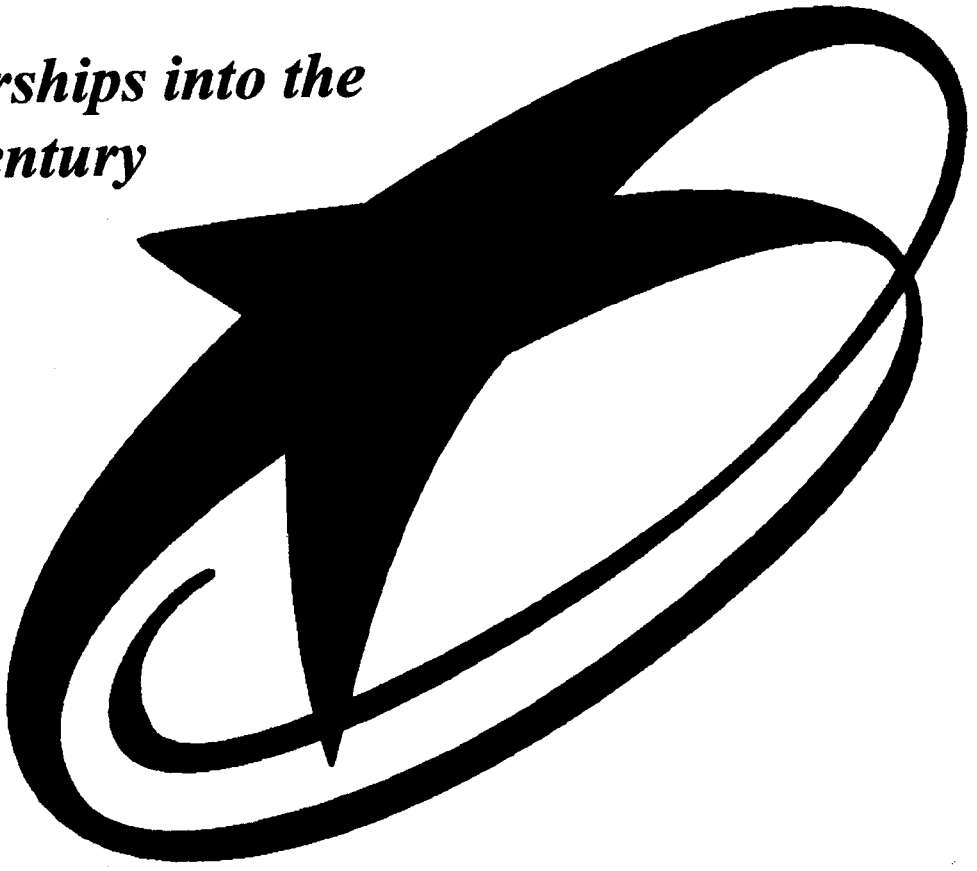
The Texas Transportation Plan

Partnerships into the 21st Century



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Discussion Draft

DYE MANAGEMENT GROUP, INC.

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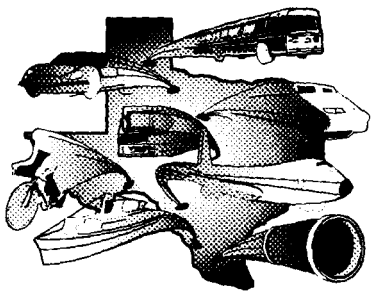
EXECUTIVE SUMMARY

Transportation affects every Texan. We commute to work, go shopping, run errands, visit friends and family, and go on vacation. To do this, we travel by automobile, airplane, train, bus, ship, bicycle, and on foot. Products and services arrive by truck, train, ship, airplane, pipeline, or by telephone, fax, or modem. Our quality of life and our economy depend on an efficient, effective, comprehensive, and coordinated multimodal transportation system that provides choices for the movement of people and goods, and allows quick transfers between modes when and where they are needed. The Texas Transportation Plan was developed to help Texas build a transportation system that can meet these needs well into the 21st century.



A. The Transportation Planning Process

The Texas Transportation Plan is the product of an extensive process bringing together a broad range of government agencies, stakeholders, and the public. The Texas Department of Transportation, other state agencies, cities, counties, and regional organizations, including metropolitan planning organizations, representatives from airports and sea ports, the rail and freight industries, public transit systems, and the business and environmental communities provided input. Meetings held at fourteen locations across the state ensured the public a strong say in the Plan's preparation.

B. The Plan is Multimodal

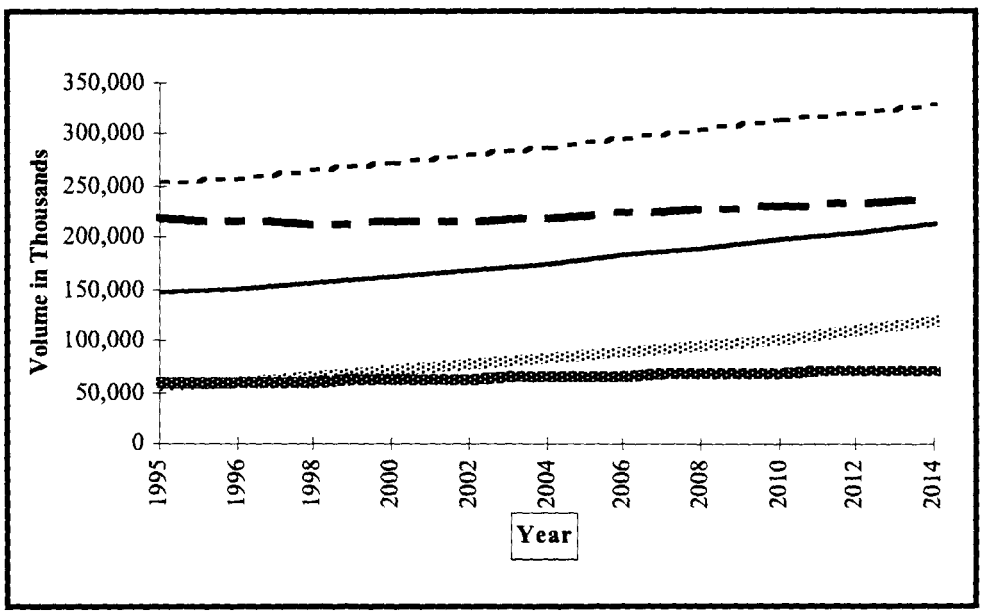
The Texas Transportation Plan is multimodal. It provides direction for developing and preserving all modes of transportation in Texas, and for ensuring connectivity between these modes:

- Highways and Bridges
- Bus Transit and Intercity Bus
- Aviation
- Freight and Passenger Rail
- Marine
- Nonmotorized
- Pipelines
- Telecommunications and Information Technology

C. Growing Demand for Transportation

The period covered by The Texas Transportation Plan will be characterized by growth in the demand for transportation in Texas, as illustrated in Figure E-1.

Figure E-1
Demand for Transportation in Texas
1995-2014



Source: *Texas Transportation Plan Forecasts*, 1994

During the life of The Texas Transportation Plan:

- Transit ridership in Texas will grow 25 percent.
- Freight transport by ship to and from foreign ports will grow 9 percent.
- The number of vehicle miles travelled on state roadways will increase 45 percent.
- The number of air travellers using Texas airports will more than double.
- Rail shipments originating in Texas will increase 23 percent.

D. Transportation Plan Goals

The Texas Transportation Plan is driven by seven primary goals, as summarized in Table E-1.

- Mobility and Accessibility
- Effectiveness and Efficiency
- Choice and Connectivity
- Safety
- Environmental and Social Sensitivity
- Economic Growth and International Trade
- New Technology

Table E-1
Goals of The Texas Transportation Plan

E. The Action Plan

The Texas Transportation Plan is action-oriented. The Plan recommends policies, strategies, and actions to the Texas Transportation Commission to guide transportation decision-making over the next twenty years. They do not, until adopted by the Transportation Commission, comprise official state policy.

Table E-2 summarizes the Plan's recommended policies, organized by issue group.

Issue Group	Policy
Mobility and Accessibility	1. Focus Policies, Strategies and Actions on the Texas Multimodal Transportation System 2. Maximize Personal Mobility Using a Full Range of Transportation Solutions 3. Maximize the Efficiency and Effectiveness of Freight Transportation 4. Utilize Technology to Increase Transportation Mobility 5. Maintain and Enhance Essential Transportation Infrastructure and Services in Rural Texas 6. Increase Mobility and Accessibility Through Closer Integration of Transportation and Land Use

Table E-2
Summary of Recommended Transportation Plan Policies

Table E-2
Summary of Recommended Transportation Plan Policies

Issue Group	Policy
Facility and Corridor Preservation	7. Maximize Preservation of Existing Transportation Infrastructure and Services for All Modes of Transportation 8. Balance Expansion and Preservation of Transportation Modes and Corridors 9. Encourage Cost-Effective Private Sector Participation in Transportation Solutions 10. Maintain Up-to-Date Information for Transportation Planning, Programming, and Decision-Making 11. Preserve the Gulf Intracoastal Waterway
Intermodal Connections	12. Maximize Connections Between All Transportation Modes
Economic Development and International Trade	13. Coordinate Statewide Transportation and Economic Development Policies 14. Ensure Adequate Transportation Capacity to Meet International Trade-Related Demands
Environmental Quality, Public Health and Safety	15. Develop Environmentally Sound Transportation Infrastructure, Facilities, and Programs 16. Minimize Risk from Transportation of Hazardous Materials 17. Ensure Transportation System Capacity During Emergencies and Disasters 18. Maximize the Safety of All Transportation Modes
Interjurisdictional Cooperation and Coordination	19. Expedite the Project Development Process 20. Ensure Implementation of Regionally Approved Projects 21. Ensure the Organizational Capacity for Multimodal Transportation Planning
Finance	22. Optimize the Use of Existing Funding Sources 23. Maintain the Purchasing Power of Existing Transportation Revenue Sources 24. Obtain Sufficient Revenues to Meet Essential Transportation Needs 25. Fund Special Needs 26. Provide a Transportation Revenue Structure that Ensures Cost Responsibility 27. Increase Flexibility in the Use of Transportation Resources 28. Monitor and Address Emerging Issues

F. Key Multimodal Transportation System Issues

The Texas Transportation Plan designates a multimodal transportation system of statewide significance that is comprised of the state's most important transportation infrastructure and services. Key issues for the multimodal transportation system include:

1. Highways and Bridges

- To date the system has generally been in good condition and has met the mobility needs of Texans. However, there are still important needs to be addressed, including 11,000 miles of roadway in need of remedial attention and 6,000 bridges with structural problems. Without additional funding, it will be increasingly difficult for the state to finance needed construction, rehabilitation, and maintenance. Estimates are that there will be funding to meet only 40 percent of the projected needs for highways and bridges over the life of the Plan.

- Congestion must be addressed in some corridors in urban areas, and there are some bottlenecks on border access routes and facilities.

2. Bus Transit and Intercity Bus

- Small urban and rural transportation systems are suffering because they do not have a stable source of funding - federal funding has been erratic in recent years and there is no dedicated source of funds at the state level.

3. Aviation

- The most pressing issue for the aviation community in the state is a lack of funds for general aviation airport development and maintenance. Federal funding for airport improvement continues to decline each year. In addition, these airports receive only very limited funding from the state. This jeopardizes the function and integrity of the state's airport system.

- Congestion at some major commercial airports could impact economic development in the state at some point in the future and in

particular could hamper business opportunities with Mexico and the rest of the international community.

4. Freight and Passenger Rail

- ❖ Rail plays an important role in the state's freight movement system. It is expected, however, that the current trend towards rural rail abandonment and consolidation of railroads will continue and leave some parts of the state without access to rail.

- ❖ Commuter and light rail could play a role in mitigating congestion and air pollution in some metropolitan areas during the lifetime of the Plan.

5. Marine

- ❖ Port facilities in Texas should be able to meet most of the forecast future demand; however, there are important concerns about environmental issues and land access to ports.

- ❖ Continued operation of the Gulf Intracoastal Waterway is vital to economic growth and development in Texas. Environmental considerations threatening closure of some segments must be addressed and remedied.

6. Nonmotorized

- ❖ Bicycle and pedestrian travel currently plays a limited role in the overall transportation system. However, nonmotorized modes can contribute to meeting clean air standards in nonattainment areas and relieving congestion.

7. Pipelines

- ❖ Pipelines provide vital infrastructure for Texas' petroleum and natural gas industries. Issues important to the Plan include provision of right-of-way and buffers for pipelines, prevention of deterioration, and environmental protection.

8. Telecommunications and Information Technology

- Intelligent Transportation Systems will contribute to improving the efficiency of highway and public transportation systems. Additionally, telecommuting and telecommunications will have unknown impacts on travel behavior.

I. INTRODUCTION

Transportation affects every Texan. We commute to work, go shopping, run errands, visit friends and family, and go on vacation. To do this, we travel by automobile, airplane, train, bus, ship, bicycle, and on foot. Products and services also need to be moved from place to place. Oil, computer and other machine components, agricultural products, special deliveries, and information arrive by truck, train, ship, airplane, pipeline, or by telephone, fax, or modem. Our quality of life and our economy depend on an efficient, effective, comprehensive, and coordinated multimodal transportation system that provides choices for the movement of people and goods and allows quick transfers between modes when and where they are needed. This plan was developed to help Texas build a transportation system that can meet these needs well into the 21st century.

