' requirements reinforce the philosophy of strengthening local planning methods, and encourage systematic evaluation of conditions and needs, and consideration of life-cycle costs and cost-effectiveness in the development of improvements.

Clean Air Act Amendments of 1990 (CAAA)

Amendments to Federal Clean Air Act, passed in 1990, are having major impacts on the transportation planning and project development process in the non-attainment areas. These areas are required to implement transportation control measures in order to reduce vehicle miles of travel and congestion. The most significant provisions of the 1990 CAAA, with respect to planning, are strengthened requirements for conformity between the state implementation plan (SIP) for air quality and the approval for federal funding of regional transportation plans, programs, and projects. Conformity must now be based on a demonstration that the total emissions from the mobile sources, which would occur due to the combination of projects and programs in the transportation plan, are consistent with the levels of emission in the SIP.

The transportation plans must be analyzed once every three years in order to comply with the standards set by air control authority in the area. These new amendments, together with the transportation/air quality provisions of ISTEA, will necessitate much closer cooperation between transportation and air quality planning agencies and a broader evaluation of the impacts of transportation projects.

North American Free Trade Agreement (NAFTA)

NAFTA establishes a free trade area between Canada, Mexico, and the United States of America, consistent with the agreement on tariff and trade. The objectives of the agreement are the elimination of barriers to trade, the promotion of fair competition, the creation of new investment opportunities, the protection of intellectual property rights, and the establishment of effective procedures for both the implementation of the agreement and the resolution of international disputes. This agreement will affect transportation in the U.S. by opening up borders to Mexican and Canadian trucks, trains, and ships. There are several concerns that this opening of the borders presents to regulatory authorities, including: (1) the establishment of universal standards on equipment such as tires, brakes, weights, and dimensions of containers, maintenance, repair, and certain aspects of emission levels; (2) the establishment of medical standards for truck drivers; (3) international regulation of hazardous materials transportation; and

(4) the development of standards for locomotives and rail equipment used in cross-border operations.

Enhancement of Global Competitiveness

Efficient transportation is one of the keys to a strong economy. An efficient transportation system should provide a fluid movement of goods and services. The development of this efficient transportation system requires public and private sector coordination during the planning, design, construction, and management of transportation services. Businesses that are "of markets" and not "of nations" are a new reality in which the U.S. maintains a dominant voice in research and advanced technologies among its trade partners. Also, expanding scope of free-trade agreements and regional trade formations will have a greater impact on fostering collaborative mechanism.

Two of the major objectives of the ISTEA are the promotion and the planning of transportation systems that enhance economic development and support America's leading position in the global market. Ports and airports provide vital infrastructure to international commerce. These are the intermediary points in the international transportation, providing transfer of cargo between modes. Consistent standards are most important in ensuring that containers can be safely and easily interchanged between transport modes and between nations. Standardization of equipment increases productivity, speed, safety, reliability, and efficiency for both shippers and consumers. The size and structural integrity of transportation equipment and facilities are standardized by International Organization for Standardization (ISO) regulations. Both the American National Standards Institute and American Society for Quality Control have adopted these standards.

Landside access to both ports and airports is given increased emphasis in the new legislation. Ports are the least understood component of land, water, and air intermodal movements. Issues such as land availability, land accessibility, and trade policy require coordination of many public and private entities. Air cargo movement has always been intermodal. Boeing projects worldwide air cargo fleets to increase in size by 110% by 2015. Worldwide trade with the U.S. is increasing, requiring more intermodal terminals at ports and airports and improved landside access. In addition, the effects these expansions will have such as traffic congestion, noise, and other environmental restrictions must be considered. Enhancing the global competitiveness of the U.S. requires changing the single mode perspective to intermodal and multimodal perspectives of transportation systems.

Reallocation of Funding Priorities

Transportation resource allocation decisions are becoming more difficult and complex. Resources are continuing to shrink while the set of problems needing to be addressed grows and diversifies. The list of concerns competing for transportation funding includes aging and decaying infrastructure, urban and suburban traffic congestion, improving traffic safety, balancing new growth with infrastructure to support it, strengthening the economy, achieving air quality standards, and reducing energy consumption. The legislation described above is forcing stronger integration of some of these concerns into transportation decisions.

The focus of these current transportation problems has changed to demand management strategies, maintenance and preservation, operational and efficiency improvements, multimodal solutions, and land-use controls. In many metropolitan areas, expansion of highway facilities is no longer considered a viable solution. Instead, views are shifting to the efficient operation of a multimodal system. The ISTEA dramatically increases flexibility in the use of federal transportation funds. Instead of directing what funds should be used for, it emphasizes the use of sound management approaches to resource allocation decisions and considerations of the full range of solutions to solve the problems. In reality, some portion of the funds available are likely to be allocated to modes, program categories, and geographic regions at the start of the programming process. The more this occurs, the more difficult it would be to examine key tradeoffs and establish true multimodal and multi-objective programs. Hopefully, some balance can be achieved between modal funding stability and modal funding flexibility.

Taking full advantage of the ISTEA presents technical, institutional, and political challenges. While improvements in technical methods can play a strong supporting role in reshaping planning process, fundamental changes in how resource allocation decisions are made will require strong leadership and revision of current roles and responsibilities, both with agencies and among institutions which participate in transportation decisions.

PRIVATE SECTOR CATALYSTS

Much like the public sector, the private sector must have concrete reasons to abandon unimodal networks in favor of intermodal and multimodal transportation systems before it will be willing to pursue this multimodal and intermodal system. This project has identified five reasons that are compelling the private sector to shift to an intermodal and multimodal focus. These reasons are: (1) maintaining competitiveness, (2) increasing transportation efficiency, (3)

improving transportation quality, (4) securing greater regional, national, and international markets, and (5) meeting international standards. These five factors are described in greater detail below.

Maintaining Competitiveness

To remain competitive in the private industry, it is important that companies exploit all applicable technologies to provide the most cost efficient and reliable service. In the past, many trucking firms were content to see themselves as a single mode operation. They believed that their markets were distinct from the rail markets, and therefore focused efforts only on over-the-road operations rather than trying to open new markets by working with rail. Intermodal service was also believed to be unreliable and was not seen as a threat to the over-the-road market. This was the prevailing attitude in the trucking industry until the recent recession, when growth of the industry slowed and truckload firms now faced greater competition as firms competed for additional freight.

Trucking firms needed to find innovative ways to improve their service and maintain competitive pricing. The increased competition in the industry caused companies to rethink their single mode transportation operations and investigate the possibilities of intermodalism.

A natural choice for trucking firms was to use rail lines to move freight over long distances, creating an intermodal freight transportation system. One of the first major alliances, under the name Quantum, was between the J.B. Hunt and the Santa Fe Railroad in 1990. This alliance proved to be very successful for both companies, and stood as an example of the possibilities of intermodalism for other firms in the freight movement business.

This is only one example of the way those in the freight movement industry will need to rethink intermodalism. Many small freight movers, such as Federal Express, have used intermodalism very successfully for years, relying on planes and trucks to move freight. As competition in the industry increases, single mode transportation will no longer be enough to maintain the competitive edge.

Increasing Efficiency

In general, an increase in efficiency should lead to either a cost or time savings, or both. Intermodalism offers a great deal of possibilities to increase efficiency in a transportation network. For example, the Association of American Railroads estimates that a railroad can move a given quality of freight for one-fifth the fuel of a motor carrier and carry seven times as much freight per employee. Assuming the previous statistics are correct, it is much more efficient in terms of fuel and labor cost to use rail when transporting freight over long distances.

With the use of computerized operating systems to manage large intermodal transportation networks, a variety of modes can now be used while still maintaining high levels of

efficiency and reliability. Before such operating systems, the logistics of moving different types of freight with several modes would be extremely difficult, resulting in unreliable service to the customer.

A highly efficient use of intermodalism is displayed by New United Motor Manufacturing, Inc. (NUMMI), based in Fremont, California. NUMMI is a joint venture between Toyota Motor Corporation and General Motors Corporation that produces approximately 300,000 vehicles per year, including Toyota Corollas, Toyota compact pickup trucks, and Geo Prizms. Parts and materials for the plant arrive from Japan, Canada, Mexico, and the U.S. NUMMI operates its plant on a "just in time" basis, bringing in materials and parts only as needed. NUMMI generally operates on a one day inventory for parts coming from within California, and a two to three day inventory for items coming elsewhere. Four ships arrive at the Port of Oakland each week with materials bound for NUMMI. Midwest suppliers are organized through NUMMI's Midwest Orderly Pickup System, which consolidates materials in Chicago and then ships them by train to Fremont. Suppliers in Southern California, Mexico, and Texas use long haul truck routes to deliver materials. Due to the various materials and parts that are constantly arriving at NUMMI, it is vital that an efficient container system is used to reduce the cost of handling materials and to allow the materials to go directly to where they are needed.

By using the "just in time" delivery approach, NUMMI reduces handling costs, inventory control costs, and floor space needs. This translates into reduced manufacturing costs, which allow for greater profitability. The vital link in this manufacturing approach is an efficient intermodal transportation system. If other companies wish to take advantage of the "just in time" approach, they too will need to rely on more than one mode of transportation to meet their delivery needs.

Improving Quality

Improving quality is necessary for acceptance of intermodal transportation. Several changes have occurred in the past years that have increased the reliability and simplified intermodal transportation use for the customer. An analogy to a phone system is appropriate in this case. It does not matter to the caller over which lines his call is routed, or who owns those lines — only that his call goes through. Likewise, for the freight customer, the concern is not the method that is used to deliver the freight, but rather the reliability and the cost.

Many intermodal freight companies are now working with this in mind, delivering an end-to-end service. Previously, the customer had to make arrangements if freight were to be transferred from one rail line to another. Freight companies can now take advantage, through partnerships and alliances, of intermodalism using trucks, rail, and ships, making all the necessary arrangements for the customer. The customer's only concern is the pick up and drop off points of

the freight, all transportation in between is taken care of by the freight company. This can result in a cost and time savings for both the freight company and the customer, as well as an increase in reliability.

The competitive nature of the transportation field will soon demand that all freight companies improve their quality of service to the customer.

Securing Greater Regional, National, and International Markets

The use of intermodal transportation may be vital for a company to expand into new markets. As seen in the example about NUMMI, their use of different transportation methods allowed them to tap markets for automotive parts in several different countries. This would not be possible if an efficient and cost effective transportation network could not be developed.

For freight movement companies that do no use intermodalism, the loss of possible markets may mean the end of the company. In the opposite case, use of intermodalism can allow access to markets that may have been unavailable to single mode transportation companies. The purchase of Sea-Land Service by CSX Corporation in 1985 allowed CSX immediate access to the global transportation market. There is a great deal of potential for intermodalism to open new markets to a company, whether the company be a manufacturing or freight transportation company.

Meeting International Standards

The International Organization for Standardization (ISO) is made up of the standards organizations from 91 countries, including The American National Standards Institute (ANSI) that represents the United States. ISO 9000 is a set of quality management and quality assurance standards developed by the ISO in 1987. The standards do not apply to any particular products or manufacturing processes; instead, they were developed to help provide the framework for companies to implement a total quality management program, and to gain certification under the ISO 9000 standards. The standards have gained a high rate of acceptance among the European Community (EC) and are gradually gaining greater acceptance in the U.S. In November of 1992, there were approximately 400 U.S. companies with ISO 9000 certification, with several thousand other U.S. companies actively seeking certification.

There are several implications of ISO 9000 to the transportation field. First, in order to gain certification under ISO 9000, a company will have to meet a series of quality management and quality assurance standards. For many companies, increasing quality may mean increasing the use of intermodal services. The question of reliability of the companies' intermodal services must also be addressed. In short, companies will have to examine the way they move freight and look at implementing improvements in each area.

The second impact of ISO 9000 will most likely be the ease of freight movement between international boundaries. This idea is already being pushed in the European Community. Certificates given for exports in one country would be valid in all other EC countries, allowing easy access to all EC markets. If ISO is accepted worldwide it could mean easy access to global markets. This type of access will demand an increase in intermodal freight transportation in order to keep up with global markets.

Finally, ISO has been working to develop a standard for wide-body containers. These containers would be used for shipping, rail, and trucking operations. ISO has held several meetings on this issue, but they have yet to agree on an international standard. They are continuing to study the issue to determine the ideal dimensions, but it seems as if a solution may still be several years away. However, the eventual creation of a standard container for freight movement will increase the efficiency of intermodalism and further the acceptance of intermodalism as a standard practice in freight movement.

CHAPTER 3. STATE RESPONSES TO INTERMODALISM

FEDERAL INVOLVEMENT IN STATE INTERMODAL TRANSPORTATION SYSTEMS

The federal government is enabling states and MPOs to pursue intermodal transportation systems with two pieces of legislation: the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and the Clean Air Act Amendments of 1990 (CAAA). This section of the report enumerates the specific provisions of these acts as they relate to statewide intermodal transportation planning.

The Intermodal Surface Transportation Efficiency Act declares that, "the policy of the United States to develop a National Intermodal Transportation System that is economically efficient and environmentally sound, provides the foundation for the Nation to compete in the global economy, and will move people and goods in an energy efficient manner." The ISTEA places the responsibility for achieving this policy in the hands of those most familiar with their region's transportation needs: state governments and MPOs. In terms of state responsibilities, the ISTEA proclaims:

> It is in the national interest to encourage and promote the development of transportation systems embracing various modes of transportation in a manner that will serve all areas of the State efficiently and effectively. . . .the State shall develop transportation plans and programs for all areas of the State. Such plans and programs shall provide for development of transportation facilities . . . which will function as an intermodal State transportation system. The process for developing such plans and programs shall provide for the consideration of all modes of transportation and shall be cooperative and comprehensive to the degree appropriate based on the complexity of the transportation problems.

One of the ways the ISTEA enables the states to meet this mandate is by giving them "more flexibility in determining transportation solutions, whether transit or highways."

Most of this flexibility stems from the Surface Transportation Program (STP), which eliminates many of the restrictions on the use of federal funds that existed prior to the ISTEA. The STP accounts for $23.9 billion of the ISTEA's $120.86 billion in apportionments over the six years the ISTEA is in effect. This level of funding may be augmented by the transfer of funds from other programs and by equity funds (including Donor State Bonuses, Reimbursement, Hold Harmless, and 90 Percent of Payments) . With this augmentation, the Texas Department of Transportation's Planning and Policy Division predicts $37.82 billion in funds will be available to states over a 6 year period under the STP.

There are a few restrictions concerning the allocation of STP funds within a State. Ten percent of STP funds must be provided to safety programs and an additional ten percent for "transportation enhancement activities." In terms of project distribution, 62.5 percent of the remaining 80 percent of STP funds must be allocated to urbanized areas with populations greater than 200,000. The remaining 37.5 percent can be allocated to any other areas within the state.

The ISTEA permits states to allocate STP funds for the following intermodal projects:

- Construction, reconstruction, rehabilitation, and improvements to highways and bridges . . . including any such construction or reconstruction necessary to accommodate other transportation modes
- Capital costs for transit projects eligible for assistance under the Federal Transit Act and publicly owned intracity or intercity bus terminals or facilities
- Carpool projects, fringe and corridor parking facilities and programs, and bicycle transportation and pedestrian walkways
- Transportation management systems including congestion and intermodal management systems

The scope of projects allowed under the STP in ISTEA is much broader than the scope allowed under previous transportation funding statutes. This broadened scope hopefully will serve as a "carrot" to lure states into pursuing an intermodal transportation network. However, it must be noted that the STP does not require states to pursue intermodal or multimodal transportation networks. As a result, under the STP, the initiative for planning and constructing innovative intermodal networks must come from the states themselves.

The Congestion Management and Air Quality Improvement Program (CMAQ) contained in section 1008 of the ISTEA is another program under the ISTEA that encourages states to develop intermodal transportation systems, albeit indirectly. CMAQ program funds account for $6 billion of the ISTEA's six year apportionment and, in air quality non-attainment areas, can only be used for projects which will contribute to the attainment of the air quality standards set forth by the Clean Air Act. Many intermodal projects, such as the construction of efficient transit terminals, can result in improved air quality by removing polluting, private automobile users from the highways and easing traffic congestion. These projects would be eligible to receive CMAQ funds.

In addition to the funding provided by the programs above, Title V of the ISTEA allocates $3 million in grants to be used to develop model state intermodal transportation plans. These funds are allocated to individual states at the discretion of the Secretary of Transportation, and $500,000 is the maximum grant any one state can receive.

In addition to the funding "carrot," the ISTEA uses several "sticks" to induce states to pursue intermodal transportation systems. Most of these inducements involve requirements for states to develop transportation planning procedures, management systems, and project programming systems that are geared towards intermodalism. Most of these requirements are contained in section 1025 of the ISTEA. This section details 20 factors that must be considered in the state transportation planning process. The factors that deal directly or indirectly with developing efficient intermodal transportation are:

- Strategies for incorporating bicycle transportation facilities
- International border crossings and access to ports, airports, intermodal transportation facilities, and major freight distribution routes
- Connectivity between metropolitan areas within the state and with metropolitan areas in other states
- Transportation system management and investment strategies designed to make the most efficient use of existing transportation facilities
- Methods to reduce traffic congestion and to prevent traffic congestion from developing in areas where it does not yet occur, including methods that reduce motor vehicle travel, particularly single-occupant motor vehicle travel
- Methods to expand and enhance transit services and to increase the use of such services
- The effect transportation decisions have on land use and land development, including the need for consistency between transportation decision-making and the land-use and development plans

Many of the above factors do not deal directly with intermodal transportation systems, but their consideration could conceivably contribute to the development of an intermodal network. The fifth factor, which deals with congestion mitigation, is a good example; intermodal park-and-ride transit terminals may be included in a transportation plan because the state was required to consider congestion mitigation methods in the planning process.

In addition to the consideration of these factors, states are required under the ISTEA to develop both a long range transportation plan and a state transportation improvement program (STIP). The plan and the TIP must be developed in cooperation with metropolitan planning organizations, local government agencies, private transportation providers, and the citizenry at large; these two plans must also be consistent with implementation plans required by the Clean Air Act and the plans and TIPs developed by metropolitan planning organizations. Hopefully, these state planning requirements will lead states to more fully consider intermodal transportation networks as solutions to their transportation problems.

The strongest federal requirement for intermodal transportation development is contained in section 134 of the ISTEA. This section requires states to develop six transportation management systems, three of which can apply to intermodal development. These are: (1) a traffic congestion management system, (2) a public transportation facilities and equipment management system, and (3) an intermodal facilities and systems management system. The ISTEA does not specify what the scope of the first two management systems should be, but is quite specific about intermodal management system requirements:

> The management system required under this section for intermodal transportation facilities and systems shall provide for improvement and integration of all of a state's transportation systems and shall include methods of achieving the optimal yield from such systems, methods for increasing productivity in the state, methods for increasing the use of advanced technologies, and methods to encourage the use of innovative marketing techniques, such as just-in-time deliveries.

If states fail to develop and implement such a management system by 1995, up to ten percent of their ISTEA apportionment may be withheld. Thus, with this section, the federal government forces state governments to consider intermodal transportation networks. This regulatory "stick" serves as a complement to the flexible funding "carrot" and is hopefully sending a strong message to the states about the importance of intermodal transportation planning.

The CAAA's also have been guiding states towards intermodal transportation solutions. The regulatory framework of the Clean Air Act was greatly enhanced by these amendements, which stated strict and specific air-quality improvement measures that must be implemented by non-attainment areas. Many of these measures concentrate on reducing vehicle emissions. The CAAA approach this reduction from the standpoint of reducing total vehicle miles traveled (VMT) in non-attainment areas. Although intermodal methods of reducing VMT are not explicitly mentioned, intermodal transit and freight projects definitely could contribute to such reductions. As a result, intermodal projects should be viewed as a critical portion of the State Implementation Plans (SIPs) for attaining the National Ambient Air Quality Standards (NAAQS) set forth by Title I of the CAAA. However, for the CAAA to be an effective intermodal promoter, financial penalties for non-attainment of the NAAQS must be implemented and enforced. If states are hit in the pocketbook by the federal government, the development of intermodal projects that reduce VMT will become important state goals.