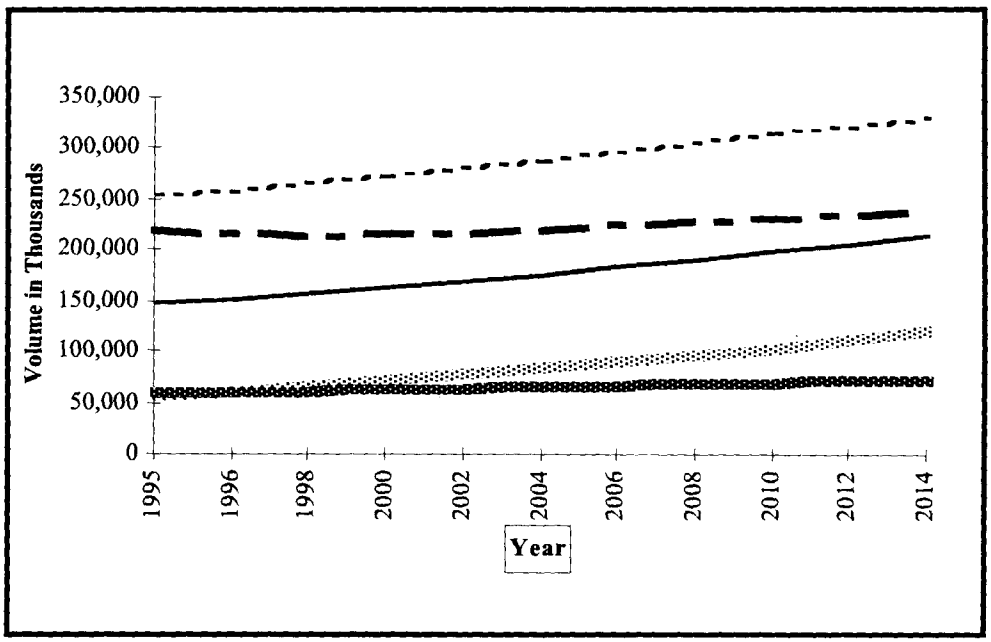
The scope of the Plan is as big as the state it serves. Texas has more roads, streets, and highways than any other state in the country: a combined 300,000 miles of roadways. With 48,000 bridges it has also more bridges than any other state. There are almost 400 public use airports and 1,200 restricted airstrips, heliports, and seaplane lanes. Dallas/Fort Worth, Texas' largest airport, is one of the four busiest airports in the nation, and another four rank among the 50 largest. The state has 25 ports, with four among the 20 most active in the nation. Texas' largest port, the Port of Houston, handles the second largest volume of freight in the county and is the nation's biggest port for petroleum and its products. The Gulf Intracoastal Waterway, Texas' main artery for waterborne transportation, is the nation's third busiest canal. Some of the state's railyards and terminals are among the largest in the nation. In addition, Texas has the nation's most extensive pipeline distribution and terminal system. As this shows, Texas already has a wide range of modal and intermodal facilities to address demand for the movement of people, goods, and services.

The challenge for The Texas Transportation Plan lies in providing a framework that allows Texas to build on these assets and to mold them into an interconnected transportation system that can meet the demand for transportation infrastructure and services through the next twenty years and beyond. As Figure I-1 indicates, this will be a period of steady growth in the demand for all modes of transportation in Texas. During this period:

- Transit ridership will grow more than 25 percent.
- Waterborne freight transport to and from foreign ports will grow 9 percent.

- The number of vehicle miles travelled on state roadways will increase 45 percent.
- The number of air travelers using Texas airports will more than double.
- Rail shipments originating in Texas will increase 23 percent.

Figure I-1
Demand for Transportation in Texas 1995-2014



Source: ***Texas Transportation Plan Forecasts*****, 1994**

A number of forces are fueling increased transportation demand in Texas. One is population growth. Between 1995 and 2014, the state's population is expected to grow from 18 million to 23 million. Texas is moving towards an economy built upon value-added manufacturing and service industries. Implementation of the North American Free Trade Agreement is reshaping the role Texas plays in the national and global economies. These changes are creating new transportation needs for all modes of travel as well as needs for a high level of connectivity between modes. The Texas Transportation Plan provides the framework for ensuring that these needs are met.

A. Organization of The Texas Transportation Plan

This Plan contains the following sections:

- *Introduction.* This presents state multimodal transportation goals, the Plan mandate, and the transportation planning process.

- *The Action Plan.* This is divided into seven issue groups:

    - Mobility and Accessibility
    - Facility and Corridor Preservation
    - Intermodal Connections
    - Economic Development and International Trade
    - Environmental Quality, Public Health and Safety
    - Interjurisdictional Cooperation and Coordination
    - Finance

- *The Multimodal Transportation System.* This presents an overview of the system's basic elements and profiles each mode of transportation in Texas:

    - Highways and Bridges
    - Bus Transit and Intercity Bus
    - Aviation
    - Freight and Passenger Rail
    - Marine
    - Nonmotorized
    - Pipelines
    - Telecommunications and Information Technology

- *Appendices.* In addition to The Texas Transportation Plan document, additional detail is available in the form of:

    - Issue Committee Policy Papers
    - Modal Profiles Describing Each Transportation Mode
    - A Technical Report which Contains Detailed Technical Analyses

B. Texas Transportation Goals - Our Future

The policy goals for The Texas Transportation Plan as presented in Table I-1, define future Texas transportation direction. These goals permeated discussions at all levels of the planning process.

Table I-1
The Goals of The Texas Transportation Plan

Mobility and Accessibility:	To develop a multimodal transportation system that meets the mobility and accessibility needs of all Texans.
Effectiveness and Efficiency:	To maximize the use of existing transportation facilities and services and ensure that investment decisions are based on efficient solutions.
Choice and Connectivity:	To maximize the modal options available to individual and business transportation system users and to ensure that all modes are efficiently connected to provide for easy transfers and timeliness.
Safety:	To ensure that all modes of transportation and transfers between modes are safe for transportation users and providers.
Enviornmental and Social Sensitivity:	To provide a transportation system that is environmentally sound, energy efficient, and sensitive to community needs and impacts.
Economic Growth and International Trade:	To build a transportation system that maximizes opportunity for economic growth, international trade, and tourism.
New Technology:	To take advantage of emerging and new technologies that increase the efficiency, safety, and attractiveness of the transportation system.

C. A Plan Built by Texans

The Texas Transportation Plan is a plan for all Texans. To ensure a decision-making structure that reflects the state and its citizens, Texans were involved in all stages of its development. The organizational structure for developing the Plan is illustrated in Figure I-2.

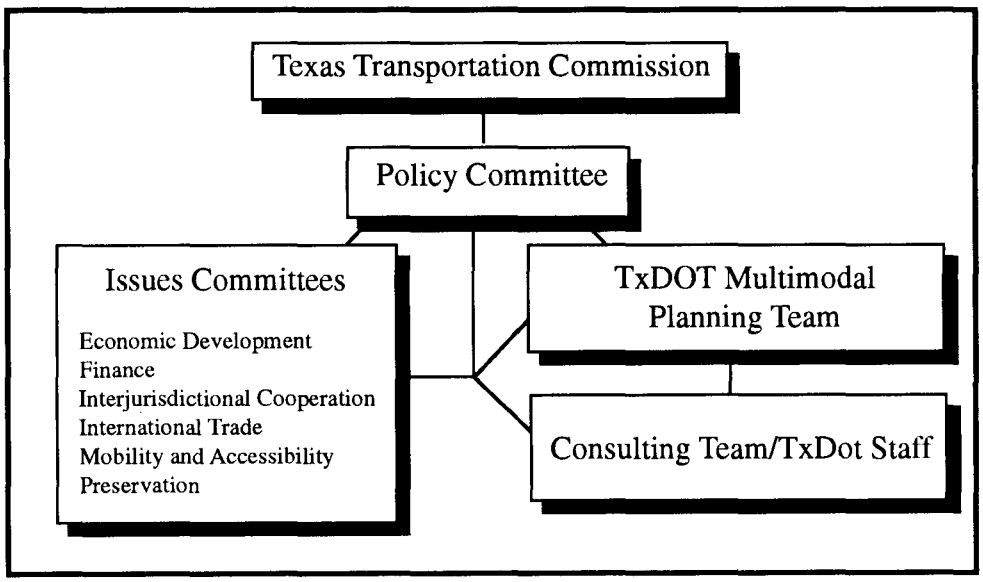


Figure I-2: Organization

1. The Transportation Commission

The Texas Transportation Commission provided overall guidance during development of the Plan. The Commission also adopts the Plan.

2. The Policy Committee

The Policy Committee coordinated the transportation planning process. It was chaired by Anne Wynne, a member of the Transportation Commission. The committee's vice-chairman was William Burnett, the Executive Director of the Texas Department of Transportation. Its membership comprised of Robert Cuellar, Deputy Executive Director for Transportation Planning and Development at the Texas Department of Transportation (TxDOT) and the chairs of all issue committees described below. The task of the Policy Committee was to review and coordinate the work of the issue committees, deal with overlapping and conflicting issues, and ensure that the issue committee work addressed the most important transportation needs of Texas.

3. The Issue Committees

To develop The Texas Transportation Plan, TxDOT called upon the state's citizens and some of its best transportation experts to help identify key transportation issues and develop transportation policies. TxDOT brought together representatives of Texas' cities, counties, metropolitan planning organizations, railroads, air and sea ports, bicycle interests, freight carriers, public transportation systems, and the business and environmental communities on committees that addressed different transportation issues. The six committees were as follows:

- Economic Development, chaired by Dusty Rhodes, Representative of the City of El Paso.
- Finance, directed by Jan Hart, Associate Director of Bear, Stearns, and Company in Dallas.
- Interjurisdictional Coordination and Cooperation, led by Lorraine Perryman, Mayor of Odessa.
- International Trade, chaired by J. Jorge Verduzco, Executive Vice President of the International Bank of Commerce in Laredo.
- Mobility and Accessibility, led by Dr. Naomi Lede, Chairperson of the Transportation Studies Department of Texas Southern University in Houston.
- Corridor Preservation, under the chairmanship of Richard Schiefelbein, Assistant Vice President of Burlington Northern Railroad in Fort Worth.

These committees developed the elements of the Action Plan presented in Section II.

4. The TxDOT Multimodal Planning Team

Throughout the transportation planning process, transportation expertise and technical guidance was provided by the TxDOT Multimodal Planning Team, composed of TxDOT staff drawn from twelve different TxDOT divisions and district offices.

5. The Consulting Team and TxDOT Staff

The policy and technical processes were supported by a team of professional consultants with expertise in transportation policy and planning. Other TxDOT staff also played a key role in providing technical assistance.

D. The Mandate: A Comprehensive Direction for Texas Transportation

In 1991, two legislative actions provided TxDOT with the mandate to develop The Texas Transportation Plan. The Texas legislature charged TxDOT with the development of a multimodal transportation plan, while the Intermodal Surface Transportation Efficiency Act required Texas to carry out statewide multimodal planning that is fully integrated with decision-making. The following provides an overview of these mandates and shows how The Texas Transportation Plan fulfills both requirements.

1. The Texas Mandate

With the passage of House Bill 9, the Texas legislature provided TxDOT guidance to include all modes of transportation in the statewide transportation plan:

- Highways and Turnpikes
- Aviation
- Mass Transportation
- Railroads and High-speed Railroads
- Water Traffic
- Pipelines

The bill also recognized the importance of a coordinated approach and requires TxDOT to seek the opinions and assistance of other state agencies and political subdivisions in developing the Plan.

In addition to these modes of transportation, the Plan addresses the role nonmotorized transportation, and telecommunication and information technology play in the Texas transportation system.

2. ISTEA Statewide Planning Requirements

The Intermodal Surface Transportation Efficiency Act requires TxDOT to develop and implement a planning process for multimodal surface transportation that encompasses all areas of the state. The Act also mandates that the transportation planning process address 23 different planning factors. These 23 factors are identified in Table I-2. Appendix B identifies how these planning factors have been addressed in the Action Plan's recommended policies.

3. Other Requirements

The Plan must consider a number of federal and state laws. Several of Texas' larger urban areas are in nonattainment or near nonattainment of Federal Clean Air Act Amendments of 1991. Other requirements are from the Clean Water Act and the National Environmental Policy Act. The Texas Transportation Plan accounts for the impact of transportation decisions on the environment, including air and water quality. The Plan also works to ensure access and mobility for all Texans, including people with disabilities, as required by the Americans with Disabilities Act.

E. The Process

The following outlines the organizational structure for the current planning effort, describes the framework that enabled Texas to generate this document, sets the stage for future work, and presents the results of public outreach.

1. The Transportation Planning Process

Work on The Texas Transportation Plan began in 1993 with the development of a business plan identifying the appropriate approach to developing the actual plan. In the spring of 1994, TxDOT embarked on the task of putting The Texas Transportation Plan together. The process included a number of different steps to ensure that the transportation concerns and needs of Texans were addressed and that the Plan was based on based on a sound technical foundation and good information. Figure I-3 illustrates the steps.

a. Policy development

Much of the effort in the planning process focused on policy development. At the outset of the planning process, public outreach helped to identify problems and issues that the Plan must address and to develop a vision of the future of transportation in Texas. Based on this input and information developed during the technical analysis process, the six issue committees developed clear problem definitions and goals for the Plan. They also identified policies, strategies, and actions that address the problems and help Texas meet its transportation goals. The policies, strategies, and actions were consolidated into the Action Plan presented in Section II. They are subject to further public review before they are presented to the Transportation Commission. Detailed policy papers developed by each issue committee are available upon request.