Additional federal guidance concerning both the ISTEA and the CAAA has been forthcoming in the form of Notices of Proposed Rulemaking that appear in *The Federal Register*. The first of these, detailing federal requirements for the ISTEA mandated management systems,

appeared in the June 3, 1992 issue of this government publication. Of key interest are the proposed requirements for Intermodal Management Systems (IMS). The June 3 document first defines an intermodal facility as "a transportation hub that interconnects different modes of transportation," and an intermodal system as providing "a means for moving people and goods using various combinations of modes." The proposed rules also outline the following five IMS elements:

1. Identification of Intermodal Facilities: including passenger and freight facilities
2. Identification of Efficiency Measures and Performance Standards: including, but not limited to, travel time, transfer time, and total cost
3. Data Collection and System Monitoring: perpetual inventorying of the condition and operational characteristics of intermodal facilities
4. System and Facility Performance Evaluation: determination of specific causes for the efficient or inefficient movement of goods and people in the intermodal transportation system
5. Strategy and Action Identification and Evaluation: consisting of the identification and evaluation of future state intermodal opportunities, including the consideration of advanced technologies and innovative marketing techniques

These five elements are to be incorporated into a statewide IMS that addresses both short and long range intermodal needs and opportunities. In the end, this IMS should result in:

> An inventory of intermodal facilities and systems, incorporation of IMS strategies and actions into state . . . transportation plans and transportation improvement programs, and an implementation plan as part of the statewide . . . transportation plan.

A second set of proposed rules, appearing in the March 2, 1993 *Federal Register*, detail statewide transportation planning requirements. These proposed rules specify many of the details concerning statewide planning procedures and scope. However, like the ISTEA itself, these rules relegate intermodal issues to the background. Generally, intermodal transportation is mentioned only in broad terms as being one of the factors that must be considered in the statewide transportation plan. Despite this weakness, important pronouncements on the subject of inter-agency cooperation are made. The proposed rules state that data collection activities, intermodal planning, environmental analyses, and financial planning for transportation must be coordinated with all involved parties including MPOs, private transit providers, and the public.

EXPLORATION OF METHODS AND CONCEPTS TO MEET NATIONAL MANDATE

Prior to the passage of the ISTEA, the status of multimodal and intermodal transportation planning, and the need for expanded emphasis in these areas, were already known. A report prepared for the National Council on Public Works Improvement in 1987 examined the relationship between intermodal transportation and public works programs. This report defined intermodal transportation as the movement of goods and/or persons by two or more modes of transportation between specific origins and destinations. Public investment was found to be predicated on two objectives: stimulating economic growth and development and improving the United States' competitiveness in world trade. Almost every freight or passenger movement involves some form of interruption due to a change of mode. For intermodal transportation to work efficiently, the report found that the cost of modal transfers must be reduced through integrated and coordinated infrastructure, integrated and standardized facilities and equipment, coordinated communication, coordinated management and administration, coordinated paperwork (documentation), and clarity of liability responsibility. A "mismatch" of any of these intermodal requirements would lead to increased cost of transportation.

A 1989 study by the Lyndon B. Johnson School of Public Affairs was performed to provide a comprehensive overview of state efforts to use multimodal and intermodal transportation plans, programs, and projects to promote economic development or to respond to competitive market considerations. As an economic growth and development mechanism, state transportation and economic development officials typically created incentive programs designed to attract and retain business. These programs financed infrastructure improvements or additions to a capacity which benefited local companies and communities. Few officially designated intermodal programs exist. In many states freight transportation was found to be almost entirely the realm of the private sector and, as such, considered private sector domain. Multimodal planning of freight movement primarily concentrated on port facilities. States declaring that their transportation plans are multimodal, actually were producing unimodal plans that operated independently under the statewide master plan. Some state transportation trust funds used flexible funding mechanisms (Maryland). For an intermodal project to occur, sufficient funding or at least a stable financial situation was required. No consistency was found as far as local county, or state involvement in the process beyond federally mandated requirements, nor did MPO and local community involvement appear to significantly affect states' actions.

In July of 1992, following the ISTEA's passage, the Transportation Research Board convened a conference on Transportation Planning, Programming and Finance in Seattle, Washington. The conference was held in conjunction with meetings of the National Association

of Regional Councils (NARC) and the American Association of State Highway and Transportation Officials (AASHTO). The goal of the conference was fourfold: to review emerging environmental issues affecting planning and programming decisions, to assess current and new approaches to programming and planning including technical and institutional aspects, to determine steps to address these issues, and to develop a research and action agenda. During the conference four issue papers were presented in the areas of planning, programming, finance, and institutional issues dealing with the impediments to creating a truly multimodal process.

From the transportation planning perspective the terms multimodal and intermodal were defined in the issues paper on planning presented by Meyer:

Multimodal planning is a process of:

1. defining a transportation problem in a generic way (that is, in a non-mode-specific manner);
2. identifying more than one modal option to solve this problem; and
3. evaluating these modal options in a manner that provides for an unbiased estimation of each mode's contribution, either individually or in combination, to solving the problem.

Intermodal planning is a process of:

1. identifying the key interactions between one or more modes of transportation where affecting the performance or use of one mode will affect another;
2. defining strategies for improving the effectiveness of these modal interactions; and
3. evaluating the effectiveness of these strategies from the perspective of enhancing overall performance of the system affected by intermodal connections.

In this context multimodal is viewed from the large, transportation systems planning perspective, while intermodal refers to the study of modal interactions as they affect performance effectiveness of the system.

In addition to providing the definitions of multimodal and intermodal planning, Meyer's paper discussed the shift in transportation planning towards multimodalism. Past barriers to multimodal planning were due primarily to institutional and financial issues. These included limits and incentives to local decisionmaking regarding federal aid projects using formula-based or categorical funding, traditional modal orientation due to an agency's mandate which is reinforced in daily operation, and the restriction of revenues to either highway or transit purposes. The new, changing environment for the development of transportation alternatives, independent of modal prerequisite, is part of the context of the ISTEA. Two examples of good multimodal planning were cited: the Maryland Commuter Assistance Study, and the I-15 Corridor Analysis in Salt Lake City. In conclusion, the author commented on the elements of a true multimodal planning process which would include policy goals and objectives, problem definition, criteria, analysis and evaluation tools, public involvement, a defined relationship between agencies performing multimodal planning, and other institutional issues.

In spite of the optimism expressed by Meyer, AASHTO has found, in general, multimodal planning is virtually non-existent within state DOTs. The agencies are not well organized for multimodal planning, staff training in multimodal concepts is insufficient, and databases are unequal and generally inadequate. Identification and involvement of customers is a problem. In spite of the ISTEA, categorical funding barriers still remain, especially at the state level.

Financial planning elements are required under the ISTEA at both the state and metropolitan level. A strategic fiscal planning process will be necessary to balance congestion relief, air quality and financial feasibility by considering conformity and concurrency. Capital, operating, and maintenance expenditures must be evaluated in terms of a life-cycle cost basis. Cash flow management and risk/uncertainty analysis are some of important tools that should be examined as methods to assure realistic financing transportation investments. In addition, public-private partnerships and other new funding sources, including impact fees and tolls, must be placed on the table to fund transportation infrastructure. A transition must be established between the existing process and a new process that meshes with changes to occur in the transportation planning and programming environments.

To take advantage of the new opportunities presented by the ISTEA, public agencies must work toward fulfillment of the following public finance objectives:

- establish a new transparent and flexible planning and resource allocation process
- improve the recognition of real cost and short falls
- given increased attention to new resources, pricing and benefit assessment
- increase the pressure for funding stability to meet program commitments
- invite new players to cooperatively participate
- establish a strategic perspective within life-cycle asset management

The result will be a funding process credible to state and political leaders which contains elements of realism and accountability. This new process will lead to a change from a wish list mentality toward an investment strategy based on policy goals and objectives of the transportation plans.

The issue paper on transportation programming presented by Neumann began with a review of objectives and methods of this process. Then, the directions toward which programming practice must turn to function effectively in today's environment were identified. Expanded attention is necessary for demand management strategies, multimodal solutions, operational improvements, maintenance and preservation of existing, and land use planning in the programming process. Integrated planning and programming which considers these requirements is used infrequently in practice by public agencies.

Changes in the structure of the overall programming process and the supporting data and technical analysis are necessary. Individual projects should be funded cost-effectively, and

resources must be designated in an effective way to address policy objectives. To facilitate trade-offs in the programming process, engineers and planners will be required to reach consensus decisions. The ability to inform technical and policy decision makers by indicating alternatives and explaining the cost/benefit trade-offs among the alternatives is as important as the end results of the process. Project coordination and resource scheduling are efficiencies that should be built into a programming process and will aid effective project delivery. Neumann proposes a new, more productive framework for the programming process.

- Explicit linkage with policy objectives and system planning to ensure the program is responsive to the full range of policy objectives
- A simplified overall program structure that can facilitate relating policy objectives to program categories (maintenance, preservation, improvement) and make it easier to integrate management systems into the programming process
- Use of bridge, pavement, and transit facility management systems to guide the maintenance and preservation program needs analysis, target funding analysis (i.e., trade-offs of different funding levels and facility conditions), project identification and evaluation, and program evaluation
- Use of a broad range of transportation criteria together with congestion, safety and intermodal management systems to guide development and evaluation of service improvement programs
- Explicit program evaluation and trade-off analysis examining the implications of alternative program funding levels
- Program and system performance monitoring to establish better accountability for program decisions and to provide feedback to policy makers and an ongoing long-range process.

However, this framework faces dangers evolving from the new decisionmaking atmosphere resulting from the ISTEA. The environment, economic growth, and mobility are feeding a wide ranging and often times conflicting set of policy goals. The new funding flexibility provided under the ISTEA removes one of barriers when considering a range of program choices. Multi-jurisdictional and multimodal coordination will have increasing significance in the future.

The proposed framework can address these issues in a number of ways. The linkage between government and planning needs to be strengthened, though in a manner which improves communication and simplifies the process to understandable levels for citizens and legislatures. The technical tools and procedures necessary to establish credibility between engineers, planners, and policymakers must be developed and used. A wide range of program alternatives and trade-offs including multimodal choices must be explicitly considered in the process, as well as extending the needs assessment criteria to include an expanded set of policy

goals. Accountability for program decisions can be improved by creating a program and system performance monitoring structure as an integral part of the process. Unfortunately, the financial reality at state, regional, and local government levels has heightened importance because of current fiscal constraints. Political reality requires collaborative effort among agencies and from both the public and private sector.

Institutional questions and intergovernmental relations issues of the ISTEA were addressed by McDowell and Edner. The ISTEA could cause state DOTs to reformulate their planning processes, reaching beyond their own resources within state government, and dramatically reform the relationship between MPOs and state DOTs. Institutional issues are structured around the current system — it is not a clean slate. The changes rest not only with technical issues. Explicit involvement of governors, legislatures, local politicians and governments, transportation agencies, the public, and other government agencies is necessary. Only a small number of states meet the requirements for statewide transportation planning considering energy conservation, land use and development policy, environmental protection and all modes of transportation. Transportation is becoming, more often, a means toward larger state objectives. State and metropolitan transportation planning put the state DOT in partnership with programs for spurring economic competitiveness and growth, protecting the environment, conserving energy, managing growth and organizing local government.

The state planning process is modeled after the MPO conceptually. The required content of state and MPO plans is explicit; the process of integration of those plans is not. The state must address the content of MPO plans within its planning effort, but the nature and content of integration is ambiguous. The operational meanings of coordination, consultation, and cooperation remain open until federal rulemaking make them clear. State officials become members of MPO policy boards under the ISTEA. The state develops long-range transportation plans for all areas of the state and only needs to consider coordination with the MPOs transportation plans. This opens the door for possible difficulties and inconsistencies in the transportation planning process. Planning at the rural and small urban area level is of concern as well as the capacity for planning analysis at the state and regional levels. New decision making capability at the state and regional levels should be built to avoiding gridlock in the process. Clearly defined roles are needed for those who set policy and those who impact or affect policy. In addition, many new partnerships developed in the spirit of cooperation and with common goals will be useful to the process.

The conference summarized its findings by recognizing that many of the observations, concerns, issues and suggestions have existed for many years; now new challenges are added to

the preexisting ones. Four primary issues are at the root of the discussion. First is performance based planning which is related to the management systems specified in the ISTEA. A strong trend toward this methodology already exists in the comprehensive planning profession. Secondly, the CAAA and the ISTEA require the ad hoc working relationships with the business community, citizens, and environmental groups, which have occurred for many years, to be institutionalized as "partnerships." This formal participation could be good, bad or indifferent depending on an agency's location and particular situation. In the past, the requirements of shippers and freight carriers have been neglected, and transit options will need to be considered more thoroughly. The scope of planning must be expanded to include many aspects not traditionally considered, specifically externalities (a current example is air quality). Statewide plans related closely to the institutional issues surrounding metropolitan areas. Transportation finance is an area where political, institutional, and technical issues abound. The flexibility possible under the ISTEA is a great opportunity, but must be viewed as a double edged sword since it can cut both ways. The closing phrase for the financial setting was "flexibility, yet competitive."

STATUS OF MULTIMODAL AND INTERMODAL PLANNING IN STATE DOTs

Since the passage of the ISTEA in the fall of 1991 various states have been developing new strategic plans and working toward preparation of statewide transportation plans to fulfill the multimodal aspects of the Act. Some states had a head start on their work due to the particular nature of those state's transportation system environments. This section examines the status of plans and processes formulated to meet the multimodal planning requirements at the state level. A cross section of state departments of transportation were asked for documentation or draft documents of each agency's current efforts to meet the multimodal planning requirements of ISTEA. This request included material on coordination of efforts with metropolitan areas and the methods to be used to transition from the existing planning process to a new one meeting the ISTEA requirements. Any changes in organizational structure or culture of an agency necessary to meet the new goals were noted.

Florida

The current State Transportation Improvement Program (STIP) is based on the Florida Department of Transportation (FDOT) Adopted Work Program and MPO Transportation Improvement Program (TIP) projects and is consistent with the State Long Range Plan. STIP projects for non-attainment areas are consistent with projects contained in the State Implementation Plan for air quality. STIP projects or project phases reflect the ISTEA priorities and must have funding available for each project or project phase. Projects for areas under 50,000

population are selected by FDOT in cooperation with local governments except NHS, bridge and Interstate maintenance projects.

The Long Range Component (LRC) of the 1993 Florida Transportation Plan recognizes that it is based on MPO adopted long-range transportation plans and FDOT plans following state and federal policies and procedures used since the mid 1980s. Emphasis in the current document is placed on the future LRCs which will respond to significant changes in state and federal policy, and uses this document to establish future policy direction. New state policies to supplement and expand recent policy changes will be proposed in the development of the LRC to create a comprehensive policy framework. If organizational structure needs to be changed to do this, it will be evaluated once this analysis is complete. Part of FDOT policy will be the designation of a major corridor system to emphasize statewide mobility, using the most efficient and effective choice of modes and their interconnections to enhance mobility.

The role of current the LRC (1993) is to establish a policy framework to provide direction for future transportation policy development. It will create an inventory of the total transportation system and evaluate specific changes necessary to accommodate the intermodal/ multimodal planning that exceeds existing work already being done. The goal is to establish a comparison benchmark. This inventory will serve as the information base for the periodic transportation needs assessment summary mandated by Florida law to update changes since the 1991 Needs Assessment. LRC policies will provide the basis for Ten-Year Program Guides. The LRC will direct the updates of the statewide modal plans which are integral parts of the long range element of the Florida Transportation Plan and provide guidance to updates of local and MPO plans. Future LRCs are to build on these results, conclusions, and policy changes in the initial LRC.

The 1994 LRC is to have targeted activities oriented towards developing an understanding of what transportation facilities and services are contained in current adopted long range plans and the needs they represent. It will provide direction to FDOT and guidance to other partners regarding implementation of recent changes in policy direction, including the CAAA, the ISTEA and major department policies that directly affect the mix of facilities and services to be provided by the state. The 1995 LRC will include a more comprehensive examination of policies and policy alternatives than the 1994 LRC. It will set long range goals and policies for transportation in Florida and will be the Statewide Multimodal Transportation Plan required by the ISTEA. The LRC for 1997 will be the first to reflect the complete incorporation of ISTEA mandates in the partners' plans, particularly the MPOs. In addition, it may propose changes in federal policy to influence the next federal surface transportation act. After 1997 LRC is adopted, it may be necessary to prepare interim updates on targeted issues. Subsequently, every three to five years

FDOT will prepare a comprehensive LRC update to include changes in policy direction and extend the LRC planning horizon.

Illinois

Development of the statewide transportation plan is already underway by the Illinois Department of Transportation (IDOT). Philosophically, it is a policy plan, though federally proposed rule making hints against that emphasis. IDOT management will submit comments to the proposed rule making. Available information on the state transportation system will be documented in advance of public hearings: system issues, problems (i.e., air quality), technology, resources, and a strategic inventory. Public forums, not hearings, will be held from April through the end of summer. The goal is discussion to gather public comments, not adversarial conflict. The draft plan is to be released in the fall, followed by a comment period through January.

According to Keith Sherman, Chief of Transportation Planning, the IDOT Office of Planning and Programming is divided into statewide (primarily highway) and urban program planning (transit, MPOs, and airports). Also, there is a separate Bureau of Railroads. There exist structural divisions; however, the entire organization is small enough that cross division communication is frequent and open. Therefore, in terms of multimodal planning, the process works. IDOT does the planning required in the ISTEA at the 90% level; though the terminology is not the same, it is functionally the same. Private parties, the railroads, the trucking industry, and shippers, will be included in meetings more often.

The intermodal management system is viewed as a forum for discussion of freight and passenger issues at regular meetings. This provides cross-modal communication and check systems for plans, in addition to a system inventory. On the passenger side, current planning is not done in isolation. For example, in the third airport study for Chicago, landside access and connections is one of the primary considerations. IDOT is concerned with freight center site development and providing meaningful input early in the development process. As an example, the Burlington Northern TOFC ramp in Galesburg, Illinois, developed in conjunction with IDOT, included a bridge replacement and access improvements.

The agency is very concerned with the federal government being realistic about the relation between government and industry, especially in freight transportation. Who is to judge efficiency? The IDOT view is that government agencies do not work to coordinate the effects of private freight transportation development on the system surrounding a site. Their goal is to

facilitate improved efficiencies for freight movement by improving public facilities in conjunction with private initiatives. This will help improve the operational efficiency of private parties as well as the system.

Iowa

In the Iowa Department of Transportation all modal plans are developed by the same group of people, and by virtue of the common staff, are all consistent with each other. The agency is presently organized along modal lines and no changes are anticipated to the existing planning process nor the organizational structure.

Maryland

Bajpai, et al, present the overall approach used in the Maryland Statewide Commuter Assistance Study. The study was undertaken to determine how best to improve the daily commuter's trip to work on that state's 24 most heavily congested corridors. Other major objectives of this study included: educating the public to the applicability of various transportation improvements to meet different types of transportation needs and conditions; creating multimodal options for short-, medium-, and long-terms; and establishing an ongoing statewide transportation planning process which can be updated as new information becomes available. The process established an analytical and institutional framework to evaluate, define alternatives, forecast travel demand, and estimate the capital, operations and maintenance costs. This framework yielded transportation improvement recommendations responsive to the needs of the commuters and the environmental goals of the state. Analytical criteria were established for measures of the problem, the possible solutions, practicality, and cost. A full range of transportation options, including mixed mode solutions within a corridor, were examined by the joint Maryland DOT/consultant team using matrix evaluation for the different measures.

Transportation facilities and programs in the Maryland Department of Transportation are separated into the following divisions: the State Highway Administration, the Mass Transit Administration (Baltimore area, commuter rail, freight, and statewide grants), Washington Metropolitan Area Transit Grants (Washington Suburban Transit grants), Maryland Port Administration, Maryland Aviation Administration (Baltimore-Washington International Airport, and other aviation facilities and programs) and the Motor Vehicle Administration. The Maryland Transportation Plan (MTP) identifies the objectives of the department and its modal administrations, discusses accomplishments, current activities and future plans, and highlights issues that require attention. The Consolidated Transportation Program is developed within the framework of the MTP and is consistent with it. The program element is updated annually by the department and contains cost estimates for operating, constructing, and improving transportation

facilities during the current year, the budget request year and the succeeding four-year period. It is developed in accordance with the current projection of six-year financial resources.

A conversation with Paul Wiedefeld, Director of the Office of Systems Planning and Evaluation of Maryland DOT, elucidated the effect of the ISTEA on Maryland. Ninety percent of Maryland's population lives within its MSAs. Maryland DOT is on all the MPO Policy Boards. Maryland DOT has close relations with local elected officials and works with local governments as well as MPOs before presenting transportation plans and programs to the General Assembly. The statewide transportation plan, the MTP, will build on Maryland Commuter Assistance Study methodology. There are no changes anticipated in the organizational structure to develop multimodal planning. They do not have true multimodal planning, yet, but they are moving in that direction. There is an open communication structure throughout the organization. Modal administrators (the senior staff and Wiedefeld's office) are in charge of the state plan. They meet weekly to monitor progress, by different modes, towards reaching the goals of the department policy, which was developed jointly. The systems planning organization is approximately 20 people plus each modal administration has a planning staff.