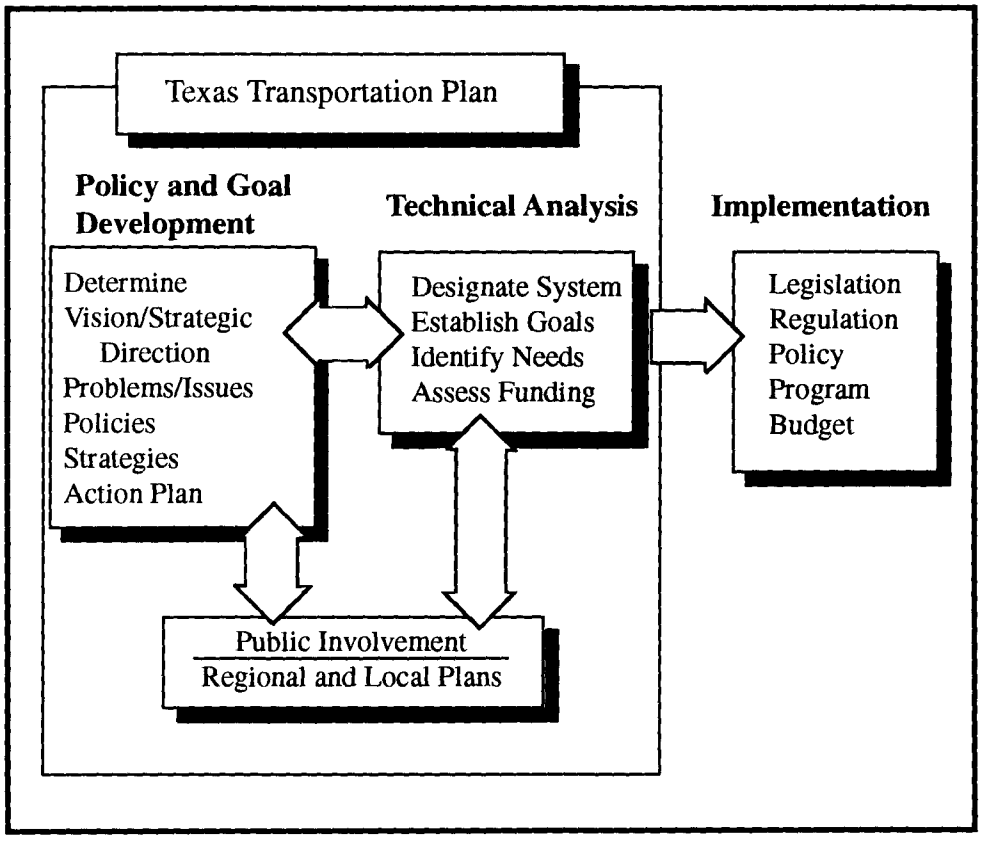


Figure I-3: The Process

b. Technical analysis

A vital element of the technical work was to develop criteria for the transportation facilities and services covered by the Plan and to develop the Texas multimodal transportation system. In addition, the needs of transportation modes were identified and compared to the expected revenues that will be available to address those needs. To meet these objectives, the technical staff collected and compiled large amounts of information and data. Staff used existing information sources such as TxDOT's Strategic Plan, the long-range plans of metropolitan planning organizations, and other documents and data bases. In addition,transportation providers were surveyed to collect additional information.

c. Public involvement

Texas citizens were involved throughout the planning process as described below.

Table I-2: ISTEA Statewide Planning Factors

A Broader Role for Transportation Planning	Developing a Balanced Transportation System	Increasing Transportation System Efficiency
• Consider the overall social, economic, energy and environmental effects of transportation decisions. • Consider the effect of transportation policy decisions on land use and development. • Consider access to specific types of locations, including ports, intermodal facilities, recreation areas, and military installations. • Consider the consistency of transportation planning with federal, state, and local energy goals. • Consider the transportation needs of areas outside metropolitan areas through consultation with local elected officials. • Consider state plans developed under the Federal Water Pollution Control Act. • Consider recreational travel and tourism. • Consider investment strategies to improve roads that support rural economic growth and tourism development and other economic activities. • Consider the concerns of Indian tribal governments.	• Include methods to expand and enhance transit services to increase their use. • Consider the transportation needs identified through the use of the management systems. • Preserve rights-of-way for construction of future transportation projects. • Consider the connectivity between MPOs within and outside Texas. • Incorporate bikeways and pedestrian facilities in projects. • Address long-range needs of the state transportation system. • Coordinate and reconcile metropolitan and statewide plans to ensure connectivity. • Consider strategies for identifying and implementing transportation enhancements.	• Preserve existing facilities and meet transportation needs by using those facilities more efficiently. • Consider the life-cycle costs of transportation systems. • Consider methods to enhance the efficient movement of commercial motor vehicles. • Consider any metropolitan area plan. • Relieve congestion and prevent congestion from occurring where it does not now occur. • Consider innovative financing of projects.

d. Implementation

The last step of the planning process, once the Transportation Commission has developed its action plan from the list of recommendations, is to implement the Plan. Some policies, strategies and actions will require new legislation or changes in the existing regulatory environment. Other policies will require policy changes or projects to be funded in the State Transportation Improvement Program or TxDOT budget.

e. Ongoing planning - A continuing process

The Texas Transportation Plan is the beginning of a continuing process. The Plan addresses important issues identified to date. While these issues are important and timely, however, there are other issues that must be addressed in the future. Likewise, some issues and proposed policies, strategies and actions presented here will be developed in greater detail to suit the changing needs of the Texas transportation system.

2. Public Involvement - A Plan Guided by Texans

A transportation plan can only meet the needs of Texans if it is based on a consensus of public needs and concerns. To help understand what kind of transportation system Texans want and need twenty years from now, TxDOT is working with the general public and representatives from a broad range of different transportation interests. Elements of the TxDOT public involvement process are identified in Figure I-4.

- Public Open Houses
- Stakeholder Focus Groups
- Newsletter and Plan Summaries to 12,000 Texans
- News Releases to Over 1,000 Newspapers
- Editorials inviting Participation
- Videos to Invite Participation and Communicate Plan
- Surveys

Figure I-4: Elements of Public Involvement

In the spring, TxDOT has held many well publicized public meetings in fourteen locations and conducted surveys. Locations for both fall and spring public meetings are illustrated in Figure I-5. These locations were selected to identify the transportation issues of different geographic areas of the state. The meetings played a vital part in the planning process because they helped shape the goals, policies, strategies and actions of the Plan.

Figure I-5: Public Meeting Sites

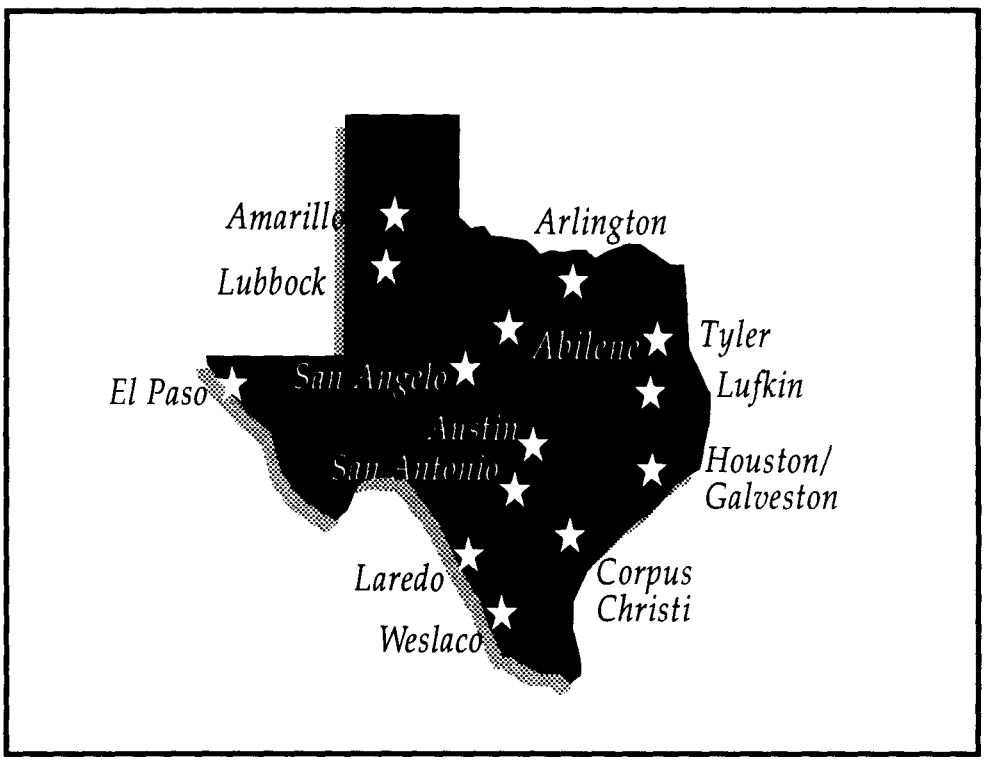


Figure I-6 briefly outlines public comment on transportation needs and concerns across the state received during the first round of public meetings.

- Texans feel there is need for a transportation system that helps the economy grow and improves the quality of life.
- Texans living in border regions pointed to the need to address the impacts of increased trade with Mexico.
- Texans requested that the rural areas of the state be ensured access to transportation facilities that assist economic growth and development.
- Texans across the state would like well planned changes to the transportation system that improve efficiency.
- Texans felt that the users of transportation facilities should pay for them.
- While many Texans would like to see the role of the automobile decreased in relation to other modes to address congestion, environmental concerns, and other issues, they believe that highways are Texas' most important transportation assets, now and in the future.
- Texans thought that the state has a good transportation system. However, they feel specific improvements are needed, such as deaing with congestion in locations where it occurs.

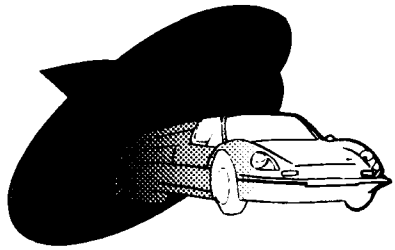
Figure I-6: Transportation - The Viewpoints of Texans

II. THE ACTION PLAN

The Texas Transportation Plan is action-oriented. It establishes policies, strategies, and actions to guide the planning, development, and preservation of a multimodal transportation system in Texas over a twenty year period. These policies, strategies, and actions are identified in this section of the Plan.

The Action Plan was developed by the six issue committees. The policies, strategies, and actions comprise committee recommendations to the Texas Transportation Commission. They do not, until adopted by the Transportation Commission, comprise official state policy.

A. Mobility and Accessibility



Providing mobility and accessibility is the major purpose of a transportation system. People must be able to commute to work and school, travel for leisure, run errands, and meet their everyday health and safety needs. Businesses must be able to move goods between producers, markets, and consumers. However, in many parts of Texas, transportation mobility and accessibility are becoming constrained to an unacceptable degree.

Congestion has emerged as a serious problem in metropolitan areas of Texas. Congestion-caused delays limit accessibility to key locations and impede the ability of Texans to undertake personal travel and to move freight in a timely manner, raising the cost of commuter, passenger, and freight transportation. Congestion also impairs intermodal connections at airports, ports, and rail terminals, while contributing to the degradation of air quality.

Rural Texas faces special mobility and accessibility challenges. The need to maintain transportation linkages between rural and urban areas is very important to the economy, public health and safety, and the social structure of Texas. Commodities including timber, fuel, and agricultural products must be moved from rural areas, where they are produced, to urban areas, where they are consumed, processed, or sent out of state. Rural transportation also plays a central role in the state's tourism industry, connecting visitors both to urban areas and to key attractions, including Texas' state and national parks.

The initial step to ensuring mobility and accessibility in Texas is the designation of a multimodal transportation system of statewide significance. The multimodal transportation system combines into a single system - the state's most essential transportation corridors and facilities, and intermodal facilities necessary to establish connections between transportation modes. Using the multimodal transportation system, Texas can act to ensure that existing transportation infrastructure and investments in new transportation improvements foster a high degree of mobility and accessibility for all modes of transportation.

Many Texans believe that they have too few transportation options. Maintaining a high degree of mobility and accessibility will involve expanding the choice of modal options, including transit service and facilities for bicycle and pedestrian transportation, establishing closer links between transportation and land use, and shifting demand from overutilized to underutilized transportation corridors. Use of Intelligent Transportation Systems can help speed traffic flow and strengthen intermodal connections. Regulations impairing freight mobility will have to be reformed and bottlenecks to efficient freight transportation eliminated. Some rural communities face threats of losing valuable transit, rail, or air service. Special efforts will be needed to ensure the provision and preservation of these services for rural communities.

Policy 1

Focus Policies, Strategies, and Actions on The Texas Multimodal Transportation System

STRATEGY 1.1

Adopt and further describe the Texas multimodal transportation system.

ACTION 1.1.1

Adopt the Texas multimodal transportation system major corridors, intermodal facilities, and connectors as the core transportation system for the State of Texas. (See Section III for a description of the proposed multimodal transportation system and the criteria for inclusion of facilities and services.)

ACTION 1.1.2

Identify the components of an integrated system of transportation facilities necessary to provide mobility and access throughout urban and rural areas, including corridors and facilities for automobile and truck, air, rail, and marine transport, transit, nonmotorized transportation, pipelines, and telecommunications.

ACTION 1.1.3
Design and implement a long-term program to survey and document freight and passenger trip patterns, especially intermodal trips, at the state level, and coordinate these with local origin-and-destination studies done by metropolitan planning organizations.

ACTION 1.1.4
Identify additional links that should be added to the Texas Trunk System to connect additional urban centers expected to grow to a population of 20,000 or more in the next five, ten, fifteen, and twenty years.

ACTION 1.1.5
Develop recommendations to the Texas Transportation Commission that identify additions to the multimodal transportation system biennially.

ACTION 1.1.6
Coordinate growth forecasting with a biennial review of the elements of the multimodal transportation system to identify needed additions to designated corridors and connectors.

Policy 2

Maximize Personal Mobility Using a Full Range of Transportation Solutions

STRATEGY 2.1

Enhance public transit throughout the urban and rural areas of Texas.

ACTION 2.1.1
Provide incentives to encourage expansion of public transit service and use in metropolitan areas; and to establish new or extensions of existing routes and higher service frequencies for buses, transit for the elderly and people with disabilities, rapid transit, commuter rail, and other appropriate public transit modes.