A key element of Maryland's transportation policy is the use of a generic fund to allocate money to transportation system investments. All transportation investments are funded out of the Transportation Trust Fund which was established in 1971. Moneys are distributed based on need. The fund is credited with taxes, fees, charges, bond proceeds, federal grants for transportation purposes, and other receipts of the department. All expenditures of the department are made from the fund. Unexpended funds remain in the fund at the end of the fiscal year. It is limited by required federal matching participation levels and it is not allocated by region. As an example, in 1988 the Baltimore LRT line was designated to receive $250 million from the transportation fund. This project used only state funds instead of trying to transfer interstate moneys. Between 1991 and January 1, 1993 the Maryland General Assembly transferred $74 million from the Transportation Fund to the General Fund of the state and $13.2 million from the driver's education account in the Transportation Fund to General Fund.

Minnesota

A paper by Gildemeister and Tanzer, written from the state DOT perspective for the 1991 Transportation Research Board Annual Meeting, notes that the lack of infrastructure investment in the U. S. is linked to the slowdown in economic activity in the nation. Three results of the deficiencies created by low transportation investment are cited: high transportation costs, urban congestion, and ineffective rural access. The effectiveness of Minnesota Department of Transportation's (MnDOT) multimodal planning is due to:

1. the agency organizational structure and mission statement, which strongly encourage multimodal planning and intermodal coordination
2. the agency philosophy promotes a "family of vehicles" concept that is subdivided into two groups: those that move people and those that move commodities
3. public and private support exists for multi-modal transportation solutions
4. funding sources are available for multi-modal transportation programs
5. private sector initiatives have emerged to identify and promote opportunities

The last statewide plan was completed in 1978. It has provided basic framework for transportation planning in Minnesota, mainly in individual modal programs. Since then, multimodal and intermodal planning activities are receiving a stronger emphasis at the state level. In addition, separate modal plans and transportation district plans are being developed. As a result, there is a top down and bottom up orientation to the statewide plan. MnDOT has hired a consultant to focus the vision and goals of the statewide plan. So far, two focus groups have been held and key stake holders interviewed to identify critical plan development issues, to discuss relationships between various transportation planning activities, and to outline optimal purposes and dimensions of the plan. A statewide GIS is viewed as a key tool to implement the management systems and state planning requirements of the ISTEA

An outside consultant was hired to create a strategic management process outlining preferred futures of the transportation system using input from state agencies, cities, citizens, and other interested stakeholders. The result was the 1992 Strategic Management Process. The manner in which two key issues are addressed in this document is important:

ISSUE IV: Intermodal

Issue Statement: Inefficiencies result from limited access to an integrated multimodal transportation system for moving Minnesota's people and goods.

Strategic Direction: Minnesota will build partnerships to develop an integrated multimodal transportation system which provides for the efficient movement of goods and people.

Perspectives on Direction: Minnesotans are currently committed to moving people by automobile. We have a heavily weighted infrastructure that allows trucks to move most commodities. MnDOT's organization reflects its long standing highway tradition; consequently, it is not a principal player in major transportation decisions and has little or no influence over the private modes. Transportation decisions are unduly influenced by a) funding sources, b) dedication of road user taxes, c) categorical restrictions of federal aids, d) the inability of certain modes to successfully compete for General Fund dollars, and e) the lack of infrastructure investment by the private modes. Modal systems essentially function independently from each other. No relationship exists between land use and transportation.

ISSUE VIII: Planning

Issue Statement: There is a lack of unified planning among government agencies and the private sector resulting in non-integrated transportation, socio-cultural, environmental and economic planning.

Strategic Direction: MnDOT takes the lead by establishing an integrated transportation planning framework. This framework includes different disciplines and levels of government and diverse members of the private sector.

Perspectives on Direction: A joint effort by state, regional, and local governments and the private sector is required to develop a statewide transportation system. Presently, each jurisdiction and the private sector play a role defined largely by tradition, federal funding requirements and legislative mandates. Future planning and development will become even more complex, with fiscal and environmental limitations calling for new approaches to meeting access needs.

The two issues and MnDOT's response to them is an example at the state level of reaching to meet the intent of the ISTEA. The response also takes on a realistic tone regarding the existing demands for participation in transportation decisions. MnDOT recognizes the necessity of public private partnerships if they are to create a completely multimodal agency. MnDOT wants to become a key player in transportation and broader development issues, and they actively promote an integrated multimodal system by providing better choices for the greater good. Integrated multimodal, multi-jurisdictional, and multi-disciplinary planning is found to meet the common needs of transportation system users.

In the longer term view, MnDOT has taken a total quality management approach using customer focus so internal and external customers have good information and meaningful participation in the planning process. The agency is examining the creation of knowledge, part of which is state-of-the art techniques for analysis. Lastly, they are reaching for the investment flexibility goal of the ISTEA through the identification of statutory, legal, and regulatory barriers to funding flexibility of the Act, and methods to overcome them. These elements of the department management process are extremely important in that they recognize the importance of multimodalism and the involvement of representatives of all modes and that the existing system is inadequate.

New Mexico

New Mexico's statewide multimodal planning process was summarized by Albright at the 1992 Transportation Research Board Annual Meeting. Their approach consisted of three primary steps: identify current theory and practice; develop a statewide multimodal team; and start a phased program to improve theory and practice. The project was defined as:

"the multimodal transportation modeling process should project all travel of people and goods involving New Mexico at a specified point in time in order that wise decisions can be made regarding the design of and the expenditure of public funds on safe, environmentally sound transportation facilities."

Albright concluded that, at a minimum, the public is served by the integration of planning data among modes. New Mexico has initiated a research process with the potential to improve transportation forecasts and, if successful, this process may help address primary transportation issues.

New York

To determine the status of efforts in New York state, Bill Lee, Director of the Statewide Plan for the New York State Department of Transportation was contacted. NY DOT has selected a policy theme approach, using twelve themes, for its new statewide transportation plan. The payoff to the state is thought to be better with this approach. The three previous state plans were balanced and comprehensive, the most recent in 1987. NY DOT wants to develop a **state** plan and has already created working groups within the department. Staff have met internally with all people to let them know about the ISTEA and how its requirements affect the agency. NY DOT will be working with other state agencies including: Economic Development, Planning, Environment, Agriculture, and Rural Affairs. They will meet staff from the Thruway Port Authority of NY/NJ, New York City, MTA, and others. Department energy has been focused on the STIP during the last six months with long-range planning on a temporary hold.

MPOs in the state range from New York City through mid-size ones (200,000 pop.) such as Buffalo and Binghamton to small MPOs (50,000 - 100,000 pop.) such as Ithaca. The agency will examine issues and commonalties of the MPOs, then address them on a statewide basis. The goal is to build on what their doing not just to incorporate it into the statewide plan. NY DOT has met with them and briefed them on the approach the department will use; it was met with a favorable response. Most MPOs are concerned with long-range plans and will struggle to meet the September 1, 1993 deadline. The MPOs have acute needs in long-range planning and want to find a means of legislative force for their plans.

A multipronged outreach effort for participation in the statewide planning process will be focused on educating the public as to what is germane to statewide planning. NY DOT will work with state universities to provide topic area seminars for selected stakeholders groups. Prior to these sessions issue papers will be distributed. In addition, less structured sessions will be conducted for the general public which will include teleconferencing to rural areas.

North Carolina

North Carolina Department of Transportation prepares a seven year transportation improvement program that is revised every year. In the introductory material for the 1993 STIP, the linkage between transportation, jobs and economic growth is noted as well as the broader implications of the ISTEA. Safety, environmental issues, and a shortfall in state highway funding are explained as top priorities of the NC DOT. The STIP is mostly oriented toward highways, though public transportation and rail projects are incorporated into the document. NC DOT is pushing to release a new document. As a result of the November 1992 elections that changed state administrations, a new Secretary of Transportation and a new Board of Transportation were appointed. The department has been slow to change priorities and policy direction, in part, due to the bipartisan nature of many projects and the need to complete an intrastate highway system. This may change with new state administration.

Ohio

In November 1992, the state of Ohio released for public comment a draft of their Access Ohio statewide transportation plan. Work on the plan has been divided into two phases, a macro-plan element and a micro-plan element. The work in 1992 focused on the macro-plan which provides, "a comprehensive, statewide look at multi-modal networks, including how they function together in intermodal facilities and hubs, and how they interact to promote a more efficient and effective movement of people and goods." This portion contains the preliminary goals, policy statements and inititatives which structure the entire plan. The first phase designates the state's highway and rail corridors, airport and water port hubs and transit clusters. The second phase analyzes and defines regional and local transportation access links to macro-level corridors and any other issues which would impede the execution of the macro-level plan.

A prioritized statewide transportation system provides the basis for the action plan under the context of the macro-plan as a framework for future decisionmaking. The process is based on criteria which serve to define corridors where a strong emphasis has been placed, creating the criteria and applying them in a defensible and replicable manner. The criteria are not all of equal importance to transportation system objectives or economic development activity. Table 3.1 lists the five evaluative criteria found to be significant by Ohio to transportation infrastructure and economic development. The weighting method selected to account for relative importance is also shown.

Table 3.1: Access Ohio Corridor Identification Criteria

Criterion	Criteria/Subcriteria	Weight
1	Average Traffic	25%
A	Commercial Truck Traffic (Daily)	(20%)
B	Class I/II Rail Freight (Yearly)	(5%)
2	Population	20%
3	Economic Acitivity	30%
A	Number of Manufacturing Establishements	(10%)
B	Manufactuting Employment Density	(10%)
C	Number of Manufacturing Employees	(10%)
4	Trade/Intermodal Centers	15%
5	Natural Resources/Agriculture	10%
A	Natural Resource Centers	(5%)
B	Agribusiness Centers	(5%)

SOURCE: Access Ohio Draft Plan, Ohio Department of Transportation, Nov. 1992, p. 10

Passenger travel is not explicitly included in the corridor identification criteria; the population and economic activity criteria were determined to include this element. Parameters for each criteria were defined and numerically ranked on a scale from 1 to 5, then corridors and hubs in the state were scored.

Five strategic policy goals for the state of Ohio were defined: systems preservation and management, economic development and quality of life, cooperative planning process and transportation efficiency, transportation safety and convenience, and funding. The plan is targeted to promote meaningful governemental cooperation and coordination to achieve these policy goals. The subsidiary policy statements are sufficinetly broad to encompass all transport modes. The initiatives to support the policy statements are specific to each mode though no individual mode is left out.

Oregon

The Policy Element of the Oregon Transportation Plan defines its purpose to develop a safe convenient and efficient transportation system which promotes economic prosperity and livability for all Oregonians. The Policy Element expands this purpose to four goals consistent

with the Oregon Benchmarks and the requirements of Land Conservation and Development Commission Goal 12: Transportation.

> Goal 1 - System Characteristics: To enhance Oregon's comparative economic advantage and quality of life by the provision of a transportation system with the following characteristics: balance, efficiency, accessibility, environmental responsibility, connectivity among places, connectivity among modes and carriers, safety, and financial stability.
>
> Goal 2 - Livability: To develop a multimodal transportation system that provides access to the entire state, supports acknowledged comprehensive land use plans, is sensitive to regional differences, and supports livability in urban and rural areas. Transportation facilities and services should support the development of compact urban areas.
>
> Goal 3 - Economic Development: To promote the expansion and diversity of Oregon's economy through the efficient and effective movement of goods, service and passengers in a safe, energy efficient, and environmentally sound manner. One mode must be connected with others through intermodal hubs which allow goods to move from truck to rail to ship or plane.
>
> Goal 4 - Implementation: To implement this plan by creating a stable, but flexible financing system by using good management practices, by supporting transportation research and technology, and by working cooperatively with regional and local governments, the private sector and citizens.

Three alternative plans were examined prior to deciding on the preferred option. The nature of the assumptions noted in the plan are interesting in comparison to other states. Plan implementation is dependent on close coordination between land use policy and transportation planning. The plan makes two fundamental assumptions with respect to land use policy.

1. Regional and local governments will continue to contain development within established urban growth boundaries. Should these boundaries not hold, the resulting low density developments would not be effectively served by transit, and additional highway investment would be needed to serve these areas.
2. Urban areas will use compact and mixed use development patterns to enhance livability and preserve open space. These patterns will support public transportation service and other alternatives to the automobile.

The transportation system will achieve the transportation-related economic and livability standards of the Oregon Benchmarks. State, regional and local governments will cooperate to achieve the vehicle miles traveled reduction standards of the LCDC Transportation Rule. In rural areas personal transportation will continue to be the only alternative available for most purposes. Telecommunications will be developed so that it provides a significant alternative to making transportation trips. The price for transportation services can include a wider variety of costs

leading to expanded alternatives to the single occupant vehicle. Most transportation services, other than public transit, will be provided by the private sector.

One of the basic concepts in the Oregon plan is that managing the transportation system may be just as important as constructing and operating it. Developing a rational pricing strategy for transport services, including the use of the highway system to be developed, will encourage travel and land use patterns which are in line with the livability goals.

Pennsylvania

A discussion with Ran Marshall, the Section Manager for Strategic Planning and Legislative Issues at the Pennsylvania Department of Transportation provided some insight to the status of their statewide process. PennDOT provided comments on the proposed federal rulemaking and is working to assess the tasks necessary to meet the mandates. In addition, PennDOT began a baseline inventory of the state transportation system. Management systems are in place.

In metropolitan areas PennDOT is working in close coordination with TMA and MPOs in response to mandated standards, though the system needs to be coordinated with TMAs in more detail. Intermodal facilities at water and air terminals are integrated into the planning process from the project start. Incident management programs were started in Philadelphia and Pittsburgh, looking to progress toward continuous monitoring of nonrecurring congestion. The approach which is already under way, is go to a higher degree of resolution in congestion/incident management system efforts. Progress reports reviewed by theSecretary of PennDOT and the opportunities/requirements of the ISTEA are updated monthly by staff. This report includes information on the legal mandate: section, provisions, deadlines, and federal register guidance; Penn DOT offices are involved in response and conclude with progress toward goals.

Wisconsin

Wisconsin Department of Transportation (WisDOT) places ISTEA in the context of a process and a plan regarding transportation as an integrated system, <u>not</u> as separate modal plans. WisDOT statewide multimodal transportation planning process contains three interrelated elements: a strategic/policy plan, an intercity multimodal plan, and metropolitan multimodal plan. The strategic/policy plan purpose is to examine broad issues, identify public concerns, scan past trends and consider future trends, and postulate transportation implications. This will help to guide department actions and could lead to major changes in direction. Strategic issues facing WisDOT include financing, economic development, intercity freight transportation, the environment, urban mobility (land use, demand management, and transit), and intercity passenger service. In addition, this element of the statewide plan addresses ISTEA requirements

which focus on federal, state, and local energy goals; social, economic, energy and environmental impacts; efficient use of existing facilities; reduction of single occupant vehicle travel and enhanced transit; transportation/land use consistency; and innovative financing of transportation.

The statewide intercity multimodal plan element is the result of a multi-step interactive process. A strategic analysis of market and technology trends, state of the art practice, environmental issues, and state, national, and international trends are important to the development of goals and objectives for this element and the creation of different multimodal system scenarios. Goals and objectives relate to efficiency, equity, environment, economic development, mobility, and energy implications of the statewide system. System scenarios are developed from descriptions of the existing passenger and freight systems and their forecasts from socio-economic data within the context of the goals and objectives and the strategic analysis. This leads directly to an multimodal interaction analysis of passenger and freight system scenarios based on preference surveys and demand models which yield a preferred alternative for each system. This results in the recommended intercity multimodal system scenario from which the statewide modal system plans are built. The statewide modal system plans examine by mode level of service, long-term needs (year 2020), system level cost/benefit analysis, and intermodal connectivity issues. Multimodal corridor plans, limited to high density corridors, are also developed from the recommended scenario. These provide more specificity in passenger modeling and freight analysis, detailed intermodal connectivity/terminal analysis, detailed capital, operation and maintenance cost data, and public/private sector cost contributions. The statewide modal system plans and the multimodal corridor plans are combined to form the state intercity multimodal transportation element.

The metropolitan multimodal plan element is viewed by WisDOT as a "new partnership" between MPOs and WisDOT. WisDOT expects to provide the statewide framework, planning criteria and standards, and technical assistance, and actively participate in MPO committees. Conversely MPOs are to provide land use plans, multimodal transportation plans and to be actively involved in WisDOT committees. WisDOT will provide guidance to the MPOs on alternative land use scenarios, alternative transportation responses, bicycle planning, pedestrian planning concepts, transit system planning, highway level of service, intermodal/multimodal integration, and system level environmental evaluation.

Metropolitan planning components follow the common process of formulating a strategic plan, data collection, forecasting, alternatives development and analysis, plan selection and finally implementation. MPO plans are to be developed in cooperation with the state and transit operators in an atmosphere of interdependence. Statewide long range plans are to be

coordinated and reconciled with MPO plans, and be developed in cooperation with the MPOs. Plans and programs should be integrated decisions systems. As a result of state approval of the TIPs, WisDOT influences MPO plans, and in turn MPOs have a special voice in state plans.

CURRENT TEXAS INTERMODAL AND MULTIMODAL POLICIES

With the review of the cutting edge state intermodal and multimodal transportation projects in place, attention must now be turned to Texas. What is the current state of intermodalism in Texas and what is being done to meet the intermodal mandates contained in the ISTEA? To answer these questions three areas must be examined: (1) Texas' own legislative mandates, (2) current organizational structures and policy making apparatuses that support intermodalism and multimodalism, (3) the views of Texas officials responsible for implementing intermodal and multimodal transportation systems.

House Bill 9 (H.B. 9) is Texas' own statewide intermodal mandate. This Bill, was passed into law during the 72nd Texas Legislative Session. H.B. 9 , like the ISTEA, focuses primarily on intermodal and multimodal passenger transportation. More specifically, the Bill charges the Texas Department of Transportation (TxDOT) with the task of developing a statewide multimodal plan. Pursuant to this goal, TxDOT established the Texas Multimodal Planning Team (MMPT) which is described later in this section.

As can be seen, the legislation is a relatively weak mandate compared to the ISTEA. However, House Bill 9 does show that the Texas State Legislature is aware of the national trend toward intermodal and multimodal transportation solutions. This awareness and the positive mindset it conveys bodes well for the funding of innovative intermodal and multimodal transportation systems. However, it remains to be seen whether House Bill 9 is a true indicator of the Texas Legislature's commitment to intermodal and multimodal transportation networks.

Texas Tomorrow – Transportation 1992-1998, the strategic plan for the Texas Department of Transportation was issued on August 31, 1992. This document sets out the vision, mission, and philosophy of the department, presents external/internal evaluation and concludes with departmental goals. The vision of the Texas Department of Transportation is stated as ".....a state transportation infrastructure that promotes for the people of Texas a mobile, economically healthy society and preserves or enhances the qualities of our environment and communities."

The department's mission is threefold:

- to provide the people of Texas with a transportation system that meets the social, economic, and environmental needs of the state
- to be a leader in the development of a state transportation network that capitalizes on the efficiencies of the various modes of transportation in promoting economic and environmental benefits
- to provide customer-oriented transportation services for the state's citizens, visitors and commerce

TxDOT operates under a philosophy which incorporates the values of continuous quality improvement, integrity in action through high ethical standards, respect and response toward customers and employees, and diversity and development in its work force and work environment.

The two goals of the TxDOT strategic plan are related through specific objectives with strategies to meet these objectives. Measurement tools to chart progress toward meeting objectives and strategies are provided. Goal 1 is to operate and maintain transportation systems and provide services to transportation users in a safe, efficient, effective , and environmentally-sensitive manner. The objectives and strategies to meet Goal 1 interpret transportation systems as those administrative elements already under TxDOT control, i.e., highways, ferries and tunnels, Gulf Intercoastal Waterway, the motor vehicle code, travel and information services, etc. The total integrated transportation system of the state, public and private, is implicit in this goal but not put forward in the objectives and strategies.

Goal 2 is to promote transportation decisions, with public input, at the local, regional and state level, and to invest in cost-effective transportation projects and programs employing innovation that:

- Enable alternative means of travel that use the most effective and efficient methods possible
- Stimulate and support long-term economic growth and development
- Increase safety, access, and mobility for the transportation of all people and goods
- protect and/or enhance the quality of the environment

The second objective of this goal is to assume a leadership role in effecting transportation planning at all levels that provides for a solid, dynamic, and environmentally sound transportation infrastructure. The outcome of the objective is measured as percent contracted federal project dollars jointly planned with MPOs, percent MPOs in compliance with ISTEA requirements, and percent completion of statewide multimodal plan (not stated whether this refers to the plan or its

implementation). The strategy to reach this objective is to coordinate and assist MPOs and other political subdivisions to conduct transportation planning that supports and complements the statewide planning process. In addition, coordination of a multimodal research program, and collection and maintenance of traffic and statistical data are part of this objective. This is measured by the number of research projects completed, and number of traffic and statistical data files updated. The third objective of this goal is to foster and assist the development of public transportation in Texas. Strategies are focused primarily on assisting in the development and delivery of public transit, and providing financial assistance to operators. This seems to be a rather limited role for a multimodal process in an agency charged with developing a statewide multimodal plan. Steps toward improvement in the interaction between modes and the provisions of transportation alternatives within the state for service in the state should be at the forefront of a strategic transportation plan.

The MMPT was established by TxDOT in an Administrative Announcement dated February, 1992. The MMPT's mission is to manage the development of a statewide multimodal plan. The MMPT receives input from two external committees. The External Modal Advisory Committee consists of 7 State and local officials outside of TxDOT that have an interest in the development of the statewide multimodal plan. The committee receives input from the External Advisory Panel. This panel represents local transit authorities, regional transportation officials, and port authorities. The Stakeholders' Advisory Committee, which also consistsof seven members, acts as a liaison between the MMPT and private industry and special interest groups like the Bicycle Coalition, the American Trucking Association, and the American Automobile Association. This committee is in place to insure that these groups have a voice in the development of modal focus in the statewide multimodal plan. The MMPT itself consists of seven members, a chairman, and a vice-chairman. The MMPT coordinates the efforts of TxDOT staff, external agency staff, and consultants who have been divided into modal subcommittees.

In pursuit of developing a statewide multimodal plan, the MMPT has the following responsibilities:

- To act as a steering committee for TxDOT staff and consultants performing research and analyses and drafting documents and recommendations
- To act as the liaison among the External Advisory Committee and the Stake Holders' Advisory Committee to ensure their perspectives are included in analyses
- To ensure the identification of unimodal issues, policies, and strategies is completed in a timely manner

- To ensure that the implementation of strategies and modal transportation plans is completed in a timely manner
- To ensure that the six management systems mandated by the ISTEA are implemented by the 1995 deadline

The last responsibility must be coordinated with the Integrated Engineering Systems Oversight Committee, which has been in charge of developing transportation management systems in the past. The reason the responsibility for management systems has been divided between the two committees is "to insure the integration of intermodal statewide planning and management system requirements."

In terms of a work plan, TxDOT has developed a three phase action plan for the MMPT. Phase I will initially examine the needs of individual modes independently of other modes and identify issues, policies and strategies for meeting these needs. This part of Phase I, termed "unimodal analysis," will be followed by a "multimodal synthesis," which will seek to combine the individual modal needs into a comprehensive identification of multimodal needs. After this synthesis, Phase II will begin. This Phase will consist of the identification of an implementation plan to meet identified multimodal needs. Finally, Phase III will consist of the actual development of multimodal transportation plans.

For phase I TxDOT hired Dye Management, a California based business consulting firm, to develop a business plan compatible with the development of the above multimodal plan. Dye Management was responsible for pinpointing departmental modal information and staffing needs. In addition, TxDOT negotiated a contract with Cambridge Systematics for the development of a statewide modal inventory system.

How effective will the MMPT be in developing an efficient multimodal and intermodal transportation systems? To answer this question, attention must be turned to how the MMPT is developing its plans. These plans are almost exclusively concerned with the development of a multimodal system. With the exception of designing the federally required intermodal transportation management system, little attention is paid to the development of intermodal networks. In this sense, the MMPT seems out of step with the ISTEA, which is primarily intermodal in focus. Although this in itself does not doom the MMPT efforts to failure, the way in which the MMPT is developing its plan is extremely susceptible to communication and coordination failures. This is because, in Phase I of the MMPT's action plan, individual modes are considered independently from the others in what the MMPT itself has termed "unimodal analysis." Such a planning effort could set up currents of modal independence in later planning stages, dooming modal coordination efforts. Although the MMPT may still be able to address the provision of

multimodal links between points, intermodal development will surely be stunted. A more intermodal focus must be required from the MMPT for successful intermodal planning to exist at the state level.

Discussions with TxDOT officials somewhat mitigated the above concerns, but also revealed that intermodalism and multimodalism are concepts that have not been fully explored by TxDOT. Three individuals from TxDOT supplied the information reported below: (1) Robert Cuellar from the Transportation Planning Division, (2) Richard Christie from the Public Transportation Division, and (3) Tonia Norman from the Planning and Policy Division.

All three individuals expressed that TxDOT was enthusiastically pursuing compliance with the ISTEA and were excited about the prospects for the statewide transportation network under the new federal legislation. Most of the information gleaned from the three individuals dealt with State / MPO coordination. Both Ms. Norman and Mr. Cuellar described TxDOT as having a close working relationship with all MPOs in the state. In terms of coordination, Mr. Cuellar stated that he has three staff members in the field working with the 23 Texas MPOs. This low ratio of TxDOT staff to MPOs could detrimentally affect state and MPO consistency as demanded by the ISTEA, but such an eventuality was not considered likely by Mr. Cuellar given the MPOs enthusiasm to work with the state. The only MPO shortcoming that Mr. Cuellar could see was the inability of MPOs to attract experienced staff. This problem was attributed to deficient MPO funding as well as the relatively short time MPOs have had to supplement their staffs since the passage of the ISTEA.

In terms of TxDOT staff, Mr. Cuellar stated that he is attempting to supplement his current highway oriented staff with other modal specialists. He predicted that such staffing changes would occur incrementally over the long-term. He also predicted that many of these changes would stem from Dye Management's business plan.

Of the three individuals, only Mr. Christie provided information concerning specific intermodal projects that have been planned. He mentioned two intermodal transit terminals that were in various stages of planning. The first one is to be located in Larado. This terminal will serve urban buses, rural transit buses, Greyhound intercity buses, and Mexican bus lines. The center will also include park-and-ride facilities, retail space, and transit offices. The plans for this project have been approved and it is now awaiting construction. A second transit center that will also include connection to AMTRAK is currently being planned for Bryan-College Station.

The only other comment of interest came from Mr. Christie. He noted that although the ISTEA had greatly increased the availability and flexibility of capital cost funding for transit systems,

federal appropriations of transit operating funds have been cut in the past year. Mr. Christie expressed concern that new intermodal projects may fall by the wayside as ISTEA funds are diverted to transit system operation and maintenance.

CHAPTER 4. THE ROLE OF METROPOLITAN PLANNING ORGANIZATIONS

BACKGROUND

Highway legislation, beginning in 1962, delineates a "continuing, cooperative, and comprehensive" relationship between federal, state, and local agencies. This was the beginning of an effort aimed at reducing the backlash by local governments and citizens over the planning process for the interstate highways being built through their communities. Initial design and location decisions leaned more toward physical planning than social or economic planning. The experts were optimizing their resources to generate a product that often sacrificed or neglected local needs while developing the nation's transportation network. Further legislation in 1973, 1984, and 1991 has worked to refine that relationship in an overall effort to increase local input into the nation's transportation planning processes.

The entity called the Metropolitan Planning Organization (MPO) was created to allow local governments input into the regional planning process. While a number of regional planning organizations have existed since before the turn of the century, there were no requirements for regions to bring together the planning efforts of their population subsets. Today federal law requires the governor of each state to designate an MPO for any region recognized by the Census Bureau as a metropolitan area of 50,000 or more persons. Most MPOs are commissions made up of at least one representative from every governmental jurisdiction within the agreed upon boundaries of the planning region. This format is intended to blend diverse local input with the technical expertise of transportation planners in order to develop a transportation system that will optimize both the efficient use of state and federal funds and the planning for the social, economic, and physical needs of the local and regional populations.

The evolution of the MPO as a responsible force in regional planning has taken time and will continue into the future. The ISTEA legislation of 1991 continues the decades long practice of improving local input by providing the MPO additional authority coupled with additional responsibility. In an effort to promote the autonomy of today's MPO, the law provides many broad guidelines and few specific criteria. While this method provides great latitude for creativity and regional individuality, it creates difficulty in promoting a specific concept like intermodalism. The next few paragraphs review the three sources currently available to guide MPOs in their pursuit of intermodalism.

The ISTEA Legislation - October 1991

While ISTEA has continued the shift toward local participation in planning, it has not clearly defined the role of the MPO in pursuing intermodalism. Section 1034 of Public Law 102-240 provides guidelines for metropolitan planning. Subsections address a variety of topics:

a) General Requirements
b) Designation of Metropolitan Planning Organizations
c) Metropolitan Area Boundaries
d) Coordination in Multistate Areas
e) Coordination of MPOs
f) Factors to be Considered
g) Development of Long Range Plan
h) Transportation Improvement Program
i) Transportation Management Areas
j) Abbreviated Plans and Programs for Certain Areas
k) Transfer of Funds
l) Additional Requirements for Certain Nonattainment Areas
m) Limitation on Statutory Construction
n) Reprogramming of Set Aside Funds

These subsections provide substantial information regarding the framework within which the MPO must operate, but offer little in terms of promoting expansion of intermodalism at the local level.

The legislation requires the MPO to develop a Long Range Plan (LRP). This 20 year plan is to be used to guide the Transportation Improvement Program (TIP) that will cover three years. All of the TIPs from across the state will be joined to form the State Transportation Improvement Program (STIP). This framework seems plausible and the legislation provides for public participation at the local level. The only intermodal reference in the MPO guidelines is found in the subsection that discusses factors to be considered while developing these plans and programs.

The MPO must, at the minimum, consider these 15 factors in developing transportation plans and programs:

1. Preservation of existing transportation facilities and, where practical, ways to meet transportation needs by using existing transportation facilities more efficiently

2. The consistency of transportation planning with applicable federal, state, and local energy conservation programs, goals, and objectives

3. The need to relieve congestion and prevent congestion from occurring where it does not yet occur

4. The likely effect of transportation policy decisions on land use and development and the consistency of transportation plans and programs with the provisions of all short- and long term land use and development plans

5. The programming of expenditure on transportation enhancement activities as required in section 133

6. The effects of all transportation projects to be undertaken within the metropolitan area, without regard to whether such projects are publicly funded

7. International border crossings and access to ports, airports, intermodal transportation facilities, major freight distribution routes, national parks, recreation areas, monuments and historic sites, and military installations

8. The need for connectivity of roads within the metropolitan area with roads from outside the metropolitan area

9. The transportation needs identified through use of the management systems required by section 303 of this title

10. Preservation of rights-of-way for construction of future transportation projects, including identification of unused rights-of-way which may be needed for future transportation corridors and identification of those corridors for which action is most needed to prevent destruction or loss

11. Methods to enhance the efficient movement of freight

12. The use of life-cycle costs in the design and engineering of bridges, tunnels, and pavement

13. The overall social, economic, energy, and environmental effects of transportation decisions

14. Methods to expand and enhance transit services and to increase the use of such services

15. Capital investments that would result in the increased security in transit systems

Only factor number seven makes a direct reference to intermodal transportation. Several other factors could include intermodalism in the consideration process, but the legislation leaves the MPO without any specific parameters of intermodal transportation or how to promote the concept at the local level.

The management systems, referred to by factor nine, are listed in section 303 and include this requirement:

> (e) Intermodal Requirements - The management system required under this section for intermodal transportation facilities and systems shall provide for improvement and integration of all of a State's transportation systems and shall include methods of achieving the optimum yield from such systems, methods for increasing productivity in the State, methods for increasing use of advanced technologies, and methods to encourage the use of innovative marketing techniques, such as just-in-time deliveries.

This statement is a broad definition of the last of the six required management systems and does not provide adequate additional guidance for planning by the MPO. The legislation even fails to clearly define intermodalism anywhere within its broad framework.

Interim Guidance - April 1992

The Interim Guidance (IG) was issued to aid FHWA and FTA field offices in clarifying the statutory requirements and target dates for states and MPOs. It was intended to emphasize the specific metropolitan planning activities and requirements that must be underway until the formal rulemaking process is completed. There are no additional inputs or definitions regarding intermodalism and/or intermodal planning.

The topics addressed by the IG are details and technicalities rather than concepts. The IG addresses designation and redesignation, boundaries and coordination, project selection and certification, but still fails to even define intermodalism. The IG then is another document that supports ISTEA's effort to increase local inputs but falls short in promoting intermodalism.

Notice Of Proposed Rulemaking - March 1993

This third document, the Notice of Proposed Rulemaking (NPRM), is the most helpful in informing MPOs about intermodalism. There is even a definition of intermodalism and multimodalism. The NPRM is divided into three sections, General, Section-by-section Analyses, and Rulemaking Analyses and Notices, and provides some encouraging insights for MPOs.

The first section finally provides a definition of intermodal planning, the "I" of ISTEA:

> Intermodal planning reflects a focus on connectivity between modes as a means of facilitating linked trip making. It emphasizes connections (transfers of people of freight in a single journey), choices (provision of transportation options to facilitate trip making), and coordination and cooperation (collaboration among transportation organizations).

It goes on to explain how previous projects by different entities were analyzed and pursued independently. ISTEA "would permit local officials to decide the specific institutional arrangements and procedures to be used in the consideration of transportation alternatives." MPOs are empowered to coordinate the analyses of implementing agencies in order to allow full consideration of various modes and the connections, choices, and coordination and cooperation the traveler or package must face in moving through or around within its boundaries.

The Section-by-section Analysis summary of the purpose of ISTEA delineated in Section 450.100 states that "the overall rationale for requiring this transportation planning process is to achieve an efficient, effective, integrated, intermodal transportation system for each metropolitan area." The comments on the Transportation Plan in Section 450.122 describe the intent of ISTEA as an effort to "strengthen the planning process and make it a central mechanism for

structuring effective investments to enhance overall metropolitan transportation system efficiency."

The NPRM is useful to the MPO as it elucidates the authority and responsibility of the MPO to plan intermodally. However, the MPO is, at this point, given full discretion as to the form and extent that it chooses to pursue intermodalism. The resulting condition is that the MPO must include intermodalism in its planning process but is not required to implement any specific intermodal efforts in its investments. The FHWA must find a way to press intermodalism into use without forcing local governments to act.

MPOs Nationwide

Metropolitan Planning Organizations (MPOs) nationwide are relatively similar in structure. The designated MPO for an urbanized area is usually composed of elected and appointed city, county, state and other transit authorities. The MPO provides a forum for cooperative decision-making by local government officials. The MPO is responsible for "carrying out and maintaining the urban transportation process" (1) through the development of the Unified Planning Work Program (UPWP), Transportation Improvement Plan (TIP), and a Regional Transportation Plan. Because of its wide range of responsibilities, the MPO relies on the support and recommendations for transportation project planning from a Technical Advisory Committee (TAC) and a Policy Advisory Committee (PAC). The technical unit reviews the technical accuracy of transportation plans and provides routine guidance to the technical procedures employed in the planning process. The TAC establishes and approves, when necessary, any technical procedures for the implementation of the transportation planning process. The policy organization is normally comprised of elected officials, transportation agency representatives, and other public members involved in transportation, including air quality and congestion management teams. The PAC is arranged in such a manner that "a good combination of policy-level input into the plan" (2) is effectively communicated between all parties involved and impacted by the transportation planning process.

Projects

Intermodal transportation projects are just starting to be identified. A limited survey of several planning agencies in various cities reveals a severe lack of intermodal planning. Although ISTEA presents an intent to encompass all modes of transportation (3), at the MPO level the focus is on developing intermodal passenger services.

The most common type of intermodal passenger service is the basic park-and-ride facility. Most cities with transit, whether bus or rail, offer park-and-ride opportunities. Other cities, such as

Seattle and Boston, have expanded this service to include water transport by boat and ferry, known as Park-and-Boat. (4,5)

Transit centers allow passengers to transfer from one mode of travel to another. North Central Texas Council of Governments, which oversees the Dallas/Fort Worth area, has plans for constructing several transit centers to allow patrons to transfer between bus and light rail transit. (6) These multimodal centers will also allow for park-and-ride participants. The city of Boston has similar transit stations where bicycle racks are to be implemented. (5) Future plans include two Dallas CBD Multimodal Transfer Facilities which will accommodate bus riders, vanpools, taxis, and possibly an adjacent light rail transit line. (6) In the Orlando urban area, intermodal opportunities associated with the proposed MagLev (magnetic levitation train) project are being reviewed. (7) Seattle residents were given the opportunity to voice their opinion in a local election. A majority of citizens voted for the Major Centers or Multiple Centers transportation alternatives, which will require the development of transit stations throughout the area. (4)

Several other intermodal projects have been proposed around the country which deserve recognition. Boston plans to expand its shuttle bus service from the subway stations to the Logan Airport terminals. An added incentive to make the subway-to-shuttle bus option more attractive to Logan aviation passengers is the abolishment of the fare. (5)

Requests for proposal on an intermodal terminal planning and feasibility study in the San Antonio central business district are currently being accepted. San Antonio hopes to encourage tourism and economic development by providing its visitors with access to various modes of travel. The terminal plans to "link AMTRAK, local transit, intercity bus, high-speed rail, rail service to Mexico, taxi, airport shuttle, and highway travel modes together at one centralized hub." (8)

An inventive intermodal project was developed in Orlando by the Greater Orlando Aviation Authority and the Canaveral Port Authority. The project proposed "building a rail line and utility corridor linking the Orlando International Airport and Port Canaveral." "This corridor would include rail lines for both passenger and freight trains, power and fuel lines, water lines, and bicycle/jogging paths" to be financed by user fees. Unfortunately, the Canaveral Port Authority has withdrawn its support for the project "due to lack of funding and public support." (9)

Summary

Intermodalism is gaining support and being promoted for passenger service. Most cities have provided interconnecting services between auto and public transportation. However, freight transportation has been overlooked. This may be due to the history of transportation planning organizations, which have been concerned in the past solely with people movement. Most planning agencies have well established working relationships with transit operators.

Unfortunately, most intermodal freight projects are handled by the private sector. For improving freight movement, transportation planing organizations will need to work with and understand freight shippers' concerns.

THE AUSTIN MPO

Background

Austin, Texas is situated on IH-35 just a few hours south of Dallas-Fort Worth and just over an hour north of San Antonio. Houston, a few hours drive to the east, completes a triangle that has one of the nation's ten largest Metropolitan Statistical Area (MSA) at each apex. The Austin MSA is home to over three-quarters of a million people and realized over 45 percent growth in population during the boom and bust cycle of the 1980s.

IH-35 passes north-south through the Austin MSA and roughly follows the Balcones Fault. This geologic a feature divides the prime agricultural plains on the east from the environmentally sensitive central Texas hill country on the west. Most of the city is located over the Edwards Aquifer and the city limits and Extra-Territorial Jurisdiction (ETJ) encompass a large portion of the recharge zone.

As the capitol of Texas, Austin tends to be politically charged. The City of Austin has more than its share of political fireworks as well. Strong no-growth sentiments often go head to head with ever increasing development pressure. The University of Texas and the various high-tech industries in the area create economies of agglomeration that are hard for other research facilities and clean industries to resist. Some see Austin as the next "Silicon Valley," or the "Silicon Prairie" in this case.

Even with this wide view of Austin, it is not difficult to see that the sheer volume of people and activities, the environmental configuration and sensitivity, the political and economic forces, and innumerable other impacts all come together to make planning difficult. The Austin Tomorrow Plan is the long range comprehensive plan that is currently in use, while a more recent one, AustinPlan, was developed but never adopted. Even though the Austin Tomorrow Plan has been approved, the City's growth since its 1980 adoption illustrates weak implementation of its goals. Leapfrog development, tax payers revolts, the Save Our Springs referendum, and myriad other factors impact Austin's transportation needs and serve to make transportation planning in this city even more challenging.

The Austin Transportation Study

The Austin Transportation Study (ATS) is the designated MPO for Austin, Texas. The local transit authority, Capital Metropolitan Transportation Authority, the State of Texas, Travis

County, and Austin have worked together within ATS for a number of years. The local airport authority is not currently participating as a part of the MPO's planning team. Originally headed up by and housed with Travis County, ATS is now located in Austin's City Hall Annex. Transportation Planning Director Mr. Micheal R. Aulick is in the process of expanding the ATS staff to handle the new demands ISTEA places on the MPO. In an interview, Mr. Aulick expressed concerns over the lack of guidance in regard to intermodal planning. ATS is pressing on to meet the various technical requirements and deadlines that will allow continued funding and is looking forward to opportunities to incorporate any intermodal projects that would improve the efficiency and effectiveness of Austin's transportation system.

Planning Tools

The first of the three ISTEA planning tools for the MPO is the Unified Planning Work Program (UPWP). The ATS adopted its current UPWP on August 18, 1992. The UPWP includes seven activities that categorize the tasks necessary to implement ISTEA in Austin. The UPWP addresses a public transportation element, a bicycle element, a pedestrian element, and a roadway element. Some of the elements within the UPWP require "identifying important linkages with other modes of transportation" as a part of the task.