ACTION 2.1.2
Provide incentives to encourage expansion of public transit service and use in rural areas and small cities; and to establish new and extensions of existing routes and higher service frequencies for buses, transit for the elderly and people with disabilities, and other appropriate public transit modes.

ACTION 2.1.3
Establish remote or fringe parking facilities, including park-and-ride lots, at major freeway interchanges and other appropriate locations.

ACTION 2.1.4
Establish a public-private task force to recommend options to expand intercity transit service, to increase service connections between public and private transit operators, to coordinate intercity bus and rural transit service, to address elimination of bus service, and to identify funding sources to support appropriate implementation measures.

ACTION 2.1.5
Increase public awareness of transit services through marketing and education.

ACTION 2.1.6
Encourage high capacity high-speed water transportation systems to link areas surrounding Texas ports.

STRATEGY 2.2

Implement transportation demand management strategies and promote ridesharing and carpooling.

ACTION 2.2.1
Give equal consideration to demand management strategies that impact demand for transportation facilities and services, and capital projects that increase capacity, and adopt corresponding performance measures.

Action 2.2.2
Create financial incentives and disincentives to encourage employer-based trip reduction and area-wide rideshare, carpooling, and transit programs in congested transportation corridors.

ACTION 2.2.3
Implement reversible and high-occupancy-lane projects with expanded hours to encourage ridesharing on congested highways.

ACTION 2.2.4
Develop a statewide ridesharing program and associated publicity campaign to achieve trip reductions, starting with central and district TxDOT offices and other state agency offices.

ACTION 2.2.5

Support formation of local transportation management associations to facilitate ridesharing and similar programs.

STRATEGY 2.3

Enhance bicycle and pedestrian mobility for commuting, recreation, and other travel purposes.

ACTION 2.3.1

Provide incentives and recognition awards to encourage bicycle use in the public and private sectors and adopt engineering, design and planning criteria and procedures for transportation facilities that accommodate and facilitate bicycle transportation.

ACTION 2.3.2

Implement education programs to inform bicyclists, road users, transportation planners, and law enforcement personnel of laws pertaining to bicycle operation, of safe road-sharing techniques, and of the public benefits of bicycling.

ACTION 2.3.3

Enforce laws designed to protect bicyclists and pedestrians from hazards posed by motorists operating unlawfully, and enforce laws against illegal operation of bicycles.

ACTION 2.3.4

Require local governments to demonstrate public safety hazards before prohibiting bicycling on any public roadway.

ACTION 2.3.5

Give high priority to funding pedestrian and bicycle-oriented projects, including pedestrian and bicycle-friendly zoning ordinances and design guidelines, geometric standards for streets, and downtown streetscape improvements.

ACTION 2.3.6

Utilize available sources of federal funding to expand and improve bicycle and pedestrian facilities, including the National Scenic Byways Program and the National Recreational Trails Fund.

ACTION 2.3.7

Evaluate and document levels of bicycle usage and bicycling promotion programs and include criteria essential for identification of suitable bicycle routes in the state road inventory and other transportation information data bases.

ACTION 2.3.8
Fund, develop, and disseminate a Texas bicycle suitability map based on American Association of State Highway and Transportation Officials guidelines.

ACTION 2.3.9
Develop a map that includes abandoned railroad rights-of-way appropriate for bicycle and pedestrian facilities.

Policy 3

Maximize the Efficiency and Effectiveness of Freight Transportation

STRATEGY 3.1

Implement regulatory reform that will improve the quality and reliability of the freight system.

ACTION 3.1.1
Review regulations affecting freight transportation, and eliminate those that negatively affect highway, rail, air, and waterway freight transportation competitiveness, while maintaining those necessary for public health, safety, and environmental protection.

ACTION 3.1.2
Monitor implementation of intrastate trucking deregulation and document the impacts on motor carrier service and economic development in Texas.

STRATEGY 3.2

Identify bottlenecks in the freight transportation system and implement prioritized improvements.

ACTION 3.2.1
Utilize the state's Congestion Management System to monitor and address roadway congestion on designated freight corridors and identify transportation system links and facilities that constrain freight traffic.

ACTION 3.2.2
Establish public-private funding mechanisms to alleviate identified deficiencies of the freight transportation system.

ACTION 3.2.3
Determine the legality and feasibility of applying Intermodal Surface Transportation Efficiency Act funds to privately-owned freight transportation infrastructure or other innovative freight facility projects.

ACTION 3.2.4
Use targeted capital improvements, prioritized funding, and other means to expand availability and use of economically efficient and environmentally sound freight transportation modes.

ACTION 3.2.5
Identify key commodity types that lend themselves to alternative transportation and develop recommendations for more efficient modes for interstate and intrastate transportation of these goods; identify measures and benchmarks whereby these modal shifts should be encouraged, and incorporate them into the management systems.

ACTION 3.2.6
Establish mechanisms to ensure the reliability of freight deliveries, including a shipper-information network and clearinghouse providing on-line information on shipping services, routes, carriers, general cost, and traffic conditions for Texas businesses.

ACTION 3.2.7
Establish exclusive truck lanes or restrict trucks to certain lanes on roadways where truck traffic impedes commute travel.

ACTION 3.2.8
Promote the most efficient modes, such as rail, where appropriate to decrease truck traffic and corresponding highway use.

Policy 4
Utilize Technology to Increase Transportation Mobility

STRATEGY 4.1

Develop and encourage widespread and cost-effective applications of Intelligent Transportation Systems technology.

ACTION 4.1.1
Evaluate the application of new technologies in all potential projects involving capital investment and/or capacity enhancements.

ACTION 4.1.2
Incorporate new technologies into the management systems to maximize efficiency and utilization of existing transportation facilities.

ACTION 4.1.3
Study the impacts of new technology on the freight industry and on personal travel behavior in Texas.

ACTION 4.1.4
Develop advanced transportation technologies for major transportation corridors and facilities, including integrated freeway and arterial surveillance traffic control centers, incident detection and response programs, real-time motorist information systems including message reader signs, and automated access management systems including ramp metering.

ACTION 4.1.5
Encourage the use of teleconferencing, "telemedicine," and "distance education" to shift travel demand to the telecommunications infrastructure.

ACTION 4.1.6
Remove obstacles to investment in the telecommunications system.

ACTION 4.1.7
Develop Geographic Information System capability based on road inventory file data to identify capacity problems and underused facilities.

Policy 5
Maintain and Enhance Essential Transportation Infrastructure and Services in Rural Texas

STRATEGY 5.1

Adopt intermodal transportation infrastructure and facilities serving rural Texas as priority elements of the statewide multimodal transportation system.

ACTION 5.1.1
Ensure a minimum level of surface transportation in rural areas of Texas.

CASE STUDY

TransGuide Advanced Technology Improves Transportation Efficiency and Safety

San Antonio's TransGuide Transportation Guidance System is a glimpse into the future of Intelligent Transportation Systems. TransGuide demonstrates how state-of-the-art Intelligent Transportation System technology can be harnessed to improve the efficiency and safety of a local transportation network.

TransGuide unites electronic sensors, computers, fiber optics, video cameras, and electronic signs into a comprehensive network for monitoring and managing local highway traffic. The system includes eight hundred sensors which measure highway traffic speed and density and relay this information to a Texas Department of Transportation Operations Control Center. There, a computer chooses from 64,000 solution scenarios to dispatch pre-programmed messages to 50 electronic reader message signs that warn motorists of slowdowns, suggest alternate routes, and direct lane changes. An additional 359 TransGuide lane control signals also help motorists choose highway lanes.

Fifty-two highway video cameras serve as remote eyes for the Operations Control Center, helping it to identify the cause of traffic slowdowns and to alleviate problems. The Control Center is encircled by a video wall, which can show any of the video scenes transmitted by camera, a color-coded map of traffic flow, or the local weather map. TransGuide is over 95 percent automated, and takes only two minutes and fifteen seconds to detect a traffic slowdown, send appropriate messages to highway signs, and dispatch required emergency vehicles.

TransGuide will soon become even more far-reaching. In early 1995, VIA San Antonio, the local transit agency, the San Antonio Police Department, city engineers and signal technicians, and a 911 crisis management team will become linked to TransGuide. Police and 911 dispatchers will use TransGuide to identify emergencies quickly and efficiently. City signal technicians will alter the timing and phasing of city stoplights to better accommodate traffic routed off backed-up highways. VIA San Antonio dispatchers will help transit and paratransit drivers avoid highway jams. During special events, cameras at park-and-ride lots and the Alamodome sports arena will help dispatchers send more buses or police vehicles where and when they are needed.

Today, TransGuide stretches over 26 miles of highway. By 2003, the system should encompass 191 miles. For the rest of Texas, and the nation, it is a shining example of how technology can lessen traffic congestion and improve air quality, and transportation system efficiency.

ACTION 5.1.2
Maintain the ranch- and farm-to-market road system as a system of roads providing for the economic well-being of rural Texas.

ACTION 5.1.3
Ensure a high level of connectivity throughout rural Texas and between rural areas and urban centers, surrounding states, and Mexico.

ACTION 5.1.4
Give priority to projects included in metropolitan planning organization plans and the State Transportation Improvement Program that maintain or improve corridor level links to state and national parks and other major tourist attractions.

ACTION 5.1.5
Identify opportunities for multimodal transfer and uses, including expanding intermodal transfer centers in rural areas.

ACTION 5.1.6
Evaluate growth in the non-metropolitan areas of Texas to determine areas of economic decline, review Pavement Management System and Bridge Management System maintenance recommendations in conjunction with non-metropolitan area population patterns to determine adjustments in recommended maintenance efforts, and incorporate findings into the State Transportation Improvement Program.

STRATEGY 5.2
Improve and maintain rural airports.

ACTION 5.2.1
Provide an adequate and stable source of funding for general aviation airport development and maintenance (see Action 24.2.1).

ACTION 5.2.2
Identify rural airport facilities which are needed to meet minimum essential air service and support key economic sectors, and prioritize airport spending to develop and maintain these airports.

ACTION 5.2.3
Provide public-private ground transportation linkages between rural airports and adjacent communities.

STRATEGY 5.3

Enhance rural and intercity transit service.

ACTION 5.3.1

Maintain current levels of rural transit service and support its expansion into areas where it currently does not exist.

ACTION 5.3.2

Develop a definition of minimum essential transit service for rural Texas, and evaluate the potential for a rural "transit trunk system" in consultation with public transit operators.

ACTION 5.3.3

Give priority funding to rural corridor development projects and facilities that foster high-occupancy-vehicle use or energy efficient travel modes over single-occupancy-vehicle use, including intercity bus and transit, and passenger rail.

ACTION 5.3.4

Identify cooperatively with private carriers areas where rural and intercity bus service may cease to be cost-effective before the service is terminated and investigate options for shared service to prevent service elimination.

Policy 6

Increase Mobility and Accessibility Through Closer Integration of Transportation and Land Use

STRATEGY 6.1

Encourage closer integration of transportation and the land use approval process.

ACTION 6.1.1

Encourage adoption of local land use and urban design policies linked to efficient transportation, including more compact and accessible patterns of land development, urban boundaries, the reuse of existing urban areas and development quotas, transit-oriented design features, and mixed-use developments.

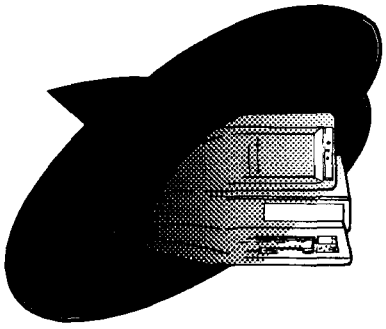
ACTION 6.1.2

Give priority in transportation funding to local agencies and jurisdictions that adopt integrated land use and transportation plans.

ACTION 6.1.3
Develop model land use and transportation infrastructure compatibility standards that support densities suitable for high capacity infrastructure improvements, and use these as the basis for identifying potential demonstration projects in metropolitan planning organization areas for a major investment study.

ACTION 6.1.4
Educate and provide technical assistance to local agencies on land use practices that accommodate efficient transportation.

B. Facility and Corridor Preservation



Texas is home to one of the largest transportation systems of any state in the U.S. Traditionally, the state's transportation infrastructure has been maintained at a fully functional level and in good repair. Now, however, some components of the system are deteriorating, threatening its integrity. Another problem is the lack of balance in the utilization of transportation infrastructure and modes. Currently, limited mechanisms exist to balance transportation system user demand, resulting in over-utilization of key roadway corridors and facilities and congestion. This accelerates the need for maintenance costs, even as other transportation facilities and modes are utilized at less than capacity. These and the following issues must be addressed by the Plan.

Maintaining the function of Texas' highway infrastructure in the future will require investment. In 1993, more than 3,000 miles of state maintained roadway operated at unacceptable service levels, 11,000 miles needed remedial attention. In the same year, Texas had more than 6,000 bridges on the state highway sytem that were either structurally or functionally deficient. A number of factors contribute to decline in roadway service levels. One factor is limited funding, which leads to deferral of roadway preservation in order to meet other more immediate public needs. Without additional funds and under current policies, TxDOT will have sufficient funding to meet only 40 percent of its roadway needs over the 20 year life of this plan.

Another issue is that, as recent studies indicate, commercial trucks only pay a fraction of the costs for damage they do to the roadway system. A particular concern surrounds the implementation of the North American Free Trade Agreement. Mexican trucks are subject to heavier weight limits than

U.S. trucks, and their travel on Texas highways may contribute to increased roadway deficiencies. A third issue is the need for private sector participation in the financing of transportation infrastructure preservation and improvement. Greater use of congestion pricing, toll roads, and public-private investment partnerships will require that barriers that currently constrain these options are removed.

There are also concerns about other modes. The function and integrity of the state's airport system is jeopardized by a lack of funding for general aviation facilities. Preservation of the Gulf Intracoastal Waterway is another important issue. The Waterway is an essential corridor for marine shipping and international trade. Disputes between federal and state agencies and local governments, port districts, and environmental interests must be resolved to maintain this corridor.

Policy 7
Maximize Preservation of Existing Transportation Infrastructure and Services for All Modes of Transportation

STRATEGY 7.1

Make preservation and maintenance of corridors and facilities identified in the state multimodal transportation system a high priority.

ACTION 7.1.1

Prioritize road and bridge maintenance funding to preserve existing corridors as identified in the Texas multimodal transportation system.

ACTION 7.1.2

Maintain existing transportation system corridors and facilities through appropriate means, including roadway repair, airport facility improvement, rail replacement, and port upgrades.

Policy 8
Balance Expansion and Preservation of Transportation Modes and Corridors

STRATEGY 8.1

Implement market-based incentives and pricing mechanisms to promote more efficient travel behavior and mode choice decisions.

ACTION 8.1.1

Implement congestion pricing demonstration projects, including variable, time-of-day pricing and reduced or waived tolls for high-occupancy-vehicle lanes, to shift single-occupancy-vehicle use to higher capacity and underutilized transportation modes and corridors during periods of roadway congestion.

ACTION 8.1.2

Increase registration fees for commercial trucks and combination vehicles or establish a weight-distance tax to ensure that these vehicles cover their impacts on roadways and bridges.

Policy 9

Encourage Cost-Effective Private Sector Participation in Transportation Solutions

STRATEGY 9.1

Promote public-private transportation partnerships.

ACTION 9.1.1

Allow TxDOT to purchase right-of-way and property for rail, airport, and transit facilities, including highway/fixed guideway corridors and intermodal transfer facilities. These will be for later sale, lease, or operation by private enterprise.

ACTION 9.1.2

Expand TxDOT authority for use, construction, operation, and lease of state-owned highway right-of-way and facilities for operation of fiber-optic communication corridors.

ACTION 9.1.3

Conduct a study, including a benefit-cost analysis, of the feasibility and potential impact of creating a statewide system of toll roads and of selling existing toll facilities to private investors, and develop a statewide toll facility plan.

ACTION 9.1.4

Develop investment outreach programs to attract investment in state toll facilities, including investment in the form of joint ventures.

ACTION 9.1.5
Establish an ongoing public-private multimodal linkage committee to identify regulatory barriers to intermodal partnerships and private operation of public transportation facilities, and to propose a biennial legislative agenda aimed at eliminating barriers.

ACTION 9.1.6
Establish a regulatory barriers ombudsman to hear and act on regulatory barriers to private ownership of toll facilities.

STRATEGY 9.2
Preserve transportation infrastructure through increased inspections and enforcement.

ACTION 9.2.1
Increase truck inspection and overweight violations enforcement capabilities to protect Texas' transportation infrastructure investments.

Policy 10
Maintain Up-to-Date Information for Transportation Planning, Programming, and Decision-Making

STRATEGY 10.1
Implement fully the management systems.

ACTION 10.1.1
Implement fully the management systems mandated by the Intermodal Surface Transportation Efficiency Act:

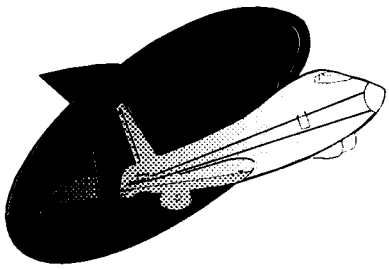
- Intermodal Management System
- Congestion Management System
- Pavement Management System
- Bridge Management System
- Public Transportation Management System
- Highway Safety Management System
- Traffic Monitoring System

ACTION 10.1.2
Use the management systems to prioritize preservation and maintenance needs and optimize investment schedules for roads, bridges, and other transportation infrastructure components identified in the Texas multimodal transportation system.

ACTION 10.1.3
Use the management systems to manage existing transportation system capacity more efficiently in order to alleviate congestion and surface access problems at airports and other passenger terminals.

ACTION 10.1.4
Incorporate time/distance measures between city pairs as indicators of the transportation system's performance in the Traffic Monitoring System and the Congestion Management System, and consider publishing these on official state maps used by the traveling public.

ACTION 10.1.5
Evaluate the operational performance of the Intermodal Management System annually or at the frequency identified in the Intermodal Surface Transportation Efficiency Act .



Policy 11
Preserve the Gulf Intracoastal Waterway

STRATEGY 11.1
Balance interests to ensure operation of the Gulf Intracoastal Waterway in an economically efficient and environmentally sound manner.

ACTION 11.1.1
Move forward with establishment of an intergovernmental coordinating team and supporting work groups to identify solutions to disputes over the dredging of the Gulf Intracoastal Waterway.

C. Intermodal Connections

The Intermodal Surface Transportation Efficiency Act requires development of an intermodal transportation plan for all modes of transportation. In Texas, this means planning for auto and truck travel on roadways and bridges, air, marine, and rail transportation, bicycling and walking, pipelines, and telecommunications technology.

Historically, individual transportation modes have been planned and operated largely independent of each other. Often, this has produced duplication of transportation services and other economic inefficiencies. Intermodal connectivity has suffered.

Economic changes and changes in work and personal behavior have led to the recognition that efficient and effective transportation requires greater connectivity between transportation modes in Texas. In industry, expanding trade and innovations such as just-in-time manufacturing often require the transport of goods by a combination of truck, ship, air, and rail in a short period of time, placing a great premium upon a transportation system with a high level of intermodal connectivity. Commuters seeking solutions to urban congestion have fueled demand for multimodal solutions to travel, including combinations of travel by foot, bicycle, automobile, and transit. Business travellers require quick connections between air and surface transportation to meet busy schedules. Similarly, intermodalism is essential to meeting economic, health, and safety needs of rural Texas.

In the past, the lack of intermodal coordination has been reinforced by federal and state regulations. This is especially true with regard to freight transportation. Above all, however, the lack of intermodal coordination reflects the absence of a system for tying together the roles and responsibilities of the private sector and different levels of government that play a role in providing transportation infrastructure. Designation of the Texas multimodal transportation system will help ensure intermodal connectivity in Texas.

The multimodal transportation system and other transportation management systems can act as the basis for identifying investments needed to maximize the utility of existing intermodal connections and to establish new intermodal links. Greater connectivity will require targeted investments in intermodal facilities at airports, marine ports, and rail terminals, for road travel, and for nonmotorized transportation.

Policy 12
Maximize Connections Between All Transportation Modes

STRATEGY 12.1

Implement investments needed to maximize linkages between transportation modes.

ACTION 12.1.1

Develop a comprehensive inventory of multimodal transportation facilities and district-wide intermodal system plans which identify missing links in intermodal transfer capabilities.

ACTION 12.1.2

Survey, describe, and model interstate and intrastate passenger travel

patterns to identify deficiencies, opportunities to improve intermodal passenger travel, and actions required to address system deficiencies.

ACTION 12.1.3
Create intermodal transportation action teams to focus on specific barriers to effective intermodal connectivity and recommend appropriate solutions in urban and rural areas of Texas.

ACTION 12.1.4
Identify funding sources for proposed intermodal linkage improvements.

ACTION 12.1.5
Prioritize investments needed to improve intermodal passenger and freight transportation travel based on critical needs, costs, and importance to state economic growth, taking into account the state's transportation, social, and environmental goals.

ACTION 12.1.6
Identify and eliminate redundancies in the intermodal system that result in extra costs or delay in the movement of persons or goods.

ACTION 12.1.7
Offer incentives to encourage multiple or shared use of public or private transportation hubs and rights-of-way.

ACTION 12.1.8
Encourage development of intermodal transfer centers for freight and passenger transportation.

STRATEGY 12.2

Improve intermodal access and facilities at ports, airports, and rail facilities.

ACTION 12.2.1
Encourage the revision of Federal Aviation Administration's Code of Federal Regulations, Part 135, to simplify, and reduce the cost of, establishing and maintaining an air charter activity, and encourage the simplification and standardization of local airport regulations governing air charter activities on airports.

ACTION 12.2.2
Establish a working group to identify intermodal capacity problems at airports to identify and to prioritize needed intermodal facility improvements.

ACTION 12.2.3
Develop airport access and intermodal transfer facility improvement plans for major airport facilities.

ACTION 12.2.4
Establish a working group to study access and identify intermodal capacity problems at marine port facilities, to identify and prioritize needed intermodal facility improvements and develop compatible cost estimates.

ACTION 12.2.5
Prioritize maintenance of identified links to ports and airports identified as connectors in the multimodal transportation system.

ACTION 12.2.6
Improve approach roads and other facilities providing access to and from ports and airports, intracoastal waterways, freight terminals, and industrial areas to eliminate recurrent or incident-related congestion impeding access to these facilities.

ACTION 12.2.7
Improve container-handling facilities at Texas ports and rail terminals.

ACTION 12.2.8
Ensure port and airport capacity is adequate to meet current and future international trade related demands.

ACTION 12.2.9
Provide modal alternatives for accessing ports and airports where demand exists.

ACTION 12.2.10
Deploy and promote the use of Intelligent Transportation Systems technologies for improving access to ports and airports.

ACTION 12.2.11
Identify and address issues impeding the competitiveness of public ports and airports.

ACTION 12.2.12
Establish multimodal level of service goals for access to and from Texas ports and airports.

CASE STUDY

Enviornmentally Sound Intermodal Transportation at Barbours Cut

Barbours Cut, the Port of Houston Authority's container terminal, is a prime example of an efficient and environmentally sound intermodal transportation center. Located on the northwest shore of Galveston Bay, near Houston, it is a major point of connection between trucks, trains, and cargo ships.

Barbours Cut officially opened in 1977. Since then it has grown rapidly. Today, the terminal serves approximately 500 cargo ships each year, and ranks as one of the busiest and most modern ports in North America. One reason for its success is that it is designed to efficiently transfer goods between ships, trucks, and trains.

Approximately 90 percent of the cargo passing through Barbours Cut is transported between ships and the roughly 1,000 trucks that travel in and out of the port facility every day. Large, ultramodern cranes load and unload cargo. From Barbours Cut, the trucks can easily access all major highways in the area.

While the majority of cargo passing through Barbours Cut comes and goes via truck, it is the rail connection that makes Barbours Cut unique. At Barbours Cut, there is a rail terminal located right on Port of Houston property. This allows direct transfer of goods between ship and rail. Without this convenient connection, trucks would be required to connect ship and rail, as is the case at most other ports.

Eliminating the need for truck transfer between rail and ship at Barbours Cut saves money. It also saves time, reduces congestion on nearby roadways, and helps reduce pollution emissions.

The Port of Houston is working to increase the number of trains that can move in and out of Barbours Cut. The Port has secured funds for this purpose from the Houston-Galveston Area Council, the local metropolitan planning organization, and is optimistic about receiving additional funding in the future under the Intermodal Surface Transportation Efficiency Act. The Port estimates that increasing train capacity at Barbours Cut will eliminate 50,000 truck trips each year. The result will be to save money, speed freight movement and reduce congestion and air pollution on local roadways.

STRATEGY 12.3

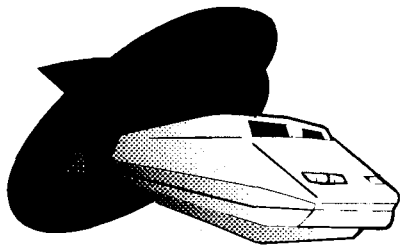
Increase public access to current, accurate information regarding intermodal transportation.

ACTION 12.3.1

Improve signage on state routes that provide access to intermodal terminals as well as in bus and rail stations, airports, and other intermodal passenger facilities to ease transfers and improve personal mobility.

ACTION 12.3.2

Implement programs that improve public awareness of and access to current, accurate information regarding intermodal transportation options, connections, and travel conditions, such as facility conditions, public carrier schedule changes, and intermodal fare agreements.



D. Economic Development and International Trade

The link between transportation, economic development, and international trade is very close in Texas. Texas is moving towards an economy based upon value-added manufacturing and service industries. At the same time, the North American Free Trade Agreement (NAFTA) is reshaping the role Texas plays in the national and global economies. NAFTA is expected to result in a steady increase in the demand for services and products from Texas. It also positions Texas as a major crossroads for North American and hemispheric trade, giving the state the opportunity to become an international warehousing and distribution center. Growth in value-added manufacturing, services, and trade is creating new transportation needs for the rapid and reliable movement of people, goods, and information by truck and motorized transport, for air, rail, marine, and pipeline travel and telecommunications, and for a high level of connectivity between these modes.

At the same time, attention must be given to the economic development needs of the state's rural areas and how these can be met through the transportation system. Because of the vastness of the state, rural communities can be quite isolated from one another, from urban areas, and from important markets. Efficient, well-maintained transportation options are critical if Texas' rural regions and communities are to attract new industry and maintain existing industries.

Recent initiatives have laid the groundwork for development of a cohesive statewide economic development strategy for Texas. However, Texas has yet to develop an explicit strategy for linking transportation investments to local and regional economic development and trade. Meanwhile, congestion at and near border crossings is a significant and growing problem. Implementation of NAFTA will further increase pressures on border crossings and trade corridors, especially on highways in South Texas and the Upper Rio Grande Valley, but also on rail lines, marine ports and waterways, and airports. Estimates of capital improvements needed to meet the demands of NAFTA are between $1.5 and $2 billion, with most of this money earmarked for transportation facilities and corridors.