The second tool is a Long Range Plan (LRP). The ATS had developed a Transportation Plan that was adopted in 1986. A revision of that plan was underway at the time the ISTEA legislation was passed. The current LRP is fundamentally composed of this previous plan and incorporates the additional requirements created by ISTEA.

The third MPO tool is the Transportation Improvement Program (TIP) that is derived from the LRP. ATS issued a draft TIP for the 1994 to 1996 fiscal years on March 2, 1993. Part I lists the TxDOT projects that are planned within the MPO boundaries. Part II contains project requests for STP 4C funds from TxDOT, the City of Austin, Travis County, Williamson County, the cities of Round Rock, Bee Cave, and Cedar Park, and Capital Metro. Part III is the expanded information that Capital Metro must provide for FTA funding.

The draft TIP does not even mention intermodalism or intermodal projects. About 80 percent of the projects seeking STP 4C funding are directed toward adding travel lanes or building new roads. Less than 15 percent of the projects impacted modes other than automobile travel. Only six of the 50 projects listed are seeking to improve the choices, connections, and coordination and cooperation aspects that have been used to define intermodal planning.

These three planning tools are continuing to evolve as guidance from FHWA is promulgated. With these tools the ISTEA objective of coordinating diverse interests, public and private, local and regional, is being met. However, the freight industry has not been involved in

this integration process. The use of these planning tools with continued refinement in the concept of intermodalism and continued commitment by ATS will be reflected in the future of the Austin transportation system.

Summary

Currently there are several of the more common intermodal opportunities available in the Austin area. There are a number of Park-n-Ride facilities to encourage carpooling and transit use, Capital Metro offers a rubber tired trolley service in the downtown area and shuttle services for the University of Texas, cab services are available at the airport, and the Capital Area Rural Transportation System (CARTS) offers services to Austin and its neighboring communities. As these projects illustrate, most of the intermodal effort to date has been for passenger travel and is more multimodal in nature.

With the UPWP, LRP, and TIP underway, ATS is making great strides toward complying with ISTEA and shows substantial potential to improve intermodal planning and service provision for Austin. There are a number of issues that merit attention within this planning process that are not apparent. Given Austin's location on the IH 35 corridor between Dallas-Fort Worth and San Antonio, and its proximity to Houston, what are the implications of the North American Free Trade Agreement (NAFTA)? With the closing of Bergstrom Air Force Base, the 18 years of uncertainty for relocating Robert Mueller Airport will apparently be coming to an end in the near future. What will this mean to all other surface modes? As further growth knocks on Austin's door, how can this plan work to keep Austin off the non-attainment list that it has already come close to joining on a few occasions?

The transition from the old "you do your thing, I'll do mine" planning and implementation methods to the proposed integrated methods of ISTEA will take some time. ATS has begun to move in that direction in regard to technicalities and requirements, but has barely begun to incorporate intermodal planning. There are two main problems delaying the start. First, and curable, is the lack of specific direction and motivation by federal law regarding intermodalism. Second, and incurable, is the planning resistant environment of Austin. Both of these factors will impact the ability of ATS to introduce intermodalism and improve the Austin transportation system within the guidelines of ISTEA.

THE HOUSTON MPO

Background

Houston, Texas has become one of the most dynamic cities in the Southwestern United States, surpassed in size by Los Angeles only. Houston's beginnings were modest but it soon displayed growth patterns unique to those cities of the American West. The city has a consistent history of doubling population every 20 years since 1850. This growth has been a fact which continues to both astonish and concern, as it has continued largely unabated. During the previous 20 years Houston has come, in a sense, to represent the accepted norm of urban growth in the United States. The city's nearly geometrical progression of increased development sustains the image of its newness, a phenomenon which belies the very real fact that urban issues, at a variety of scales, have been a part of its history from the very beginning.

Houston was one of the earliest towns to be planned after Texas won its independence from Mexico, and ultimately the most successful if measured by size and population. The city was laid out in the grid pattern from its inception and each acquisition of new land also fell subject to the grid. The grid pattern later proved to be a source of irritation when traffic increased because traffic streams were continually crossing. "From the very beginning, transportation and the technologies used in providing it have been basic factors in the vitality of Houston's urban development and its physical form."

Houston is a relatively new, low-density city which is heavily oreinted towards automobile transportation. Half of the city's residential and commercial real estate has been built since 1960. Two-thirds of all office space was built during the 1980s. Employment is distributed within a large number of activity centers other than the central business district. Commuting distances are long with work trips of 25 - 30 miles not being uncommon.

Today, Houston represents all the negative consequences of allowing a city to grow unchecked. It has been rated as having the second worst traffic congestion in the country after New York City, but this is just one item on a very long list. "Houstonian politics have always embodied a laissez-faire attitude in terms of government and private practice. During the boom years this system appeared to work, with Houston's successful growth coalition promoting the city's free enterprise system and the anti-state attitude of minimal government interference with land use. However, a lack of zoning restrictions and realistic planning for the future has left Houston at risk."

Houston's lack of zoning restrictions has yielded violations of residential areas by industry, most noticeably in predominantly African-American sections of the city. Overbuilding throughout Houston has also increased the potential for land subsidence.

The Politics of Houston. "Most Houstonians, not only conservative boosters, would contend that any analysis of Houston's success must also include the role of the political culture of unregulated capitalism. This argument has it that since the Allen brothers successfully marketed a Gulf Coast swampy area, the city of Houston has known growth and prosperity due to is free market economy — an economy unbridled by government intervention and supported by an ideology of laissez-faire capitalism. In Houston free enterprise is still the gospel."

The predominant thrust in Houston during the Twentieth Century has remained anti-government, anti-regulation, anti-union, anti-public planning, and anti-taxes. The reigning authorities have been against anything which might represent a limitation on the economic privilege and activity of the city's business community. For example, Houston was the last major city to adopt a zoning ordinance. Planning has been done, until very recently, by the private sector or done by the public sector at the request and under the guidance of private sector leadership. There are no state or city income taxes and property taxes have always been low. The private sector is the driving force in the city. In this atmosphere, the government provides a minimum of basic services and assists business growth. Citizens who want more than the minimum go the the private sector to get support.

Density. The urbanized area of Houston lies on a flat, featureless plain covering some 900 plus square miles. Unlike many other large metroplexes, Houston is not enclosed by suburban jurisdictions but instead dominates the metropolitan area. It has managed to do this by annexing surrounding areas, through which it has expanded to 590 square miles. Houston's population has increased almost exclusively through annexation. Since 1940 the city's population increased by four times, but the population of the city's 1940 boundaries has remained essentially unchanged at 375,000.

Population decentralization in Houston has been occurring for a number of years. Employment is somewhat more centralized than population. The central business district's share of total employment has been steadily declining during the previous two decades and now constitutes less than 11 percent of total metropolitan employment. Most of the recent growth in metropolitan employment has occurred outside of Loop 610. Between 1970 and 1985, total inner-city (within Loop 610) employment grew by 92,000 jobs, whereas 671,000 new jobs or 87 percent of the total were created outside the Loop 610 area. During the 1980s, all of the growth in population occurred in areas 20 - 30 miles from the CBD. Much of the new construction occurred in master planned communities. There has been little population altering, residential development in the inner-city. Since 1960, the inner-loop population has fallen from 535,000 to 442,000.

Houston is not a city that developed in concentric, symmetrical rings. In general, the eastern side of Houston is dominated by the petroleum and chemical industries and blue collar residential communities. The more affluent neighborhoods have primarily developed in the western and northern sections of the metropolitan area.

The average population density in Houston is a low 3,000 people per square mile. The densest areas of the city are less dense than the average density of many of the large older cities of the Northeastern United States. The low density of Houston is largely due to large amounts of vacant land, Houston's transportation system and leapfrog development. There are seven major freeways leading into the CBD and three major loops or circular roads. The inner loop, about five miles from the CBD; Beltway 8, which is about 10 to 12 miles from the CBD; and FM 1960/Highway 6, which has recently been expanded to form a continuous six-lane arc around two-thirds of the metropolitan area at a distance of between 20 to 25 miles from the CBD. The intersections of circular and radial highways have promoted concentrations of employment and retail activity.

"A non-ubiquitous transportation system results in a complicated distribution of population density. Housing, retailing and other businesses gather along high speed transportation corridors. Spread-out, leapfrog, spider-like development is promoted. In Houston's case, the development of freeways increased density along the freeways and decreased density in suburban areas located away from the freeways. Land considerably distant from freeways or circular roads that provide access to the freeways tends to remain vacant, while land close to the freeways, but ten to fifteen miles further out, is developed."

The road system has an important impact on the pattern of employment decentralization. Of the total 156 million square feet increase in office space during the 1970s and 1980s, 117 million square feet, or 75 percent of the total, were built in employment centers at or near the intersections of major freeways or thoroughfares. By 1989, more than 30 percent of office space was in suburban locations, employment decentralization encouraged residential decentralization and increased the forces leading to linear and leapfrog development. Leapfrog development can also be explained by the heterogeneity of the land. Some parts of the Houston area contain small faults, old oil and gas fields, or have poor access to roads. Other parts of the Houston metroplex suffer from poor drainage characteristics. Developers have turned to the best wooded land for development, even if it meas greater distances from the CBD.

The Houston Metropolitan Planning Organization

An examination of the Intermodal Surface Transportation Efficiency Act of 1991 reveals that the legislation requires active planning for intermodal transportation activities on a state and local level. Specifically, the legislation has required the formation of new governmental bodies on

the local level called metropolitan planning organizations or MPOs. The MPOs are charged with the task of fomenting and implementing a transportation plan for a region with specified boundaries. Those plans are to include actions to promote intermodalism such as bike paths, rail and High-Occupancy-Vehicle (HOV) lanes.

The Houston-Galveston Area Council. The Houston-Galveston Area Council has been designated by the Governor of Texas as the MPO for transportation planning in the Gulf Coast State Planning Region. The region consists of 13 counties - Austin, Brazoria, Chambers, Colorado, Fort Bend, Galveston, Harris, Liberty, Matagorda, Montgomery, Walker, Waller and Wharton. The H-GAC utilizes a Transportation Planning Committee, which is composed of 21 locally elected officials and technical representatives of area agencies, to provide policy guidance and overall coordination of the multimodal planning in the region. They also work in cooperation with TxDOT and the Metropolitan Transit Authority of Harris County. The Transportation Planning Committee and the H-GAC Board of Directors have complementary roles in transportation planning. The Council's Board of Directors establishes the overall policy for comprehensive planning coordination for the region; whereas the role of the Transportation Planning Committee is to proivde a single policy direction for multimodal transportation planning and development.

The Metropolitan Transit Authority of Harris County. The METRO was created in 1978 through voter approval. At the same time, the voters approved a local one-cent sales tax to partially support the construction and operation of a comprehensive regional transit system. The METRO works in cooperation with the H-GAC, TxDOT and area government officials. The METRO operates numerous park-n-rides and the HOV lanes, and they have plans for the construction of a light rail line from Katy to downtown. METRO views its primary objective as being to reduce traffic congestion in the Houston metroplex. Its principal tool in solving the region's traffic problems is their bus system. They also fund a number of "mobility projects," which are street maintenance and improvements. They spend at least 25 percent of their funds from the one-cent sales tax for this purpose because it helps the bus fleet to run more efficiently.

Current Modes of Transportation in the Houston Area

Automobile. The typical Houston transitway, or HOV lane, is located in the median of a major thoroughfare, usually a freeway. It is 20 feet wide, reversible and separated from main traffic lanes by concrete barriers. These lanes move large numbers of people in commuter and express buses, carpools and vanpools at maximum speeds of between 50 - 55 miles per hour during peak traffic periods. At first they did relieve some of the congestion on the freeways, but a recent independent study revealed that they are now having little impact.

As of November 1992, METRO was operating 46.5 miles of transitways in four major Houston traffic corridors, carrying more than 65,000 passenger trips each day. The Katy (IH-10 West), the Northwest (U.S. 290) and the North (IH-45) are complete and operational. The Gulf Freeway has 6.5 miles of finished transitway and another nine miles are under construction. The Southwest Transitway between Bellfort and Shepherd has recently opened. Design and construction is underway for segments of the Eastex Transitway from Loop 610 to Will Clayton. It is scheduled to open in early 1996. A transitway in the Westpark corridor is part of the Regional Bus Plan. In October, the METRO Board gave approval to go ahead with the design of the facility. Plans are now on the drawing board to expand the North Transitway. When complete, the transitway network will contain about 100 miles of transitway facilities.

The Smart Commuter Program. This two component project combines the transitway network and high technology to promote commuting by bus, carpool and vanpool. Smart Commuter is based on the belief that commuters who have access to accurate information about bus routes and schedules, instant ride matching programs and current traffic conditions will more likely use public transportation or some other high-occupancy commute mode.

The first element of the pilot program focuses on the suburb to downtown bus market along IH-45, north of downtown. It may use leading edge videotext or advanced telephone technologies placed in commuter homes and work places to convey current traffic and transit information. The second component focuses on the suburb to suburb travel market in the IH-10 West to Post Oak/Galleria corridor. It will be structured to encourage a shift from driving alone to carpooling with two or more persons. The first year of the four-year Smart Commuter Project will be spent on design and development, followed by a three-year demonstration project.

As part of the larger $17 million Intelligent Transportation Systems (ITS) system, this $5 million project has several funding sources. In August of 1992, the Federal Transit Administration awarded METRO a $500,000 grant that the authority combined with a $125,000 contribution of its own to help finance the project. The Texas Department of Transportation also is participating by contributing $1.25 million and the Federal Highway Administration has contributed $2 million.

Bus. Currently, METRO operates a fleet of 1,072 buses. During peak periods they operate 1,022 buses on the street. METRO adopted a regional plan in 1992 that will increase the fleet by 650 buses. They will also replace the 1,040 diesel buses with clean-burning liquefied natural gas vehicles. They will also make use of a "smart bus" system which will carry numerous electronic enhancements to monitor passengers, fares, communications, motor functions, driving and traffic. An automatic vehicle locator will give the exact location of the bus at all times, allowing both traffic flow and scheduling of buses to be closely controlled.

Between now and 2010, METRO will acquire 650 new buses on top of replacing the current fleet to meet the demands of the region's growing ridership. Under the Regional Bus Plan, the Authority's strengthened bus system will provide inner-city riders with significantly expanded crosstown service and it will offer Park & Ride patrons more direct service to activity centers from suburban origins

The Regional Bus Plan relies on operational changes to provide riders with greater latitude in getting from point to point in the areas. For example, each Park & Ride location will have two services — one non-stop to downtown and a second that will stop at a regional transit center en route to its primary destination (Greenway Plaza, Galleria, etc.). In each of these operations, there will be a maximum of one transfer to other major destinations. Because the Regional Bus will make it easier to use public transit from residential areas to densely developed employment centers, ridership is expected to increase noticeably by 2010, almost 60 percent compared to 1988 levels.

There are two events which must be completed before the plan can take shape. First, the preliminary engineering and final environmental impact studies must be completed, which is scheduled for this spring. Second, fully authorized federal funding is anticipated by June 1993 in the form of a Full Funding Grant Agreement.

Air. There are 149 airports in the 13 county H-GAC region. There are 3 primary airports: William P. Hobby Airport, primarily used for domestic passenger flights; Houston Intercontinental, primarily used for foreign air travel and freight movement; and Ellington Field, which is operated by the U.S. Air Force. Currently, the City of Houston operates a shuttle from downtown to Intercontinental Airport, but that is the only intermodal link.

Rail. Information on heavy rail capable of servicing freight traffic is nearly non-existent. The author has spoken with officials at the Texas Railroad Commission and they informed me that information as to the tonnage of freight, and types of freight carried through Houston is not available. To date, this sort of information has not been compiled for all of the railroads servicing Houston, and the individual rail lines refuse to reveal the information. The City of Houston has been after this information as well in order to plan hazardous materials evacuation procedures, but the railroad companies have not been forthcoming. Houston Metro has acquired two abandoned rail lines, and the Texas Department of Transportation is about to acquire a third. Both agencies are hoping to use the newly acquired lines to implement a light rail system in the metroplex. Currently, METRO is negotiating with four rail companies to determine thier best offers to operate demonstration commuter lines in four transportation corridors - Katy, Clear Lake, Missouri City and Harris County. They want to share some of the existing 300 miles of track in Houston.

Port. The Port of Houston currently has four docks, a fifth dock is near completion, and construction on a sixth dock is about to start. The port has rail, trucking, and pipeline facilities. In a discussion with Jim Stratton of the port, he claimed that the port was not aware of the ISTEA legislation. Sea-Land handles a majority of the rail freight into and out of the Port of Houston, but Southern Pacific is the primary rail line. Approximately 100 truck lines operate in and out of the Port of Houston. This area will be covered more fully in the chapter on public/private partnerships, removing the need for further discussion here.

Houston's Plans for the Future

The 1993 TIP for Houston and surrounding areas was developed by the H-GAC. Listed below is a summary of the planned improvements.

1. Completion of the Congestion Management Plan
    a. Rideshare Computer: purchase of hardware and software for matching potential carpool/vanpool users
    b. Advanced Transit Scheduling: an automated telephone system for schedule and route information
    c. Automatic Vehicle Locator: development and purchase of a Geographic Information System (GIS); will assist in providing a prompt response in the event of an emergency; will also provide information for other transit information systems, such as screens at transit centers
    d. Regional Computerized Traffic Signal System: will optimize signal timing and operations by unifying the signals into a manageable system so that progressions can be programmed to facilitate traffic flow

2. Completion of Transportation Control Measures as part of the Conformity Analysis
    a. Vanpools: purchase of 50 vans through funds donated by TxDOT; METRO will administer the program
    b. Park-and-Ride: increase the number of parking spaces by 4,833 by December of 1995
    c. Peak Hour Bus Service: increase the number of buses operating during peak hours by 114 new vehicles by 1996
    d. Transitways: increase HOV lane mileage by 53.5 miles

e. Employer Trip Reduction Program: businesses with over 100 employees that go to work during peak hours must submit a plan to reduce work-related vehicle trips by 25% or increase vehicle occupancy rates by 25% by 1996; the plans must be submitted by 1994

f. Central Control Facility: develop a central control facility for the Computerized Transportation Management Systems (CTMS), which will consist of surveillance and traffic signalization optimization

g. LNG Conversions and Facilities: upgrading existing bus operating facilities to accommodate LNG operations so as to reduce particulate emissions from METRO fleet vehicles

Recommendations

The first stage of suburbanization in the U.S. began with the relocation of residential development outside the center city. As population grew and automobiles became more common, the boundaries of cities expanded accordingly. Radial transit lines allowed for city expansion in the early part of the century. Widespread availability of the automobile, construction of the Interstate Highway System, FHA low interest home mortgage loans, economic prosperity, and population growth were strong incentives for suburban residential development after World War II. People could live in the suburbs and commute to jobs in the city.

Suburbanization of jobs and residences has resulted in new cities developing on the outskirts of old, traditional urban centers. Metropolitan regions have grown many miles beyond their boundaries of 20 years ago. A new metroplex has been created with multiple high density activity centers surrounded by lower density residential areas. Like it or not, new cities on the edge of metroplexes establish the context for much of the future transportation investment. We need to focus on these issues instead of mourning the loss of traditional downtowns. With the passage of ISTEA providing new planning requirements, new programs and new flexibility in decision-making, it seems to be an opportune time to reconsider the importance of land use development and transportation in decision-making.

Accessibility is one of the biggest transportation problems in urban areas. As employment centers have grown in Houston, congestion has begun to take its toll on travel time. Increases in commute times have naturally resulted from the increases in congestion. Once a traveler reaches his or her destination, then there is a problem of internal circulation. Internal circulation in Houston is based on the single occupant automobile. The city is forced to operate on the automobile scale due to the pattern of development — low densities and office buildings

surrounded by vast expanses of surface parking that is either cheap or free to employees. This type of environment is extremely hostile to the pedestrian. Walking or taking any form of mass transit is difficult. The purely automobile scale is unfriendly, while the purely pedestrian scale is extremely dense like Manhattan.

To develop the choices necessary to operate on a combination of automotive and pedestrian scales, retrofitting of these edge cities may be required. Retrofitting is a filling in process that develops interesting, walkable areas where a person can find a decent place for lunch and possibly do some shopping as well. If an easily walkable area is created, then restaurants and other signs of urban civilization will follow. Another possibility is Taxi 2000. The concept of Taxi 2000 is to have a kind of individual rapid transit with stations in critical areas surrounded by pedestrian-oriented areas.