Now and in the future, Texas will be competing with other states and regions of the United States and other countries for capital investment and jobs. Coordination between transportation investments and local and regional economic development and trade-related goals will help ensure that Texas remains competitive. Other measures that can help reduce cross border congestion and lower shipping costs include relocating customs and other administrative facilities away from border gateways where they contribute to congestion, streamlining border administrative functions, increasing cooperation between jurisdictions with border-area planning responsibilities, and collecting data on prevailing patterns in trade-related transportation.

Policy 13

Coordinate Statewide Transportation and Economic Development Policies

STRATEGY 13.1

Develop a statewide economic development plan linked to state transportation policies.

ACTION 13.1.1

Provide a forum for the identification and discussion of statewide freight and passenger flows among state and local government officials and among public and private transportation managers.

ACTION 13.1.2

Use the forum to coordinate statewide economic development and transportation policy as a foundation for industry- and corridor-specific traffic management teams.

ACTION 13.1.3
Identify information and data required to effectively plan and implement transportation programs and projects and to inventory current and emerging transportation deficiencies and bottlenecks by industry and region.

ACTION 13.1.4
Develop a statewide economic development plan that provides a working linkage between transportation and focused economic development strategies.

ACTION 13.1.5
Supplement the statewide plan with corridor-level plans tying transportation investment to the states' economic development goals.

ACTION 13.1.6
Target transportation investments to the economic development needs of specific industries and regions.

ACTION 13.1.7
Execute a memorandum of understanding between TxDOT and agencies involved with economic development to guide the economic development plan's implementation.

ACTION 13.1.8
Focus corridor-level traffic and congestion management systems on critical economic development links, such as business traveler access to airports, truck access to rail terminals, ports, and airports, and rail access to border crossings.

Policy 14
Ensure Adequate Transportation Capacity To Meet International Trade-Related Demands

STRATEGY 14.1
Designate international trade corridors of statewide significance for highway, air, rail, and marine freight.

ACTION 14.1.1
Include international ports-of-entry and international trade corridors as critical elements of the state multimodal transportation system.

ACTION 14.1.2
Use the Intermodal Management System and the Pavement Man-

agement System to monitor current and future trade corridor and facility and transportation system performance in meeting international trade needs.

ACTION 14.1.3
Establish a joint working group to develop a prioritized capital improvement program and associated funding mechanisms to enhance international border crossings.

ACTION 14.1.4
Construct new highway segments to ensure north-south transportation system continuity where needed using federal and state transportation funds.

ACTION 14.1.5
Expand approach roads and other facilities at border gateways and meet the increased pavement preservation needs along the border.

ACTION 14.1.6
Evaluate provision of new north-south rail facilities to provide an alternative to freight travel on Interstate 35.

ACTION 14.1.7
Pursue establishment of cross-border public transportation.

STRATEGY 14.2
Re-engineer border-clearance procedures and relocate border-related processing activities.

ACTION 14.2.1
Develop intermodal and administrative facilities away from the border.

ACTION 14.2.2
Provide one-stop shopping for meeting regulatory requirements, compliance monitoring, and enforcement for commercial vehicles involved in international trade.

ACTION 14.2.3
Exempt commercial vehicle and passenger transportation from selected regulatory requirements in border areas.

ACTION 14.2.4
Identify where administrative actions and additional staffing at U.S. Customs facilities would reduce border congestion.

ACTION 14.2.5
Improve procedures for border clearance of freight and passengers, including preclearance, through introduction of Intelligent Transportation Systems technology.

STRATEGY 14.3

Increase cooperation and coordination between state, federal, local, and Mexican jurisdictions.

ACTION 14.3.1
Encourage involvement and cooperation of non-transportation entities, such as the U.S. Border Patrol, the U.S. Customs Service, and the General Services Administration, to aid in the alleviation of congestion and other transportation problems at ports-of-entry.

ACTION 14.3.2
Establish corridor-specific planning teams composed of agencies with border-area planning responsibilities to focus attention upon freight and passenger movement between Texas and the industrial Midwest, and between Texas and Mexican cities.

ACTION 14.3.3
Ensure that Texas and TxDOT participate in key binational trade related initiatives.

ACTION 14.3.4
Ensure participation of Mexico border states in Western Association of State Highway Transportation Officials and American Association of State Highway and Transportation Officials activities.

ACTION 14.3.5
Collect information on planning and infrastructure development in Mexico and include Mexico and neighboring states on transportation system maps and in planning analysis prepared by TxDOT.

ACTION 14.3.6
Continue TxDOT's leadership role in establishing US/Mexico and Texas/Mexico transportation planning, system coordination, and highway system information exchange initiatives.

ACTION 14.3.7
Prepare a manual that details common terms of reference for transportation and land use planning by border communities.

CASE STUDY

Cross-Border Transportation Planning in El Paso

Many people in El Paso consider it business as usual, but something unique is happening in this corner of Texas. The local metropolitan planning organization (MPO) routinely joins forces with other jurisdictions, including agencies from Mexico and New Mexico, to help ensure the success of local transportation projects.

An official from the nearby City of Sunland, New Mexico will serve as a voting member on the El Paso MPO Transportation Advisory Board, its decision-making body. Two more out-of-state representatives serve on the MPO's steering committee. One is from a Regional Planning Organization in New Mexico. The other is from the City of Juárez, just across the Mexican border.

The City of El Paso is also involved in interjurisdictional planning. The city initiated the Paso del Norte Regional Planning Development Committee as a means of exchanging information of regional interest. This Committee meets on an as-needed basis and includes the Mayors of El Paso; Las Cruces, New Mexico; and Juárez, Mexico; as well as officials from El Paso County and Dona Ana County in New Mexico. On another level, transportation planners from the El Paso MPO and City of Juárez meet regularly.

Past, current, and planned projects that build upon the strong foundation of interjurisdictional teamwork in the El Paso area include:

- A new international port-of-entry, and reconstruction of an existing port-of-entry, on the border between El Paso and Juárez.
- An international transit system that will connect El Paso to Juárez.
- The Northeast Parkway, which will route commercial through-traffic past the most congested part of Interstate 10 in El Paso.

Another ambitious project being jointly undertaken in the El Paso area is the Artcraft Highway (State Highway 178), a four-lane controlled access highway designed for commercial traffic. It will lessen congestion and speed travel in the heavily travelled corridor between Interstate 10 and Santa Teresa, New Mexico, an important border port-of-entry. A new highway being constructed in Mexico will join the Artcraft Highway at the border. In addition to the El Paso MPO and the City of El Paso; development of the Artcraft Highway involved the Texas Department of Transportation, Dona Ana County, New Mexico; the New Mexico Highway Department; and the Mexican federal government.

These projects point to the importance of interjurisdictional coordination and cooperation in developing and preserving the Texas transportation system, and show how cooperation can provide benefits to Texans and their neighbors.

STRATEGY 14.4

Establish and maintain international trade data bases.

ACTION 14.4.1

Undertake a commodity origin-destination study for all modes of freight transportation that identifies and compiles data on origins, destinations, and routes prevalent in international trade.

ACTION 14.4.2

Include international trade commodity flows in the state's Intermodal Management System.

ACTION 14.4.3

Define trade performance measures based upon transportation providers' priorities.

E. Environmental Quality, Public Health and Safety

Transportation and environmental quality are tied together by a host of laws, including the Intermodal Surface Transportation Efficiency Act, the National Environmental Policy Act, the Clean Air Act, and Clean Water Act. Creating an environmentally sound and safe transportation system is one of the greatest challenges facing Texas today.

Texas has responded to the challenge of integrating transportation and environmental concerns. Environmental review has become a central feature of transportation project planning and development, and efforts are underway to reduce auto-generated pollution emissions. At the same time, much remains to be done. Currently, five metropolitan areas in Texas are in nonattainment of federal air quality standards: Houston, Dallas/Fort Worth, Beaumont, El Paso, and Victoria. In addition, Austin, Corpus Christi, San Antonio, and Longview-Marshall are classified as near nonattainment areas. Failure to ensure that these areas comply with federal clean air quality standards could jeopardize federal highway funding and limit economic development and growth.

Environmental quality can be improved by incorporating environmental design and alternative technologies into transportation project design. The principal approach to improving air quality in nonattainment areas involves State Implementation Plans. These establish transportation control measures aimed at reducing pollution emissions by encouraging more efficient travel behavior, including lowering the number of automobile trips and vehicle miles

accounted for by single-occupancy-vehicles. Expanded use of alternative fuel vehicles, such as electrically powered zero emission vehicles, can also help improve urban area air quality. However, expanded use of alternative fuel vehicles will first require investment in necessary refueling infrastructure.

The transportation-environmental health and quality link is also present in the transportation of hazardous materials. A major concern surrounds the transportation of hazardous materials through the center of cities. Another stems from the cross-border shipment of hazardous materials from Mexico through Texas border communities. Mexican laws on hazardous materials may not be as strict as U.S. laws. Additional work needs to be done to define the risk posed by hazardous materials transportation and to develop solutions to these risks.

The capacity of the state's transportation system to respond to emergencies or disasters is also important. Portions of the state's hurricane evacuation routes have been neglected. Failure to designate and maintain an emergency evacuation system may impair the state's ability to respond to emergencies and result in the loss of life.

The safety of the transportation system is also a major issue. In 1992, there were over 380,000 motor vehicle accidents in Texas, resulting in over 280,000 injuries and 3,057 fatalities. Concern with basic public health and safety requires that Texas continues to improve transportation safety, through educational programs and greater enforcement of state traffic laws.

Policy 15
Develop Environmentally Sound Transportation Infrastructure, Facilities, and Programs

STRATEGY 15.1
Support the Texas Plan for Alternative Fuels, and adopt State Implementation Plan transportation control measures in air quality nonattainment and near-nonattainment areas.

ACTION 15.1.1
Research and develop transportation control measures that will promote environmental quality in federal air quality nonattainment areas.

ACTION 15.1.2
Prioritize funding of transportation projects and facilities that foster

high-occupancy-vehicle use or energy-efficient travel modes, including intercity bus and transit.

ACTION 15.1.3
Promote and support expansion of alternative fuel transit fleets and facilities through TxDOT's ongoing transit capital and operations planning and programming, first in nonattainment areas, and then in the near nonattainment areas.

ACTION 15.1.4
Expand current three-station demonstration efforts to establish electric recharging and alternative fuels refueling facilities on major roadway corridors, including rest stops and state operated park-and-ride lots.

ACTION 15.1.5
Encourage major rental car operations to establish alternative fuel fleets in areas with high tourist attractiveness.

ACTION 15.1.6
Work with the Alternative Fuels Council and responsible state agencies to educate the public on the advantages and costs of alternative fuel vehicles and available refueling facilities.

ACTION 15.1.7
Evaluate changes and costs involved in converting or replacing TxDOT and other state agency and regional and local government fleet vehicles with alternative fuel vehicles.

ACTION 15.1.8
Identify funding resources to assist public agencies to increase use of alternative fuel vehicles, first in the nonattainment areas and subsequently in areas approaching nonattainment.

ACTION 15.1.9
Prepare a railroad feasibility study in association with the private railroad companies to determine the costs and benefits of alternative fuel propulsion freight lines and service in Texas and into Mexico.

ACTION 15.1.10
Evaluate joint use of school district bus and van rolling stock and refueling facilities with public transit operators and rural transit services.

ACTION 15.1.11
Enhance the motor vehicle inspection program in order to improve enforcement of vehicle emission standards.

ACTION 15.1.12
Redirect and prioritize oil overcharge funds to include alternative fuel transportation equipment purchases for schools.

ACTION 15.1.13
Develop a demonstration and promotion program for the use of zero emission vehicles for deliveries and short commutes.

STRATEGY 15.2

Avoid and mitigate the environmental impacts of transportation facilities.

ACTION 15.2.1
Develop and maintain an environmental constraints Geographical Information System data base that considers natural resources such as sensitive habitats, wetlands, cultural resources, and other similar features. Identify sensitive environmental areas where construction of transportation facilities should be avoided.

ACTION 15.2.2
Promote public awareness of the differing environmental costs of transportation alternatives.

ACTION 15.2.3
Establish design guidelines for transportation facilities which enhance the environment.

Policy 16
Minimize Risk From Transportation of Hazardous Materials

STRATEGY 16.1

Designate routes for hazardous materials transportation, including hazardous materials destined for cross-border trade.

ACTION 16.1.1
Develop a state hazardous materials route designation system stratified by hazardous and nuclear material types and quantity, and use it to coordinate statewide hazardous materials routing with local

jurisdictions and to focus enforcement and emergency response efforts.

ACTION 16.1.2
Route hazardous materials away from central business districts and to areas equipped to handle spills and emergencies.

ACTION 16.1.3
Increase coordination and communication between federal, state, and local government agencies with responsibility for hazardous materials, waste and nuclear materials, and munitions transportation.

ACTION 16.1.4
Establish a working group to review State Transportation Improvement Program maintenance and improvement project recommendations and prioritize maintenance of designated hazardous materials and emergency evacuation routes.

ACTION 16.1.5
Develop guidelines for ensuring education of hazardous materials code enforcement personnel and carriers.

ACTION 16.1.6
Continue to expand the joint TxDOT and Governor's office emergency evacuation route planning process and provide for a process for review and update of the currently designated hurricane evacuation routes.

ACTION 16.1.7
Coordinate with international freight-forwarding companies on international trade-related hazardous materials transport.

Policy 17

Ensure Transportation System Capacity During Emergencies and Disasters

STRATEGY 17.1

Designate emergency evacuation routes for priority maintenance and funding.

ACTION 17.1.1
Adopt designated and recommended Hurricane Evacuation Routes and the Nuclear Emergency Evacuation Routes as part of the Texas multimodal transportation system.

ACTION 17.1.2
Fund projects in state and metropolitan planning organization transportation improvement programs which improve or maintain designated emergency evacuation routes.