Yet another option for Houston is to impose impact fees on developers. Presently, a lot of development is done without much thought to the effects it will have on the existing transportation infrastructure. Road improvements are often an afterthought or are given minimal consideration at the initial onset of the building. Developers should be made to conduct a legitimate traffic impact study that estimates the increase of traffic on each affected road at build-out. If the impact levels are above the capacity of the system, then the developer should provide a portion of the funds to pay for the necessary improvements. This would be difficult because some developers will purposely underestimate the impacts. Another problem is that states and localities compete for chances to expand their tax bases so the developer could just go somewhere else.

Transportation planning should also broaden its focus to include socio-economic issues. Transportation does not exist in a vacuum. Transportation drives development and development drives economics. The recent settlement patterns of suburbanization have a negative effect on the poor, increasing their plight and poverty. As more and more businesses move out of the inner-city, the opportunity for the urban poor to find work becomes more difficult. Circumstances are less favorable for the urban poor to find employment within a practical travel distance.

There are three strategic approaches to reducing inner-city poverty problems:

1) Development approaches that try to recentralize opportunity towards the residences of the poor. The leading instrument of this pattern is enterprise zones.
2) Dispersal strategies that seek to decentralize the residences of the poor from the inner-city towards edge cities and suburban employment opportunities.

3) Mobility strategies that seek to improve transportation linkages between suburban employment opportunities and inner-city concentrations of unemployed or underemployed persons.

The most viable of these three is the transportation-based strategy. Settlement patterns, such as edge cities, predicated on automobile-based mobility, creates a regressive schedule for transportation costs. Mobility by other modes has declined in recent years and the relative costs of public transportation have risen. In many cases there is little or no public transportation serving suburban employment centers. For the past three decades, transportation policy has not dealt in a sufficient and sustained way with the regressive schedule of transportation costs. Reverse commuting alternatives are a possible way to overcome the transportation shortfalls of the urban to suburban commute patterns. Several reverse commute demonstration projects have been sponsored by the Federal Transit Administration with some success. To ensure success, employers at suburban employment centers need to become involved. They could possibly help by providing transportation from inner-city location to their employment parks. Transportation systems need to be restructured, in terms of routes, schedules and fares to better support this regressive set of transportation costs among the low income worker.

A short list of policy recommendations would be for the City of Houston to tackle point source pollution, do more physical planning, and perhaps look at congestion pricing or a progressive wheel tax based on the value of the car to fund transit improvements.

Physical planning policies, particularly reurbanization and reorientation of transportation priorities are important means of reducing automobile dependence. A set of policies for physical factors that planners can control to reduce automobile dependence are:

- increase urban density
- strengthen the city center
- provide a good transit option
- restrain the provision of the automobile infrastructure

For physical planning policies to have much promise in reducing sprawl and dependence on private motor vehicles, it is necessary that such policies, once adopted, be supported by and coordinated with economic policies in land use, housing, and the provision of infrastructure, including highways. Subsidies for automobiles and housing that favor low-density suburban development create overwhelming barriers to the establishment and effectiveness of countervailing physical planning policies.

CHAPTER 5. PRIVATE SECTOR INTERMODAL DEVELOPMENT

ISSUES CONCERNING THE PRIVATE SECTOR

Issues currently facing the private sector include not only management and regulatory constraints but also financial, economical, environmental, and even physical constraints. To address and overcome these constraints will require all the intermodal players to sit at the same table, abandon their adversarial postures and develop a cooperative atmosphere.

When the private sector of intermodalism is discussed many people automatically think of freight movement and not passenger movement. While this is true, for very good reason, we must not ignore the passenger side.

> The American economy depends more and more on producers and consumers all over the world. Over the past 20 years imports and exports have increased so that they equal one-fifth of the U.S. gross national product.

Twenty percent of the GNP represents a substantial sum of money. It is vital to this country to have and maintain an efficient transportation system. The private sector within the U.S. is no longer faced with just competing with fellow domestic rail and motor freight carriers. Today the competition is on a global scale. Transportation costs are rapidly becoming the deciding factor for which location or, to a greater extent, which country receives manufacturing, assembling and even warehousing contracts. When the jobs move to other countries or the transporters are not from the U.S., this has a huge impact on the U.S. economy. This is why it is so important for us to maintain an efficient transportation system.

Within the U.S. there are many good modes of transportation. While these modes are very good in their own respect, they can only improve upon their own modes. Any one of these modes, individually, does not make up a transportation system. While each mode may strive toward optimal efficiency, collectively all modes thrown together make a chaotic transportation system at best. Through intermodalism the individual modes can develop a synergistic relationship. This is why intermodalism is so important in striving to maintain global competitiveness.

The private sector is realizing the meaning and importance of intermodalism. There are some institutional barriers which must be overcome. These barriers were discussed at the Intermodal Conference held in 1992 in California. They were identified as:

- Traditional modal bias of transportation agencies
- Organizational responsibilities within agencies for developing management systems
- Lack of coordination at all levels of government on what should be done
- Use of information in an unbiased way
- Regulatory decisions (e.g., size and weight limitations on trucks)
- Lack of MIS and intermodal expertise in the profession

These barriers can be overcome with the right management systems. These management systems require all members, both public and private, to sit down and plan together to develop a system where no one is left out. This type of system will involve partnerships to varying degrees.

In order for intermodalism in the private sector to achieve maximum efficiency the public sector must be included. The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) was enacted to help both the public and private sectors.

> In addition to requiring the development of the National Highway System, the ISTEA charges the Secretary of Transportation with coordinating federal policy on intermodal transportation and initiating policies to promote efficient intermodal transportation in the United States. . . . For metropolitan areas of 200,000 or more persons, the ISTEA requires metropolitan planning organizations (MPOs) to develop capital plans and select projects with the assistance of their states. For metropolitan areas with fewer than 200,000 persons, the states are to develop capital plans with the assistance of their MPOs. Among the factors to be considered in the development of these capital plans are access to ports, intermodal transportation facilities, preservation of rights-of-way for future transportation projects, and methods to enhance the efficient movement of freight.

In the past the private sector did not become too involved with metropolitan planning organizations or even the state transportation agencies. The passage of the ISTEA has forced the private sector to get involved with MPOs and to develop better communication with the state agencies. This type of partnership has led to benefits for both the public and private sectors.

EFFECTS OF REGULATION ON PRIVATE SECTOR INTERMODALISM

Regulations that govern the private sector have the potential to be devastating to private business operations. Short term thinking on the part of the private sector has led many companies to spend too little time or money in the regulation formulation process. This short term, money saving line of thinking can turn into a very expensive or even fatal undertaking in the long run. One steamship liner representative purports to expending four to six million dollars annually trying to remove or correct regulations that were established without private sector input.

Following is an excerpt which demonstrates what regulations without private input can do to one segment of our national transportation system.

> For example, marine transportation of domestic trade between New York and Miami is made difficult by federal prohibitions on shipments of domestic goods in ships built outside the United States and by the high cost of acquiring and operating U.S.-built ships that would not fall under these prohibitions. The loss of subsidies for ship construction has virtually ended the manufacture of commercial container ships in the United States. A recent study by the Transportation Research Board notes the many problems in marine container shipping associated with federal policies and calls for a major reevaluation of federal policies governing the merchant marine and maritime industries (TRB 1992).

Another maritime regulation is the prohibition of one U.S. flag ship to enter into an agreement with another U.S. flag ship to share some of the vessel's space. In order for an American liner to send a small freight shipment overseas it cannot rent space on another American liner. It must use a foreign flag ship.

American Association of State Highways and Transportation Officials (AASHTO) has developed standards for roadway design to be followed all over the nation. The trailer length limit standards were set in 1984 when the largest trucks on the highways hauled were supposed to be 40 feet long containers. In fact, federal regulations had approved the usage of 48 feet long containers two years earlier in 1982. AASHTO did not change their standards even though there were changes in the designs of vehicles those standards were supposed to regulate. The container ships used in intermodal transportation became longer and wider. Consequently, these ships could transport containers which were longer than they had been in the past. Federal regulations currently allow the newer 48 and 53 feet long containers on the nations roadways but the AASHTO design standards were not updated until 1990. To the dismay of many truck drivers, there are roadway design standards currently in use that are unable to accommodate these vehicles.

There are load limits still in force today that were established using vehicle loading patterns of yesteryear. Some of today's vehicles have different axle configurations and different tire dimensions and air pressures which can "safely" carry larger payloads, however, the older standards still apply.

It should be clear to see how important it is for the private sector to become actively involved in the regulation formulation process. There are instances when the public sector is doing everything it can to encourage intermodalism and multimodalism but is unaware that there are still old (and new) laws in the books which were designed to prevent just such an occurrence.

If the private sector is not invloved in the regulatory side of the national transportation system they may find themselves wrongly victimized.

PUBLIC / PRIVATE JOINT PLANNING EFFORTS

Poor joint planning in recent history has not solely been the fault of the private sector. Much of the time the private sector was not invited to sit at the transportation planning table. This is due in large part to the "look out for number one" syndrome. We are learning today that "number one" is not limited solely to the highway system or the public transit system or even a small transportation region. Today "number one" refers to a national intermodal transportation system which includes both passenger and freight movement.

One way in which both the public and private sectors are beginning to communicate is through technical conferences. At most conferences one can find consultant engineers, municipal organizations, state representatives, federal representatives, suppliers, and developers represented on the attendance rosters. This is where information and problems are freely shared and discussed. These conferences are also where one can find out who the decision-makers are when it comes to implementing new technologies or concepts.

The Department of Transportation (DOT) recently performed site visits to many of the marine ports throughout the country. This is just one example of the public sector taking an interest in how the private sector is functioning under the restraints of federal, state, and local regulations.

There are times when the public sector is made aware of regulation or design inadequacies but feels that the required changes are low priority. It is important for the private sector to understand that there are limitations to the public funds. Many times the public sector looks at changes from a benefit-cost ratio analysis point of view. Quite often the requested work or changes appear to benefit a small portion of the general public (or the private sector) and require taking funds away from projects which will improve conditions for a larger portion of the public. When this occurs the benefit-cost ratio analysis appears to favor the larger public projects.

What is starting to occur today is that the private and public sectors are planning improvements together. Both sides are getting a more complete picture of their respective problems and impediments and also what the true long term benefits can be. This type of joint planning and compromising is exemplified in the following passage.

For example, officials at the Port of Houston noted that the standard bridge height for a new bridge would cause problems for the many oversized loads moved to the port by truck. Increasing the vertical distance from 16.5 to 30 ft, as requested by the port, however, would have added $7 million to $8 million to the total cost. (In this case the Texas Department of Transportation agreed to raise the vertical clearance to 22 ft.)

Many trucking firms, rail lines, shipping lines and even some ports have personnel which have the responsibility of interfacing and providing a communication link with the public sector. Unfortunately, too often the interaction level is not at the decision making levels. This will correct itself with time. The private sector is not usually in the habit of investing time and money and receiving zero return.

PRIVATE SECTOR CASE STUDIES IN PARTNERING AND MANAGEMENT

We will look at a few cases of partnering in the shipping industry, rail industry, trucking industry and with port authorities. These represent only a small fraction of the partnerships that exist in intermodal freight movement. Partnerships can be very basic or can be imaginatively creative. In all cases the goal is to increase market share and improve upon existing service levels in order to remain competitive.

Ship Lines

Shipping lines have developed partnerships with port authorities in many instances. It is not unusual to find areas within a port terminal solely dedicated to a shipping line. Sea-Land and other shipping lines have arrangements with various ports to lease and operate large amounts of port space for their container traffic and also the use of the multi-million dollar loading cranes. At one time Sea-Land owned their own nicely painted containers. They have realized that the added costs of maintaining and tracking containers was not considered value-added to their customers. They found that many customers preferred to pay for excellent service and did not care to pay for the added costs involved with container, terminal or truck ownership. As long as their freight was delivered when promised the customers were not too concerned if the side of the intermodal container said "Sea-Land," or was generic, or if the terminal was leased or owned, or if the trucks were leased or purchased. Today they share vessel space with foreign flag ships (U.S. flag ships are not permitted to enter into joint vessel space agreements with each other). They have also gone to leasing generic containers and chassis.

Sea-Land is currently pursuing a partnership with the Department of Defense (DOD). The DOD is one of North America's largest users of freight and passenger systems. The DOD also is one of the largest operators of assets and facilities in the U.S. This partnership will greatly benefit

both organizations. Sea-Land benefits because the DOD is a customer whose business will have an impact on revenues. Military personnel are constantly in a state of flux. Usually the military personnel move to new locations every three years or less, and that means household goods must be moved. Probably more important is military equipment deployment in situations like Desert Shield/Storm, and also moving equipment during peace time. The DOD will benefit because they can learn how to operate much more efficiently from the private sector. With the communication and electronic network which Sea-Land has set up, the DOD will not have to "reinvent the wheel." They have the opportunity to emulate one of the few shipping lines in the country that is turning a profit. With the severe decline in the defense budget, the DOD has to learn how to operate both more efficiently and with fewer resources. The DOD will learn Sea-Land's quality management and customer focus philosophies.

In Tacoma, Washington, in 1983, Sea-Land Service, Inc.(under Jack Helton's leadership) took the lead in developing a revolutionary partnership with several members from the public and the private side. Those partners included three railroad lines, two city councils, the county, the State DOT, Federal Highway, the Puyallup Indian Tribe, Army Corps of Engineers, five Labor Unions, Tacoma Economic Development Board, and several private business and terminal operators. What developed from this diverse partnership is a marine terminal and intermodal facility that even today remains the most cost efficient facility in North America for Sea-Land.

Rail Lines

In the past ten years the intermodal rail business for Conrail has experienced a dramatic increase. This is due in part to containerization and the concept of container-on-flat car (COFC) and double stacking of containers. The rail industry is becoming more in tune with the concept of "Seamless Transportation Service." They can do this by having partnerships with the trucking industry, shipping lines, and with other rail lines. By having partnerships Conrail is able to boast of having 76 hour cross country freight service. They can do this by having what they call "run through" service. This means that the same train and locomotive go the entire distance. When the rail ownership changes (Conrail tracks to Santa Fe tracks) the train is not unloaded, just the company crew is changed. Conrail employees are replaced by Santa Fe employees and vice versa going the other way. This occurs during east-west service and also during north-south service.

On an international scale partnerships are very important also. Liner companies also are very interested and involved in intermodal partnerships. American President Company is a big player in the international freight liner business. They are able to negotiate deals with foreign

companies and offer them service either across the United States land bridge or anywhere within the United States. They can do this because of partnerships with the rail industry.

Management of the rail cars is a large concern. The use of modern technology has made this task easier to manage. Automatic Equipment Identification (AEI) is a very useful tool in rail car management. This consists of a transponder placed on each rail car with a unique identification code. There are "readers" located throughout the country and the locations and contents of a rail car can be tracked and identified at all times. The use of AEI is not only good for internal management of rail cars by the rail lines, but also it is priceless information that can be provided to the interested customer. The Association of American Railroads has mandated that by the end of 1994 all rail lines will be equipped with AEI.

While partnerships between rail lines and shipping lines and trucking firms is good for all concerned, there are still some disadvantages. The disadvantage to rail partnering with trucking firms is choosing the right partners. Also developing partnerships with more than one trucking firm is a very delicate procedure. The goals of each partner must be openly discussed and agreed upon. They (partners) should all be heading in the same direction. (Information on Conrail was obtained from John F. Betak in the Asset Development Dept. at Consolidated Rail Corp.)

Trucking Firms

Trucking firms have entered into many types of partnerships. J.B. Hunt and Schneider are two of the big players in the trucking industry. These companies are actively pursuing the partnership ideas. The trucking industry is going away from the "over the road" (OTR) hauling business and going to the concept of partnering with the rail companies and becoming terminal distributors. Some companies were experiencing as much as 100% turnover of drivers on an annual basis. By becoming terminal distributors they can retain their drivers by keeping their routes close to home and can also save training costs of new drivers.

J.B. Hunt Transport Services, Inc. has entered into partnerships with not only the rail industry and the maritime industry but also with other trucking companies. J.B. Hunt joined forces with a Mexican trucking company which provided service on the Mexico side to the "maquiladora" factories. This partnership provides approximately 2 percent of J.B.Hunt's revenues. In 1990 J.B.Hunt formed an intermodal alliance with the Santa Fe Railroad. They named this new alliance "Quantum." This trailer-on-flatcar (TOFC) service provides links between Los Angeles, Kansas City, San Francisco, and Dallas. Quantum provides approximately $2.9 million in revenues. In 1991 J.B.Hunt entered into an agreement with Burlington Northern Railroad. In 1992 they entered into an intermodal agreement with Southern Pacific Railroad. That same year J.B.Hunt entered into an agreement with Union Pacific Railroad which provided service from Chicago to

Laredo, Texas and then on into Mexico using the Mexican National Railroad. J.B.Hunt entered into an agreement with Conrail and also with Wisconsin Central Railroad. In May of 1992 J.B.Hunt entered into a partnership with the Mexican shipping concern, Transportacion Maritima Mexicana. This 50-50 partnership reportedly provides J.B.Hunt with access to the Mexican interior using Mexican trucks.

By forming these partnerships J.B.Hunt's average over the road hauls dropped from 826 miles in 1990 to 746 miles in 1991. These partnerships allowed approximately 14 to 15 percent of J.B.Hunt's loads to move by rail in 1992. (Information on J.B.Hunt was obtained from Truckload Profiles 1991.)

Port Authorities

The Port of Houston's container terminal, Barbours Cut Terminal, has developed relationships with the shipping lines and also the trucking lines which use the terminal. Many times the containers that enter through Houston are railed to a destination further down the line. In order to reduce total shipping time and alleviate the necessity of having to hire a drayage firm in Houston to haul the containers to the rail head, the port offers a ship to on-site rail head shuttle service.

The Barbours Cut terminal was sensitive to the time delays encountered by the trucking firms servicing the terminal. Port management realized that the lower the dwell time within the terminal for the trucks the more efficient the entire terminal's operation would be. With this in mind the terminal expanded its hours by opening an hour earlier each morning and working through the lunch hour. They also found that the trucks that showed up without proper paperwork had to wait to have the paperwork cleared. These delays slowed down the entire operation for all of the trucks with their paperwork in order. To alleviate this problem the terminal management developed what is called a customer service center located in an area of the terminal where the main flow of truck traffic would not be impeded by trucks without proper paperwork. Barbours Cut terminal also instituted a program where the trucking company dispatchers and the truck drivers themselves can call a phone number and punch in the last four digits of the container(s) of interest and the computer can give the status of that container. They call this service the Barbours Cut Terminal Container Inquiry System. It can tell if it is ready to be picked up or is waiting for inspection. This can eliminate unnecessary trips to the port to pick up a container which is not ready or can help the trucking company's dispatch when making port related assignments.

The Port of New Orleans offers a unique service to its customers. They have developed a program called "Crescent." This allows a ship to electronically transfer its cargo manifest to the port authority and the manifest is transferred to customs. By utilizing this service a ships cargo can

be cleared through customs and ready to be released up to 72 hours before the ship even gets to the port. The port has also experienced access problems to and from some of its terminals. The major truck traffic thruway ran through an adjacent neighborhood on a two-lane roadway. This was extremely hazardous to the neighborhood residents, and also, because of the badly deteriorated roads, truck traffic was sometimes limited to 20 miles per hour. The port recently built a truck thruway which eliminates that neighborhood traffic and allows much quicker access to a major trucking route.

These are just a few examples of port authorities forming relationships and partnerships with neighborhoods and customers of the port. These types of arrangements ultimately provide a more efficient operation in this intermodal transportation transfer area.

CHAPTER 6. INTERMODAL VISIONS AND POTENTIAL

VISIONS EMANATING FROM THE FEDERAL GOVERNMENT

The ISTEA's Vision

The vision of the ISTEA can be described as a drastic change in transportation planning. Before its enactment, the decision making process was focused on the interstate highway system. The ISTEA visualizes a change to an intermodal transportation planning process. The legislation promotes the development of a National Intermodal Transportation System (NITS). It has such attributes as being economically efficient and environmentally sound, providing the foundation for the nation to compete in the global economy, and moving people and goods in an energy efficient manner. Some of the attributes are discussed below:

- Economical Efficiency: The long-term growth of the economy depends on an efficient and balanced transportation system. Giving more emphasis to intermodal networks where facilities and equipment make the movement of people and goods more easy and smooth will increase the economic efficiency. Connection, choice and cooperation will play an important roll providing speed, timeliness and flexibility.

- Environmental Conciousness: Transportation and environment are closely linked to recent environmental laws. Transportation plans must now be compatible with environmental goals and mandates, considering the congestion mitigation and care to air quality, promoting carpool and van pool projects, fringe and corridor parking facilities, pedestrian and bicycle facilities and programs, as well as wet land loss mitigation.

- Global Competitiveness: Economic globalization means ports and intermodal connections will become relatively more important. As trade grows, so will an expanded capacity and improvement of intermodal connections. ISTEA gives a special emphasis for the National Highway System to provide an interconnected system of principal arterial routes which will serve and improve access to major population centers, international border crossings, ports, airports, public transportation facilities, and other intermodal transportation facilities.

- Energy Efficiency and Independence: Transportation accounts for approximately two-thirds of all petroleum use. There must be a substantial improvement in fuel efficiency of transport modes, promoting by this purpose the conduction of technological research on high-speed ground transportation systems, and adapting the National Intermodal Transportation System to "intelligent vehicles," "magnetic levitation systems," and other new technologies.

ISTEA and the Clean Air Act (CAA) impose a new planning process for MPOs and states. States and localities will need to cooperate in spending ISTEA funds to integrate transportation investments with CAA requirements and other important social, environmental and economic goals. In this manner, ISTEA creates a framework in which planning is focused more on overall mobility, environmental and community goals than on capital investments.

ISTEA indicates that the National Intermodal Transportation System (NITS) shall include improvements in public transportation necessary to achieve national goals for improved air quality, energy conservation and international competitiveness. It also provides for the mobility for elderly persons, persons with disabilities and economically disadvantaged persons; considering the social benefits and giving special attention to the external benefits of reduced air pollution, reduced traffic congestion and other aspects of the quality of life in the United States.

For the purpose of promoting intermodal transportation, the office of intermodalism maintains and disseminates intermodal transportation data and coordinates federal research on intermodal transportation.

Expert Opinions

Harvey Jordan, International Affairs, TxDOT, claims that ISTEA has moved transportation planning into "a period of discovery." Highways will no longer be considered as an independent transportation mode but as part of a multimodal network connecting intermodal centers.

Traditionally, the United States has focused on an east-west movement of goods. ISTEA's section 6015 (although related to NAFTA) will examine north-south trade corridors. Should NAFTA become ratified, north-south infrastructure improvements will occur at a much faster rate.

Rob Harrison, Associate Director of the Center for Transportation Research (CTR), thinks giving individual states and MPOs the flexibility to make their own local decisions concerning transportation infrastructure is more sensible. It is extremely difficult for someone in Washington, DC, to determine the best possible solution for local concerns. A decentralized government can better serve the people.

Transportation decisions affect land use, the environment, and the economy. Many critics feel that highway projects have created a vacuum of dealing with short-term side affects rather than focusing on long-term transportation planning. "ISTEA moves the side effects closer to the center of the planning process by forcing states and localities to look ahead and, if possible, eliminate the negative consequences of road building" (Plous, 1993).

Rod Moe, Transportation Planner for the Texas Air Control Board sees ISTEA as a major asset. Considering air quality on all transportation projects will promote alternatives to the single occupant vehicular transportation mode. Mr. Moe thinks that ISTEA will eventually lead to a coordinated land use planning system based on a shared vision for the community.

The Experimental Nature of Intermodalism

ISTEA provides funding for new, experimental projects offering alternatives to highway construction. Virtually any project increasing capacity without constructing new vehicular lanes is eligible for ISTEA funds. Traffic light signalization, intelligent highway vehicle systems, and telecommuting projects could receive federal funds.

"Flexible" funds, through the Surface Transportation Program, designed to encourage highway alternatives, may be used for public transit, bikeways, pedestrian walkways, or increasing density. Ten percent of "flexible" funds must be used for "enhancements" to attract development (Plous, 1993).

ISTEA also provides funding for promoting the use of alternative fuels. Studies are underway in Chicago, San Diego, and Boston to develop public electric cars available on a "trip by trip basis." The cars would be recharged at commuter rail stations and accept some form of credit card (Knack, 1992). The following sections discuss the visions and potentials on three levels: State, MPO, Private Sector.

STATE POTENTIALS

Visions for the Future Transportation System

What is envisioned as the future transport system of the state of Texas? Transportation alternatives accessible to all people and goods in the state that provide mobility within the constraints of the environment and reasonable cost; a transport system in which each modal subsystem is interconnected in a seamless efficient manner.

It is necessary to determine what conceptual points must be met for our state transportation system of the future to come to fruition. It is a prerequisite under ISTEA for the state DOTs to play the role of providing direction in multimodal planning for the state's transportation system for both intercity and metropolitan travel. Cultural change is necessary

within agencies to think in different terms. Transportation planning and programming is no longer the same, transportation systems do not imply a highway system any longer. An academic focus of cooperative effort and knowledge must be created to foster a broad view of transportation. Employees must be sufficiently versatile to transfer concepts from one application or mode to another.

A number of recommendations are presented as proposals of processes which can be put in place to the conceptual organizational requirements to meet the statewide vision. Organizational structures must be identified that prove most effective in facilitating intermodal and multimodal planning. This includes the team concept to focus on improvements in the transportation process or to meet transportation goals. Channels to foster organizational communication, understanding, and feedback must be strengthened across the agency to facilitate intermodal and multimodal planning. The work force of the agency at all levels must participate in training and education to meet and exceed the increasing requirements for knowledge in state-of-the-art technical and engineering methods in transportation. Allocation mechanisms for fund distribution among modes must be from a generic transportation fund as opposed to dedicated highway or transit funds. In this manner money will go to the most deserving project to meet state multimodal transportation goals. Analysis tools need to be developed to evaluate transportation scenarios based on the most efficient mode or combination of modes. Modal attributes affecting efficiency will need to defined and quantified. Bias in analyzing and selecting transportation options must be controlled and minimized.

MPO POTENTIAL

When ISTEA was passed its purpose was "to develop a National Intermodal Transportation System that is economically efficient, environmentally sound, provides the foundation for the nation to compete in the global economy and will move people and goods in an energy-efficient manner." ISTEA included an interesting feature of de-emphasizing highway construction and maintenance as shown through its title: Intermodal Surface Transportation Efficiency Act of 1991.

Through ISTEA the MPOs are to develop transportation systems which include various modes of transportation for both passenger and freight modes. ISTEA provides for the development of transportation facilities which will function as an intermodal transportation system. The goal of MPOs is to efficiently maximize mobility of people and goods within and through their area plus minimize transportation-related fuel consumption and air pollution.

Organization

Through the passage of ISTEA the role of all MPOs has been enhanced. The effects of all transportation projects that are to be undertaken in the metropolitan area are to be evaluated regardless of where the funding is coming from. ISTEA has authorized the MPOs to coordinate the selection and funding of transportation improvements in urbanized areas. All these improvements should be in the Transportation Improvement Program (TIP), which is a staged, multi-year program of projects proposed for funding by federal, state, and local sources within the MPO. Projects are evaluated and should demonstrate that energy, environmental, air quality, cost, and mobility considerations were addressed in planning and local programming. All plans and programs that are to be placed in the TIP should show that all modes of transportation were considered. Also the long range plan should include multi-modal transportation and travel demand model. ISTEA funding has also given MPOs almost unlimited flexibility in deciding which transportation mode to favor.

Multi-modal coordination is developing transportation improvement projects and programs which produce the greatest people-moving capability with the most cost-effective combination of investments for the auto, transit and demand management components of the system. It is the MPO's role to assist local governments in planning for common needs, cooperating for mutual benefit, and coordinating for sound regional development. This includes intermodal applications for both passengers and freight.

Interagency Cooperation

For MPOs to receive the greatest benefit from ISTEA there needs to be a cooperative effort between government agencies at four levels — local, regional, state, and federal. MPOs frequently represent an additional resource to the various cities, counties, transportation authorities, and Department of Transportation in many activities. Support to these transportation providers may include technical assistance, planning studies, and travel forecasting. MPOs also provide regional support to the transportation system.

Land Use Planning and Zoning

The establishment of land use plans or assumptions is needed to forecast population and employment growth. It also identifies jurisdictional authorities and analyzes the physical and/or policy constraints to development in areas. The MPO's transportation policy decisions affects land use and development that are applicable to short- and long-term land use and development plans. Large-range transportation planning allows for the preservation of rights-of-way for construction of future transportation projects. This includes identification of unused rights-of-way

that may be needed for future transportation corridors and identification of those corridors for which action is most needed to prevent destruction or loss.

Ways in which land use planning can be used to promote intermodalism are to require projects to be in accordance with a growth management and land use plan which is implemented by the local government. Some ideas include industrial development clusters, and large residential, commercial, and office developments and corridors of development. These developments would be large enough to support a transit service and large freight deliveries.

Transportation Planning

A transportation system can only be as strong as its weakest link; today the weakest link seems to be at intermodal points where passengers or freight need to move efficiently from truck to plane, from car to bus, from ship to train, etc. If the transportation plan of the MPOs is applied and it succeeds in improving the transfer points or the links between modes, this will allow for the maintaining of the competitive edge for the area by providing a flexible, responsive and market-oriented transportation system.

The transportation plan needs to have projects that relieve congestion and prevent congestion from occurring where it does not yet occur. Congestion management can make use of intermodal solutions with transit centers, park and rides, and limited and expensive parking in congested areas. A mode neutral model and plan needs to be developed to achieve a representation of transportation/land use interactions. This will probably require the use of alternative scenarios in support of each mode. Special care should be used to avoid optimizing a condition which favors a particular mode.

When developing a model for large term transportation planning, the inputs that are applied should include the use of realistic assumptions. Assumptions are needed for potential travel markets, and to what extent the existing land use, travel behavior, and pricing policies influenced it. All plans should be carefully reviewed for internal consistency, uncertainty, and sensitivity to assumptions and errors. Regional transportation needs can be identified through the process of forecasting future travel demand, evaluating system alternatives, and selecting those options which best meet the mobility needs of the region.

Infrastructure

MPOs need to develop methods to enhance the efficient movement of passengers and freight. They need to think about future investment in infrastructure and the alternatives, and how it promotes intermodalism. MPOs are normally just concerned with the conductivity of roads in their region, but they need to start considering freight needs that require the connection of roads

(and other modes) within the metropolitan area with roads (and other modes) outside the metropolitan area.

ISTEA allows the MPOs to spend funds for improving the connections to international border crossings, access ports, airports, intermodal transportation facilities, major freight distribution routes, and military installations. It also raises the importance of non-motorized transportation, bikeways and pedestrian facilities in projects to promote intermodalism.

Transit

MPOs need to work with transit providers to change people's perception of transit and educate them. People need to become aware of the benefits of using transit and start getting out of their individual, single passenger cars. For each mode available, individuals should be educated as to its true cost including time, money and environment.

Methods to expand and enhance transit services with the goal of increasing its use include the development of several major transit centers or stations, park and ride lots, transfer terminals, and neighborhood parks along a transit corridor. These transit centers should be developed as key activity centers which have joint development of adjacent parcels. They should also be the hub for intermodalism with all the different modes connecting with it: light rail, streetcar, bus, vanpool, bicycle, pedestrian, truck (for freight distribution) and any other transportation modes.

Freight

ISTEA requires that transportation planners give freight more attention than it has received in the past. MPOs, with their political composition and local interests, have not been concerned with freight movement, especially since it is mostly a private for-profit interest.

ISTEA has recognized that freight is indispensable to our national economic well-being and should receive consideration in transportation planning. MPOs should promote a choice of mode for freight movement. There should transportation options available that provide fair and healthy competition for transportation business between different modes, either independently or in combination. It all comes back to intermodalism that promotes the convenient, rapid, cost effective, efficient, and safe transfer of goods from one mode to another.

External Coordination

ISTEA requires the coordination and cooperation among transportation organizations for the purpose of improving transportation service, quality, safety, and efficiency for all modes or combinations of modes. It also means the involvement of the private sector groups: citizens, individual companies, developers, and various associations of these three. For intermodalism to

work there needs to be a single policy direction for all modes of travel which is why coordination and cooperation are so important.

Coordination with Other MPOs. At the present time there is little communication being done between MPOs on intermodalism. Each MPO is developing ideas that will work for their area. These ideas need to receive public and/or private support plus funding and be added to the TIP or long-range plan.

Some MPOs do review existing transportation plans from other cities and their transportation planning literature or survey. This is mostly done to get tips on which ideas are being funded and how the other MPO went about it.

State Involvement. Most of the federal funding is transferred through the state to the MPOs. This involves some coordination. Also ISTEA requires that MPOs, in cooperation with the state will develop transportation plans and programs for urbanized areas of the state. Usually the state and MPOs share resources and data for transportation planning.

Federal Involvement. MPOs receive federal funding through various federal sources: FHWA (Federal Highway Administration), FAA (Federal Aviation Administration), FTA (Federal Transit Administration), etc. ISTEA is a federal law, and, as such, the MPOs are to receive guidance from federal representatitives on intermodalism. The Office of Intermodalism was created by ISTEA as a way to promote connections, choices, coordination, and cooperation in transportation.

Public Participation. With the passage of ISTEA, MPOs received more responsibility and power over projects. Groups which use to go to the state for a project will now go to the MPO. There will need to be increased communication among citizens, elected officials, and technical staffs. This will allow these entities to work together to achieve desired goals and objectives.

MPOs are placing greater emphasizes on obtaining public involvement at the local government and individual community level. When the public (individual, neighborhood or business group) is involved, they will express their concerns and ideas, which are likely to address a wide range of issues that impact decision makers. Involving and informing people during all the transportation planning phases will usually reduce the time and cost of project implementation.

Private Participation. There are two types of private participation in intermodalism: transit and freight. Much is known about the transit side since data is usually provided to the MPO.

Private transit providers run such services as suburban express bus, fixed-route bus, and demand responsible van. They also provide support services for planning and operating of the transit system. The private operator should be continually informed and asked to participate in the planning process.

The private freight companies uses an intermodal system which serves a world market and has a different view point than the metropolitan transportation system which serves a regional market. The freight system does overlap into the metropolitan system but freight providers have not been active to date in supplying input to the transportation system.

Operation

Possible Scope of Activity. Through preplanning, opportunities can be developed that support intermodalism. A major emphasis of ISTEA includes giving local governments more flexibility in determining transportation solutions, whether transit, highways, or other transportation facilities plus the tools of enhanced planning and management systems to guide MPOs in making the best choices.

If MPOs can develop/obtain control of land use zoning for their area and extraterritorial jurisdiction, they can set intensity planning levels, confine services for developable land, and project a community vision. For transit this means creating high density corridors and reducing the sprawl of developments. This also means that intermodal transportation could be planned and provided for.

Ideally, a transportation intermodal project would include a transportation corridor that has power and fuel lines, water lines, bicycle/jogging paths, ride sharing, fixed guideway transit, buses in exclusive bus lanes, light rail transit, and include elevated technologies such as a monorail or low-speed maglev system — rail lines for both passengers and freight trains. This transportation corridor is possible, but since it involves so many different entities, it would be very difficult to carry out. Also, rail, highway, maritime, and aviation have developed largely as separate and independent industries through statutory and regulatory regimes that make it hard for them to interact with each other.

Likely Scope of Activity. San Antonio MPO has a request for proposal out for an intermodal transportation facility. This facility would link AMTRAK, local transit, intercity bus, high-speed rail, rail service to Mexico, taxi, airport shuttle, and highway travel modes together at one centralized hub. Also included is package express and mail services.

Most MPOs will start intermodalism by preserving existing transportation facilities and expanding on them where practical to meet transportation needs. Many MPOs have planned increasing spaces at park and rides at transit centers to encourage the use of transit service. Bicycle and pedestrian facilities, and improvements to existing transit facilities, will be funded by MPOs. Intermodal committees will be created to study ways to promote intermodalism.

Needs and Recommendations

Training Needs. There needs to be a cross-training of managers of the private intermodal system and metropolitan transportation system. These two system need to become partners to pull together to identify and make critical interaction decisions. This could be done at an intermodal planning conferences or workshops. This would be a way to produce better informed managers who can contribute to improved operations of both systems. There needs to be a continued commitment to research and technology to provide resources to improve mobility and to continue to compete in a world market.

Communication Needs. There needs to be continued participation by the research, university, business and environmental communities as well as citizen activists in the intermodal transportation planning. Also, business interests, including the freight operators who have not been previously involved, need to increase their participation.

ISTEA provides for a strategic partnership between the public and private, but the public sector knows little about how the private sector works. The private sector is funded privately through banks, stocks, and retained earnings. Their operating sources are operating revenues with the objective of obtaining a profit by providing a service to their customer. MPO's transit systems are funded by taxes with operating sources of individuals and taxes. Their focus is on commuters in a region and they have community values as the objective.

Funding Needs. ISTEA is considered to be under-funded. This means additional funding sources will need to be developed, and innovative financing techniques need to be used. Some examples of funding sources include toll collection, transportation impact fees, parking fees, sales taxes, etc. Some examples of financial options are special districts, various lease and purchase options, tax increment financing, and transportation corporations.

Specific Recommendations for the Austin MPO:

1. Reduce proportion of funding directed to improvements that encourage SOV travel
2. Consider local freight activity and associated intermodal opportunities
3. Study and prepare for the impacts of NAFTA
4. Include the airport authority in MPO activities
5. Move toward stricter CMAQ requirements by increasing intermodalism to help prevent non-attainment status

Specific Recommendations for the Houston MPO:

1. Include the Port of Houston Authority in plans for intermodalism
2. Try to foster partnerships that would reduce trips

3. Make developers pay for measures to mitigate traffic around a proposed site
4. Work with the City Planning Department to implement zoning and other land use policies
5. Congestion pricing for the area within Loop 610
6. More outbound entrances to the High-Occupancy-Vehicle lanes from downtown
7. Implement a tough inspection plan for cars to reduce emissions
8. Work with the Texas Air Control Board to have the petroleum and chemical plants removed from the exemption list of the Clean Air Act

PRIVATE SECTOR VISIONS

Private System Potentials

The following ellements illustrate the areas of greatest private sector opportunities in today's post ISTEA environment:

- A true public-private sector interface with both entities developing a "Win-Win" relationship
- Safety on the roads for auto traffic (dedicated loading and unloading zones and docking facilities for commercial vehicles)
- Dedicated access for railroad ROW (RR overpasses to reduce auto traffic delay)
- Minimum of truck traffic mingling with auto traffic (dedicated truck lanes in high truck traffic areas such as distribution centers or port areas)
- Truck routes that are designed for truck traffic (roadway pavements designed for extra heavy loadings and a longer design life, increased curve radii, vertical clearances and bridge load ratings, etc.)
- Ability for a customer to go to an "agent" much like a travel agent and pick a price "package," which may include several modes of travel in each package, and have the prices based on time of delivery and whether special handling or door to door service is required
- With the use of Automatic Equipment Identification (AEI), and Global Positioning Systems (GPS) the customer and the shipper can locate a shipment in transit at any time and can determine exact time of delivery
- Regulations that are based on input from both the public and private sectors
- Both the public and the private sectors involved in the planning and management of the transportation system on the local and regional levels

Needs and Recommendations

The keys to a successful intermodal transportation system are communication, cooperation, and a willingness to improve on the existing system. In order for this to take place, a management system has to be developed which will include all of the involved modes of transportation.

This management system will have to include public and private sectors and must also include "people" and "freight" transportation perspectives. Included in the architecture of this management system are a data collection team, benchmark team, and a system measurement team.

Much of the data needed for this system is already being collected. This data collection, however, is not a concerted effort. Much of the needed data is independently collected by different organizations more than once. They are completely unaware of their duplication of effort that equates to wasted resources. Other needed data is collected and is not being shared. This could be due to proprietary reasons or simply because the data collectors are unaware of how this information could be used by other members of the management team to improve the overall system. An example of this is the minimum vertical clearances for bridges. Sometimes the highway departments will overlay a roadway and reduce the bridges vertical clearances, completely unaware of the fact that this route can no longer be used for some of the container traffic involved with intermodal movements.

Benchmarking is another important component for developing a productive intermodal system. With striving to achieve goals that are currently out of reach of the existing intermodal system comes the realization that the system must constantly be improved and fine-tuned.

The concept of a system measurement team is complimentary to the benchmarking component. In order for the intermodal system to reach the desired goals there must be some form of measurement. This is necessary to determine where the system is currently "rated." Once it is established where the system is rated then any improvements can be evaluated, measured, quantified and tracked. These steps are much the same as any good quality management system.

The final and most important concept of a good intermodal system is customer focus. It does not matter if the customer is a very large corporation that ships goods all over the globe or the grandmother who wants to go to the local grocery store. It seems that in the past we have forgotten this one concept. It really does not matter if a railroad line can move goods across the country in 60 hours or if a steam liner can provide truly seamless service for goods from China to Small-town, U.S.A., faster than anybody else, or even if a public transit agency has the best bus

route schedule imaginable. If the customer refuses to utilize these services because he or she is not happy about something, then each of these enterprises is doomed to failure. This will hold true regardless of how efficient or well thought out they are.