ACTION 17.1.3
Evaluate current air medical evacuation system service levels, both public and private, to identify areas with no service or areas that are underserved.

ACTION 17.1.4
Ensure that connections between rural transit services and intercity passenger carriers and air facilities are adequate to meet demand during public health and safety emergencies.

Policy 18
Maximize the Safety of All Transportation Modes

STRATEGY 18.1
Improve engineering practices for transportation facilities.

ACTION 18.1.1
Ensure that local transportation engineering and practices are in compliance with state standards and policies.

ACTION 18.1.2
Develop and implement an accelerated program to add crossing protection or eliminate at-grade rail crossings of streets and highways.

STRATEGY 18.2
Enhance enforcement of transportation safety regulations and laws.

ACTION 18.2.1
Coordinate state efforts with local traffic monitoring and enforcement programs.

ACTION 18.2.2
Enforce regulations on inspection and licensing of commercial vehicles and drivers and develop vehicle safety inspection policies and facilities necessary to deal with increased international truck and auto travel.

STRATEGY 18.3
Improve transportation safety public education programs.

ACTION 18.3.1
Coordinate state efforts with local safety education programs.

ACTION 18.3.2
Develop and implement a statewide public information campaign to educate transportation system users on safety issues and the cost of transportation accidents to taxpayers.

ACTION 18.3.3
Expand documentation of accident data for all modes of transportation and coordinate the collection, maintenance, and dissemination of accident data with the insurance industry and other public and private sector groups.

STRATEGY 18.4
Develop programs to address demographic changes affecting transportation safety.

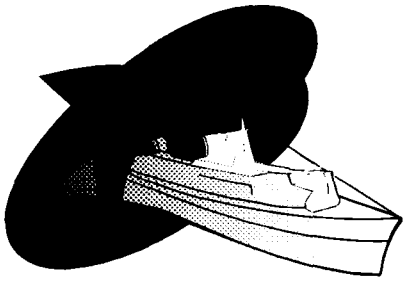
ACTION 18.4.1
Implement more frequent licensing and testing of older drivers based upon driving record.

ACTION 18.4.2
Establish a state policy with respect to the testing and licensing of non-English-speaking drivers.

ACTION 18.4.3
Develop a signage program, including symbol- oriented and multilingual signage, that responds to the needs of non-English-speaking drivers.

F. Interjurisdictional Cooperation and Coordination

Many different organizations and interests are involved in developing and preserving the Texas transportation system. Included are the Texas Department of Transportation, other agencies of state, federal, regional, and local government, the public, private industry, neighboring state governments, and Mexico. The interaction of these various agencies and interests raises important issues for the future of transportation in Texas.



Transportation system development requires compliance with a large number of federal and state laws. Often, large transportation capital projects face delays stemming from the regulatory approval and permitting processes, disrupting project development and raising project costs. Sometimes, this is because regulatory agencies are involved only after project planning is largely complete, and it is only then that significant problems arising from environmental and other regulatory matters are identified. Other times, delays arise due to the inability of transportation staff to obtain information necessary to receive project approval.

Another impediment to transportation project development surrounds occasions when individual communities obstruct projects that are otherwise the product of regional agreement. This becomes particularly costly when communities rescind previous support for a project. It is important that communities have a say in any transportation project planned for their local area. It is also important that there be a means to resolve issues within a reasonable timeframe, so regionally supported projects can be predictably planned and implemented.

Streamlining can help eliminate delays arising from the transportation project permitting and approval process; so can development of shared data bases containing information necessary for permitting, and the use of advanced planning, which involves regulatory agencies in the project development process at an early stage. The Intermodal Surface Transportation Efficiency Act also significantly expands the role of metropolitan planning organizations to include important regional multimodal transportation planning responsibilities. Some metropolitan planning organizations do not have the necessary staff or skills to fulfill these expanded responsibilities. Enhanced training and funding can help ensure the capacity of metropolitan planning organizations to fully undertake their regional transportation planning responsibilities.

Policy 19
Expedite the Project Development Process

STRATEGY 19.1

Streamline the transportation project development process.

ACTION 19.1.1
Establish uniform procedures in all TxDOT districts to coordinate and involve the Texas Natural Resources Conservation Commission, other state agencies with permitting authority and other interested parties, at the outset of transportation project development, to identify and address environmental issues more effectively.

ACTION 19.1.2
Establish a memorandum of understanding between TxDOT and other state agencies to establish "one-stop" shopping for project permitting.

ACTION 19.1.3
Work with federal agencies to establish joint permitting procedures.

ACTION 19.1.4
Ensure that the "Retooling TxDOT" work program identifies specific steps for streamlining the project development process.

ACTION 19.1.5
Establish a transportation ombudsman in the Governor's office.

ACTION 19.1.6
Establish time limitations for regulatory decisions.

ACTION 19.1.7
Develop a "user-friendly" guide to project development and permitting requirements that explains the benefits and safeguards of regulatory processes.

STRATEGY 19.2

Broaden advance planning to ensure multimodal collaboration in project planning, design, right-of-way designation, and acquisition.

ACTION 19.2.1
Include transit, bicycle, and other modes in advance planning.

CASE STUDY

State Highway 170: Efficient, Long-Range Intermodal Transportation Planning

Texas State Highway 170 is an example of Texas intermodal future in the making. Located to the north of Fort Worth, this controlled access freeway will connect three highways, the Union Pacific Railroad, and Alliance Airport when completed. Highway 170 is also an excellent example of efficient and insightful long-range planning, and a model of cooperation between multiple jurisdictions and the private sector.

Highway 170 is the product of a fast-paced process. The Texas Department of Transportation began preliminary engineering work for Highway 170 in late 1987. Within two years engineering schematics were developed, an environmental assessment prepared, public hearings held on the project, and detailed construction plans drawn up. The ground-breaking for construction of Highway 170 was held in March 1990.

The speed with which the Highway 170 project has proceeded is especially notable in light of the large number of jurisdictions involved in the project. Besides TxDOT, Highway 170 involved other state agencies, and the Federal Highway Administration. Although the Highway 170 corridor stretches only seven miles, it lies within portions of nine different local government jurisdictions, which were also involved: the cities of Fort Worth, Roanoke, Trophy Club, Keller, Southlake and Haslet, the town of Westlake, and unincorporated Tarrant and Denton Counties. The private sector was also involved in Highway 170, by donating the majority of the land needed for highway right of way

The Highway 170 project reflects long range planning and the phasing in of transportation infrastructure as it is needed. Currently, the highway consists of two urban frontage roads—three lanes running in each direction between Interstate 35W and State Highway 114--which can handle existing traffic volumes. As traffic volumes increase in the future and as funds become available, the median between the frontage roads will be expanded into a four-lane freeway. Ultimately, the Highway 170 corridor it is designed to expand to eight lanes.

In the meantime, Highway 170 serves as a model of an intermodal transportation project that was completed within a tight timeframe, as a model of interjurisdictional coordination, and long-range foresight.

ACTION **19.2.2**
Establish design standards and practices applicable for incorporating other modes as part of advance planning.

ACTION **19.2.3**
Incorporate major investment studies into advanced planning.

Policy 20
Ensure Implementation of Regionally Approved Projects

STRATEGY **20.1**

Use existing authority to site and align regionally approved projects.

ACTION **20.1.1**
Increase public understanding of the project development process and the regional benefits of an efficient transportation system.

ACTION **20.1.2**
Exercise the authority of the Texas Transportation Commission as a last resort to site needed projects and to move ahead with regionally approved projects if other actions have been unsuccessful.

Policy 21
Ensure Organizational Capacity for Multimodal Transportation Planning

STRATEGY **21.1**

Enhance the capabilities of metropolitan planning organizations and other organizations to undertake transportation planning.

ACTION **21.1.1**
Establish and fund a program setting minimum planning requirements for metropolitan planning organizations.

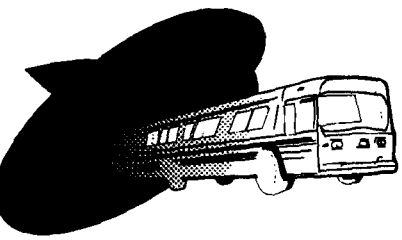
ACTION **21.1.2**
Provide coaching and training for metropolitan planning organizations, cities, counties, and councils of government to undertake planning.

ACTION 21.1.3
Enhance the multimodal planning responsibilities of TxDOT districts.

ACTION 21.1.4
Establish improved metropolitan planning organization planning capacity as a performance goal and monitor performance.

ACTION 21.1.5
Ensure ports are asked to participate in metropolitan planning organization planning and decision-making processes.

ACTION 21.1.6
Encourage the realignment of TxDOT district boundaries with council of governments boundaries.



G. Finance

Texas has identified many - often costly - transportation needs that must be addressed during the lifetime of the Plan. However, the analysis of the existing funding structure has shown that resources are insufficient to meet the goals of the Plan. Current funding mechanisms do not always lead to the most efficient and effective use of scarce resources. This is in part because users often do not pay for the full costs they impose on the system, and because current funding mechanisms are not flexible enough to allow for the best use of scarce resources. In addition, funding sources are declining in value over time because they do not account for inflation and other factors, like increases in fuel efficiency, which reduce available funding. Consequently, it is not surprising that existing funding sources cannot address existing or future needs. Special needs, like those triggered by the passage of the North American Free Trade Agreement, a large backlog of needs in urban and rural areas of the state, very large projects necessitated by economic growth, and the special concerns of Texas' major cities provide additional difficulty.

The challenge is to provide Texas with maximum flexibility to meet transportation needs for the next twenty years. The following initiatives are designed to help The Texas Transportation Plan meet this goal. The policies, strategies, and actions below represent a range of financing options the Transportation Commission may choose from to meet needs.

Policy 22
Optimize the Use of Existing Funding Sources

STRATEGY 22.1

Focus on projects with the greatest return on investment.

ACTION 22.1.1

Use benefit-cost analysis in evaluating projects to be included in the Statewide Transportation Improvement Program to ensure the greatest return on investment.

ACTION 22.1.2

Use life-cycle costing in developing project cost estimates and in evaluating projects for the Statewide Transportation Improvement Program to ensure consideration of all costs.

STRATEGY 22.2

Ensure collection of funds from existing taxes.

ACTION 22.2.1

Restructure collection approaches to reduce the evasion of motor fuel and diesel taxes.

STRATEGY 22.3

Generate income from transportation assets.

ACTION 22.3.1

Pursue aggressively leasing of air and subsurface rights, rights-of-way, and concessions to the private sector, and ensure that revenues flow back to fund transportation projects and services.

Policy 23
Maintain the Purchasing Power of Existing Transportation Revenue Sources

STRATEGY 23.1

Tie user fees to inflation.

ACTION 23.1.1

Tie motor fuel and diesel taxes to the construction price index and establish a floor at the current tax rate to guarantee a minimum level of funding.

ACTION 23.1.2

Tie the motor vehicle registration fee to the value of the automobile to account for inflation.

STRATEGY 23.2

Address loss of user fees due to increased fuel efficiency and alternative fuels.

ACTION 23.2.1

Use the motor vehicle registration fee in combination with phased in increases in taxes on alternative fuels to balance the need to recover lost revenue with Texas air quality goals.

Policy 24

Obtain Sufficient Revenues to Meet Essential Transportation Needs

STRATEGY 24.1

Maximize revenues from existing funding sources.

ACTION 24.1.1

Raise motor fuel and diesel taxes, and, potentially, motor vehicle registration fees.

ACTION 24.1.2

Develop a statewide toll road and bridge system and back bonds with system-wide toll revenues rather than project-level revenues.

ACTION 24.1.3

Optimize and expand the use of public-private partnerships and require an evaluation of the potential for such partnerships for each turnpike or toll bridge development project.

STRATEGY 24.2

Identify and implement new and innovative funding sources.

ACTION 24.2.1

Ensure an adequate source of funding for general aviation airports through the dedication of existing aviation-related sales, excise, and franchise taxes, or other revenue sources.

ACTION 24.2.2
Provide a stable source of funding for small urban and rural transit systems by providing ongoing general revenue appropriations and/or dedicating general sales taxes to public transportation.

ACTION 24.2.3
Create a multimodal transportation fund supported by new revenue sources such as emission fees.

ACTION 24.2.4
Provide additional bond financing authority at the state level, including:

- ❖ Giving TxDOT bonding authorization.
- ❖ Establishing a state bond bank/revolving loan fund that can be used for state or local transportation project financing.

Policy 25

Fund Special Needs

STRATEGY 25.1

Provide funding mechanisms to meet international trade-related needs.

ACTION 25.1.1
Develop public-private partnerships and toll financing at the state level for international and NAFTA-related projects.

ACTION 25.1.2
Seek federal funds to pay for NAFTA-related transportation needs which benefit the country as a whole.

STRATEGY 25.2

Provide funding mechanisms to meet large "one-time" needs.

ACTION 25.2.1
Seek authorization for a one-time state bond issue to address the backlog of needs of local governments.

ACTION 25.2.2
Seek authorization for a state bond issue to fund identified large projects.

STRATEGY 25.3

Implement an urban streets program at the state level to address rehabilitation of deficient roadways.

ACTION 25.3.1

Dedicate a portion of the state motor fuel tax to cities based on population.

ACTION 25.3.2

Distribute a portion of the motor fuel tax to cities based on need and a set of clearly defined criteria.

ACTION 25.3.3

Provide local jurisdictions with local option taxes and more flexibility in levying local sales taxes.

Policy 26

Provide a Transportation Revenue Structure that Ensures Cost Responsibility

STRATEGY 26.1

Internalize the true costs of the transportation decisions of all users to the extent possible.

ACTION 26.1.1

Analyze existing user fees to change the structure towards greater cost responsibility.