Future Transit Terminals

Transit terminals, which are a joint public and private venture, hold tremendous potential. To a lesser extent the future transit terminal already exists. These transit terminals or "centers" will provide ample parking spaces for the commuter who wants to become involved in bicycling, van-pooling, car-pooling and park and ride. The center will also provide public transit bus service as well as private sector bus lines for longer distances (such as Greyhound Bus Line services.) In addition to this, the future transit terminal also will provide access to light rail transit as well as high speed rail. Separate areas within the terminal will provide access for commercial trucking and rail freight services.

This future transit terminal will be very attractive. There will be spacious, well maintained parks surrounding the terminal. Within the terminal will be retail outlets, and service providers. This will include the traditional shopping mall layout with the retail stores, restaurants and food courts. Some new services will be located within the transit terminal which will be focused on the smart commuter. These services will include the on-site physical fitness centers for the thousands of commuters who usually make a separate trip to a fitness center either before or after their work day, the quality day care centers located within the transit terminal for the thousands of parents who must otherwise drop off and pick up their children from day care centers scattered about the town, a convenience store for the commuter who would probably make a separate trip to the store on the way home to pick up a loaf of bread or a gallon of milk, and also an on-site laundry service. It is easy to see that this terminal is designed to please the customer (commuter) and also reduce the commuter's number of trips.

With an attractive terminal design there will naturally be development surrounding this type of center. Residential development in the area will further decrease the need for automobiles which equates to less congestion, less pollution and quite possibly a better quality of life. This all goes back to very thorough and holistic planning involving both the private and public sectors.

Future Freight Terminals

Freight terminals can be broken down into three different types: port, rail and truck terminals. We will take a look at some of the future visionary plans for all three types of freight terminals.

Port terminal operations are faced with many problems today. Among those problems are labor costs, truck congestion to and from the port, and increasing space demands accompanied by skyrocketing adjacent property values. These land values have been driven up by private development which can garner the highest return on their high-rise office buildings and ocean side hotel dollars.

Port terminals are currently looking at building exclusive roadways for port traffic directly from the port to tie-ins with the interstate system outside of town. Also, this will also include dedicated rail rights-of-way with no at-grade intersections to tie up automobile traffic. This way local truck and auto congestion due to port operations is completely eliminated.

Another alternative currently under investigation is the development of inland terminals. Every container will go directly from the ship to a rail line to the inland terminal. These inland terminals are very large and are much cheaper real estate purchases. This type of solution will mean additional movements for each container, which means more time added to the total trip time of the freight. This may be offset, however, by eliminating virtually all truck traffic to and from the port. This means a substantial decrease in pollution, much safer city streets for the traveling public and safer driving conditions for the truck drivers.

A much further look ahead into the future may hold off-shore terminals. This type of system would work in extremely expensive and dense areas like the San Francisco or New York/New Jersey ports. This type of system would involve having an off-shore unloading facility where containers are prioritized (electronically) and downloaded to smaller ships and moved to port-owned substations along the shoreline far enough away from the large city so as to completely by-pass any of the city congestion. These substations would not have space limitations and could be specialized. One or more substation would be specifically designed for trucked cargo and others would be strictly for rail cargo. Again, they would have been electronically separated on the off-shore terminal for their respective landside destinations.

Today there is a growing number of partnerships between the rail and trucking industries. The vision of future rail and truck terminals logically necessitates a consolidation. This will be much like the idea of the airport system today. These large scale terminals will have sizes in the range of 200+ acres. These freight terminals will be run by third party enterprises. This type of ownership is similar to the marine and airport system. The terminal will lease space to any and all railroad lines and also have rental space for any and all motor freight carriers. This facility will rent storage space for both the rail and trucking firms and also maintenance facilities. By using this type of system the rail lines and the trucking lines can take advantage of the latest state-of-the-art technological systems without having the expense of purchasing an individual system for themselves. By

having these terminals strategically located throughout the country, the customer's delivery times can be greatly reduced. By going to this system, overall expenses are decreased due to eliminating the duplication of effort that exists by building and updating each rail line's and motor carrier's private distribution terminal.

These visions of future terminals are expensive alternatives to what is in use today. While we do not know if these alternatives will ever materialize exactly as described, we do know that in order to grow economically as a country we cannot continue status quo. While any changes made will be expensive, the alternative would be to lose the all important competetive advantage.

Rob Harrison, Associate Director, CTR states, "The next decade will see a big revolution in partnerships between rail carriers and truckers." Shifting from long haul trucking to an intermodal operation will require new trailer designs and different operating patterns. Ports, a natural intermodal terminal, will improve as international intermodalism is adopted by more nations.

Harrison feels it is very important to involve the private sector in planning an intermodal system. The private sector must realize they are part of a national network. As the system becomes more open, differing modal advantages will become apparent. New "niches" will emerge as old ones disappear.

Phil Sharnshort, Director, Kerrville Bus Lines claims that intercity bus companies are very interested in ISTEA since they serve the transportation industry as a whole. Kerrville would consider serving any intermodal terminal, provided the ridership is there. For a brief time, the bus company provided service from Ausin's airport to Killeen. The service was discontinued due to a lack of ridership. Currently the bus company is not serving any airports.

CONCLUSION

Summary of Intermodal Transportation Possibilities

Planning an intermodal transportation system under ISTEA gives states and MPOs the flexibility to develop a shared vision between various planning agencies, private sector participants, and public citizens. The definition of transportation "efficiency" is based on different priorities such as price, speed, safety, frequency, or accessibility. An intermodal system permits individuals to use the most efficient transportation mode for each segment.

In the context of the ISTEA, MPOs have the greatest potential to become intermodal innovators. This is because most MPOs are relatively new to the transportation planning scene and, as a result, are not ingrained with single-mode planning philosophies. This is the key advantage MPOs have over their counterparts at the state level. Another advantage possessed by MPOs is the regional perspective possessed by their staffs. As noted above, intermodalism

and multimodalism can be most successful when implemented at a regional level to reflect regional transportation realities.

Throughout this report, we have attempted to present the requirements, organizational structures, and possible benefits associated with ISTEA. We have discussed issues and causes leading up to the actual legislation, and shown the importance of developing an integrated multimodal transportation network.

As a group, we would like to conclude by looking at the possible benefits a national intermodal transportation system will have on our overall quality of life. Environmental, social, and economic considerations are important aspects of planning, all of which effect quality of life. ISTEA directly or indirectly requires that transportation planning consider all three of these issues.

The most obvious are the environmental aspects of ISTEA. Air quality and water runoff considerations are specifically mentioned in the legislation. In non-attainment areas, special provisions are included to improve air quality. Any improvement would benefit the quality of life.

Highways and single occupant vehicles have become the dominant form of transportation, and for many people, the only transportation mode available. As the cost of operating a vehicle increases through insurance rates and car prices, many people may be forced to give up their cars. Without an alternate transportation mode, such people isolated from employers, health care and social services will become an economic drain on our communities.

The new global economy has increased the importance of international trade. Improved intermodal facilities meeting "just in time" delivery systems and other important flexible production features will give America a stronger role in the international market. As America's economy improves with the aid of our intermodal and multimodal transportation system, so will America's overall quality of life.

REFERENCES

United States Statutes at Large, Vol. 105, p. 1914.

Intermodal Transportation: Papers on Select Issues, p. 29.

Smith, Dan. "Mercer Management Study of Rail/Truckload Initiatives, Part II: The Evolution of Partnerships. " *Intermodal Trends, An AAR/Market Development Report*, Vol. IV, No. 14, 1992, p. 1-2.

McKenzie, David R., Mark C. North, and Daniel S. Smith. *Intermodal Transportation - The Whole Story*. Simmons-Boardman Books, Inc., Omaha, NE, 1989, p. 263.

Borton, Bill, Assistant General Manager, Production Control, New United Motor Manufacturing, Inc.

McKenzie, David R., Mark C. North, and Daniel S. Smith, p. 278.

Leeuwenburgh, Todd. "Quality Standards That Can Open Doors." *Nation's Business*, U.S. Chamber of Commerce, Washington, D.C., November 1992, p. 33.

Van Nuland, Yves . "The New Common Language for 12 Countries." *Quality Progress*, June 1990, p. 40.

McKenzie, David R., Mark C. North, and Daniel S. Smith, p. 273.

United States Statutes at Large, vol. 105, p. 1914, p. 1962-3.

A Summary: Intermodal Surface Transportation Effciency Act of 1991, p. 5.

Intermodal Surface Transportation Efficiency Act of 1991 Fact Sheets, p. 7.

Transportation enhancement activities are defined by the ISTEA as, "the provision of facilities for pedestrians and bicycles, acquisition of scenic easements and scenic or historic sites, scenic or historic highway programs, landscaping and other scenic beautification, historic preservation rehabilitation and operation of historic transportation buildings, structures or facilities, preservation of abandoned railway corridors, control and removal of outdoor advertising, archaeological planning and research, and mitigation of water pollution due to highway runoff." (*United States Statutes*, v.105, p. 1931)

United States Statutes at Large, vol. 105, p. 1977.

A Summary: Transportation Programs and Provisions of the Clean Air Act Amendments of 1990, p. 2.

United States, *Federal Register*, June 3, 1992, p. 23466.

United States, *Federal Register*, March 2, 1993, p. 12091.

Revis, Joseph S., and Curtis Tarnoff, The Nation's Public Works: Report on Intermodal Transportation, prepared for National Council on Public Works Improvement (Washington, D.C.: National Council on Public Works Improvement, May 1987).

Lyndon B. Johnson School of Public Affairs, State Multimodal and Intermodal Transportation: An Overview of Policies and Programs Promoting Economic Growth, Policy Research Project Report 90 (Austin, TX: The University of Texas at Austin, 1989).

Meyer, Michael D., "The Future of Transportation Planning: Jump-starting the Push Toward Intermodalism," paper presented to the Transportation Research Board Conference on Transportation Planning, Programming, and Finance (Seattle, WA: Transportation Research Board, 19-22 July 1992), Photocopy.

Lockwood, Stephen C., and Gerry Williams, "Finance," paper presented to the Transportation Research Board Conference on Transportation Planning, Programming, and Finance (Seattle, WA: Transportation Research Board, 19-22 July 1992), Photocopy.

Neumann, Lance A. , Frances D. Harrison, and Kumares Sinha, "Resource Paper: Transportation Programming," paper presented to the Transportation Research Board Conference on Transportation Planning, Programming, and Finance (Seattle, WA: Transportation Research Board, 19-22 July 1992), Photocopy.

McDowell, Bruce D., and Sheldon M. Edner, "Reinventing Metropolitan and State Institutions For Surface Transportation Planning," paper presented to the Transportation Research Board Conference on Transportation Planning, Programming, and Finance (Seattle, WA: Transportation Research Board, 19-22 July 1992), Photocopy.

FDOT long range component

Telephone interview with Keith Sherman, Chief of Transportation Planning Illinois Department of Transportation. 3-22-93

Ward, Don, Director of Advance Planning, Iowa Department of Transportation

Bajpai, Jit N., et al., "Maryland Statewide Commuter Assistance Study," Preprints of Papers Presented at the 70th Annual Meeting of the Transportation Research Board, Washington, D.C. , 13-17 January 1991.

Conversation with Paul Wiedefeld, Director of the Office of Systems Planning and Evaluation of Maryland DOT

Gildemeister, Morris, and Fred Tanzer, "Multi-modal Transportation Approaches in Minnesota," Preprints of Papers Presented at the 70th Annual Meeting of the Transportation Research Board, Washington, D.C. , 13-17 January 1991.

Kriedeweis,Jonette, Manager, Intermodal Policy Section, Minnesota Department of Transportation

Executive Summary Strategic Management process MnDOT.1992.

Albright, David, "Statewide Multimodal Planning in New Mexico," Presentation to the 70th Annual Meeting of the Transportation Research Board, Washington, D.C., 13-17 January 1991.

Lee, Bill, Director of the Statewide Plan for the New York State Department of Transportation

Access Ohio p.1

Oregon Transportation Plan, Multimodal System Element (Public Review Draft), prepared by Cambridge Systematics in association with David Evans Associates, Wilbur Smith Assoicates, Barney and Worth, and Joseph R. Stowers for the Oregon Department of Transportation Strategic Planning Section, (Salem, OR: May 1992).

The Oregon Benchmarks were created by the Oregon Progress Board and adopted by the 1991 Legislature to monitor progress in acheiving the state's objectives in human resources, livability and the economy. As an example a benchmark for livability is for 100% of residents to be within 30 minute one-way commute between where they live and where they work.

Land Conservation and Development Commission Goal 12: Transportation requires that per capita vehicle miles of travel in each metropolitan area be reduced by 10% in the next 20 years and 20% in the next 30 years.

Shrantz, Roger L., "A New Environment for Transportation Planning," Presentation to the Statewide Multimodal Planning Committee of the Transporation Research Board at the 72nd Annual Meeting of the Transportation Research Board Washington, D. C., 11 January 1993.

Strategic Plan: Texas Tommorrow – Transportation 1992-1998, (Austin, TX: Texas Department of Transportation, 31 August 1992), Photocopy.

Texas State Department of Highways and Public Transportation. *Amendment to Administrative Circular No. 27-91*, p. 1.

Luedecke, Alvin, Jr., Conference on Transportation Planning for Livable Communities, Austin, Texas, March 5&6, 1993.

Intermodal Surface Transportation Efficiency Act of 1991, Public Law 102-240, 105 Stat. 1914.

Interim Guidance on the ISTEA Metropolitan Planning Requirements, Issued April 6, 1992, Published in the Federal Register on April 23, 1992, 57 FR 14943.

Notice of Proposed Rulemaking, March 2, 1993

Unified Planning Work Program, Austin Transportation Study, August 18, 1992.

Aulick, Micheal R., ATS Transportation Planning Director, Interview on February 2, 1993.

Draft Transportation Improvement Program, Fiscal Years 1994-1996, Austin Transportation Study, March 2, 1993.

Transportation and Urban Development in Houston, 1830 - 1980.

"Analyzing Urban Decentralization." *Regional Science and Urban Economics.* Vol. 21, 1991, pg. 187.

"A Ghost in the Growth Machine: the Aftermath of Rapid Population Growth in Houston." *Urban Studies*, Vol. 24, 1987.

"Urban Policy in Houston, Texas." *Urban Studies,* Vol. 26, 1989, pgs. 146-193.

Curbside. Winter 1992, pg. 5.

Edge City and ISTEA - Examining the Transportation Implications of Suburban Development Patterns.

"Automobile Subsidies and Land Use. Estimates and Policy Responses," *APA Journal*, Winter 1992, pg. 67

Landside Access to U.S. Ports, TRB SR #238

References--Chapter 4

1992-93 Unified Planning Work Program for Regional Transportation Planning, North Central Texas Council of Governments.

1993 Transportation Improvement Program for the Dallas-Fort Worth Metropolitan Area, North Central Texas Council of Governments.

Background Paper: Toward Implementing ISTEA in the Central Puget Sound Region: Recommended Process and Criteria, Puget Sound Regional Council, August 18, 1992.

Bullard, Robert D. *Invisible Houston: The Black Experience in Boom and Bust.* College Station, TX: Texas A&M University Press, 1987.

Committee for Regional Mobility. *Regional Mobility Plan for the Houston Area 1989.* Houston, Texas: Houston Chamber of Commerce, 1989.

East Central Florida Regional Planning Council, *1993-1998 Orlando Urban Area Transportation Improvement Program*, Orlando Urban Area Metropolitan Planning Organization, September 1992.

East Central Florida Regional Planning Council, *Orlando Urban Area Transportation Planning Process Unified Planning Work Program, July 1, 1992 to June 30, 1993*, Orlando Urban Area Metropolitan Planning Organization.

Feagin, Joe R. *Free Enterprise City: Houston in Political-Economic Perspective.* New Brunswick, NJ: Rutgers University Press, 1988.

Fisher, Robert. "Urban Policy in Houston, Texas." *Urban Studies.* Vol. 26, 1989.

FY 1993 San Francisco Bay Area Transportation Improvement Program (TIP) Surface Transportation Program and Congestion Mitigation and Air Quality (STP and CMAQ) Process and Criteria for Project Selection, Metropolitan Transportation Commission, July 1992.

FY 1993-1994 Unified Planning Work Program and Adopting Resolution (Draft), Durham-Chapel Hill-Carrboro Metropolitan Planning Organization.

Hanson, Mark E. "Automobile Subsidies and Land Use. Estimates and Policy Responses." *APA Journal*, Winter 1992.

Houston-Galveston Area Council. *Executive Summary of 1992 Regional Airport/Airspace System Plan Update.* Houston, TX: Houston Galveston Area Council, 1992.

Houston-Galveston Area Council. *Transportation Improvement Program.* Houston, TX: Houston-Galveston Area Council, 1992.

Houston-Galveston Area Council. *Unified Planning Work Program for the Gulf Coast State Planning Region.* Houston, TX: Houston-Galveston Area Council, 1992.

Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) Fact Sheets and Interim Guidance on ISTEA Metropolitan Planning Requirements, North Central Texas Council of Governments, May 1992.

Intermodal Terminal Planning and Feasibility Study Request for Proposal, San Antonio - Bexar County Metropolitan Planning Organization, January 29, 1993.

Kirby, Andrew and A. Karen Lyncy. "A Ghost in the Growth Machine: the Aftermath of Rapid Population Growth in Houston." *Urban Studies,* Vol. 24, 1987.

Kunde, James E. and Dale F. Bertsch. "Partnership and Partnership Development -- ISTEA and CAAA. Breakthrough or Mire." Working Paper, June 1, 1992.

McComb, David G. *Houston, The Bayou City.* Austin, TX: University of Texas Press, 1969.

Metropolitan Transit Authority of Houston. "Curbside." 1992 .

Metropolitan Transit Authority of Houston. "Metro Facts." 1992.

Mieszkowski, Peter and Barton Smith. "Analyzing Urban Decentralization. The Case of Houston." *Regional Science and Urban Economics.* Vol. 21, 1991.

Orlando Urban Area Transportation Study, 1992 Annual Report, Orlando Urban Area Metropolitan Planning Organization.

Papademetriou, Peter C. *Transportation and Urban Development in Houston, 1830-1980.* Houston, TX: Metropolitan Transit Authority of Harris County, 1988.

Poole Jr., Robert W. "An Introduction to Congestion Pricing." Conference Paper, January 5, 1993.

Regional FY92-93 TIP Amendment, Applicant Self Evaluation Instructions, Puget Sound Regional Council, October 20, 1992.

Regional Transportation Plan, 1992 Revision of the 1989 Update, Metro, January 1992.

Regional Transportation Planning and Programming: New Process, New Directions (Draft), Sacramento Area Council of Governments, September 22, 1992.

Reps, John W. *Cities of the American West: A History of Frontier Urban Planning.* Princeton, NJ: Princeton University Press, 1979.

San Antonio - Bexar County 1992-1993 Unified Work Program, San Antonio -Bexar County Metropolitan Planning Organization, August 1992.

Statewide Planning Branch, North Carolina Department of Transportation, Division of Highways, *Draft Prospectus for Continuing Transportation Planning for the Durham-Chapel Hill-Carrboro Urbanized Area*, January 6, 1993.

Texas Air Control Board. *Employer Trip Reduction Program: Houston-Galveston Area.* Austin, TX: Texas Air Control Board, 1992.

Texas Tomorrow - Transportation 1992-1998, Texas Department of Transportation, August 31, 1992.

The Intermodal Surface Transportation Efficiency Act of 1991: An Analysis, Texas Department of Transportation - The Division of Planning and Policy, August 31, 1992.

Transportation Improvement Program 1993-1995, Boston Metropolitan Planning Organization, August 14, 1992.

Transportation Improvement Program for the Portland Urbanized Area, Fiscal Years 1993 to Post 1996, Metro, November 1992.

U.S. Department of Transportation. *Edge City and ISTEA - Examining the Transportation Implications of Suburban Development Patterns.*, Washington, D.C. : Government Printing Office, 1992.

U.S. Department of Transportation. *Exploring the Role of Pricing as a Congestion Management Tool.* Washington, D.C.: Government Printing Office, 1992.

Unified Planning Work Program July 1, 1993-June 30, 1994, Raleigh-Cary-Garner-Apex-Morrisville Inter-modal Transportation Plan (Draft), Raleigh Department of Transportation, January 1993.

VISION 2020 Growth and Transportation Strategy for the Central Puget Sound Region, Puget Sound Council of Governments, October 1990.

Younger, Kristina E. and David G. Murray, *Developing a Method of Multimodal Priority Setting for Transportation Projects in the San Francisco Bay Area in Response to the Opportunities in the ISTEA (Draft)*, Metropolitan Transportation Commission, October 1992.