ACTION 26.1.2

Implement a weight-distance tax or increase vehicle registration fees for commercial trucks to achieve greater cost responsibility.

ACTION 26.1.3

Evaluate congestion-pricing, emissions fees and similar measures to provide greater cost responsibility for the environmental and congestion-related effects of automobiles.

Policy 27

Increase Flexibility in the Use of Transportation Resources

STRATEGY 27.1

Use the flexibility provided by the Intermodal Surface Transportation Efficiency Act.

ACTION 27.1.1

Use the flexibility of the Intermodal Surface Transportation Efficiency Act funds from the Surface Transportation Program to shift funds to the highest priority transportation needs regardless of mode.

ACTION 27.1.2

Seek legislation to allow the use of Texas Turnpike Authority revenues for multimodal projects.

Policy 28

Monitor and Address Emerging Issues

STRATEGY 28.1

Address emerging needs and funding opportunities.

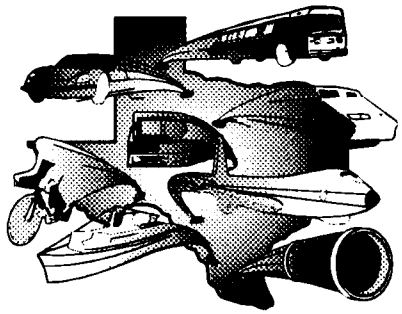
ACTION 28.1.1

Monitor needs and trends in the following areas and develop funding approaches addressing them:

- Congestion pricing and vehicle-miles-traveled taxes for automobiles.
- New telecommunications technologies.
- Public use right-of-way.
- Environmental concerns regarding pipelines.
- Port needs.

III. THE TEXAS MULTIMODAL TRANSPORTATION SYSTEM

Texas has some of the largest, most modern, and extensive transportation facilities in the nation. This section provides a description of the components of the multimodal transportation system that are of statewide importance. It does not attempt to describe the entire system. In addition, it profiles its different modal components.



A. Designating the Texas Multimodal Transportation System

Not all transportation facilities and services in Texas serve a statewide function. Some facilities, such as Dallas/Fort Worth Airport, the Port of Houston, or the I-35 corridor clearly are of statewide, if not national and international importance, while others, such as Austin's Capitol Metro downtown trolley service, serve a more local function. The Plan cannot equally apply to all transportation facilities and services. It designates a statewide system with different components reflecting the role that individual facilities or services play within the overall system. It is needed for a Plan that develops different strategies and, potentially, different standards for different functions. The following outlines this approach to designating the Texas multimodal transportation system.

1. System Components

The transportation system of statewide importance has three different components, corridors, intermodal facilities, and connectors. Figure III-1 illustrates corridors and major intermodal facilities.

a. Corridors

Transportation corridors are the arteries of the statewide multimodal transportation system and carry the most traffic. They are crucial in moving people, goods, and information between major population and activity centers in Texas and to other such centers outside the state and country. Corridors can consist of major facilities for a single mode but in a multimodal system are likely to combine a variety of different modes to carry large volumes. They are exemplified by interstate highway corridors, main freight rail lines, and the Gulf Intracoastal Waterway.

b. Intermodal/transfer facilities

Intermodal or transfer facilities are transportation facilities that allow the transfer of goods and/or people from one mode to another. Intermodal facilities can vary widely in the volume of people and goods they serve. In designating the Texas multimodal transportation system, major intermodal facilities located along corridors serving a statewide function are included at this initial stage of the statewide planning process. Other facilities providing services away from major corridors will be included over time based on the role they play in regional transportation systems. The inclusion of these other facilities is likely to address broader economic and social goals, and to ensure the development of a system connecting and serving all parts of the state. Major intermodal facilities include commercial service airports and deep draft ports. Other elements include most general aviation airports and local transit centers. Figure III-2 locates the intermodal components of the multimodal system.

c. Connectors

Connectors are linkages to corridors and intermodal transfer facilities. They link small urban and rural areas and intermodal facilities to main corridors. Generally, the volume of goods, people, and information is significantly lower than that on corridors. Connectors are more important for traffic moving within Texas and its regions than for traffic moving between different regions of the state or interstate and international traffic. As with smaller intermodal facilities, the inclusion of connectors is likely to address broader economic and social goals, and to ensure the development of a system connecting and serving all parts of the state. Examples include rural arterials or upland ship channels.

2. Modal Criteria

In addition to general criteria based on level of service, facilities and services must meet mode-specific criteria, including volume and type of traffic served. Thresholds for many of the criteria listed below will be developed during the next stages of the planning process as more information becomes available.

a. Highways supporting motor vehicles

All facilities that are part of the National Highway System or the Texas Trunk System receive corridor designation. This also applies to primary evacuation routes as designated in the Hurricane Evacuation Plan and locally designated hazardous materials routes on the National Highway System. At the connector level, roadway facilities are included if they provide access to the interstate system, serve as commodity highways, or provide access to air and sea ports, rail stations, border crossings, major tourist attractions, military installations, or Native American reservations.

A distinction will be made between major and other intermodal facilities, such as trucking transfer stations, based upon container/bulk throughput.

b. Rail

All Amtrak and intercity passenger rail as well as all freight rail main lines (Interstate Commerce Commission track categories A and B) are included as corridors. All commuter and light rail lines will serve as connectors, freight rail connectors include branch lines based on Interstate Commerce Commission categories C and D, as well as all short lines and port access links.

A distinction between major and other passenger rail intermodal facilities will be made for Amtrak stations and commuter rail stations based up on a threshold for boardings. Future high speed rail stations will be considered major facilities. Light rail stations will be included based on boardings. A distinction between major and other freight rail intermodal facilities will be made based upon tonnage and the number of rail cars and trucks they serve.

Figure III-2
Intermodal Facilities

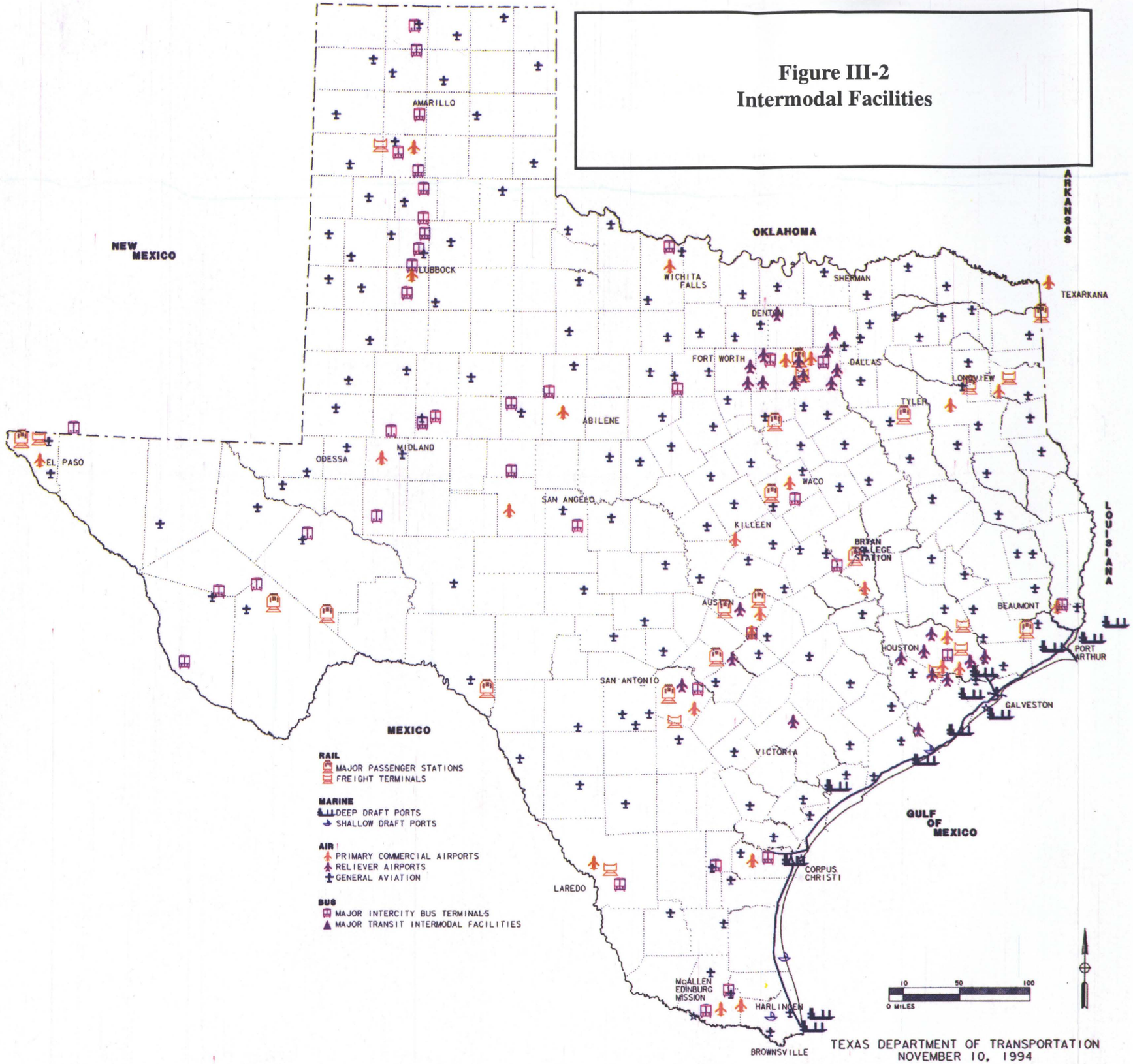
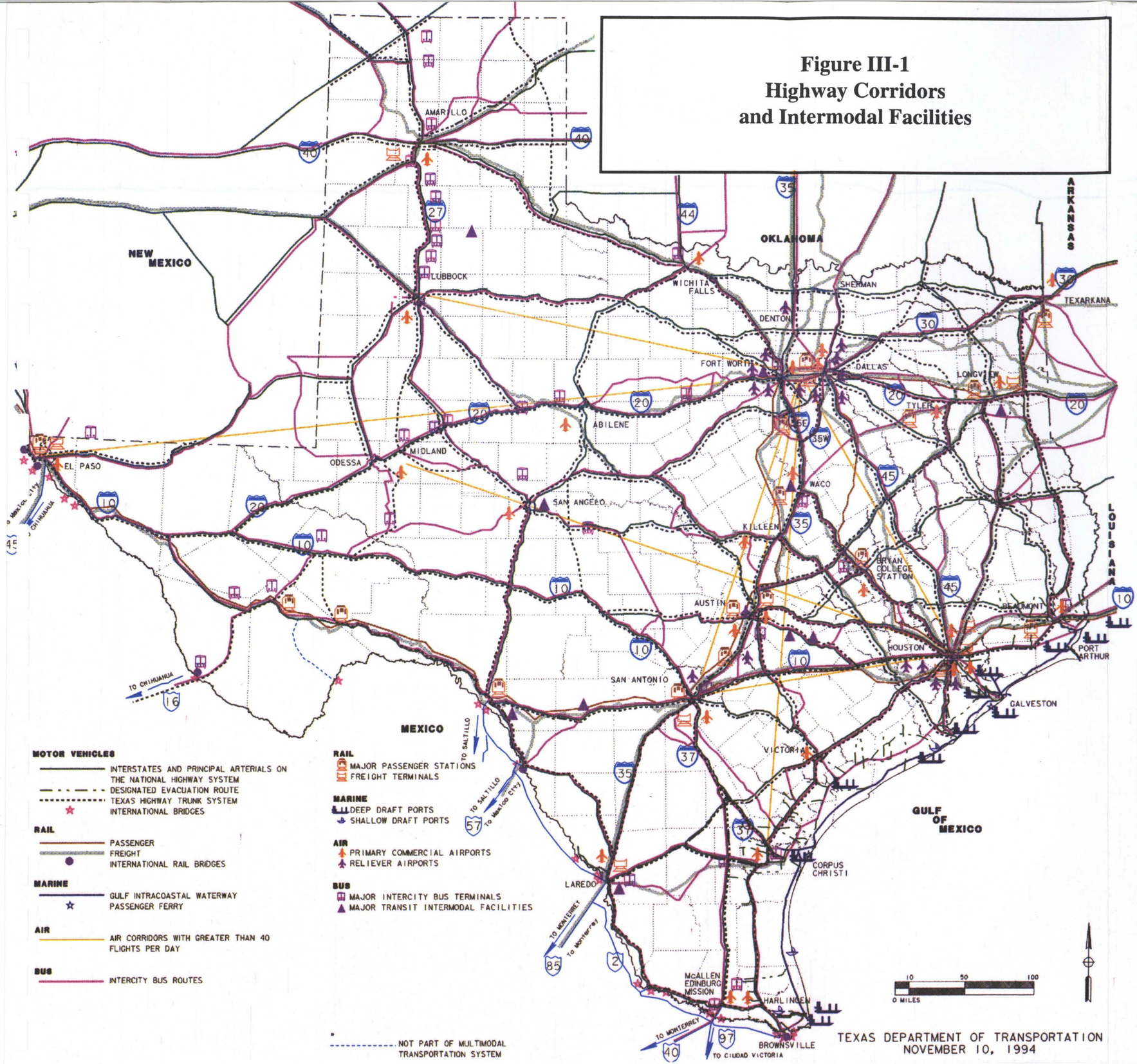


Figure III-1
Highway Corridors
and Intermodal Facilities



c. Marine

Corridors of the marine transportation system are the Texas portion of the Gulf Intracoastal Waterway and all international passenger and freight ferry, and barge routes. Upland ship channels and ferries that extend highway corridors are designated as connectors.

All deep draft ports are considered major intermodal facilities; for shallow draft ports a threshold between major and other facilities will be established as information becomes available.

d. Air

Commercial jet service routes between major city pairs will comprise air corridors, while routes served less frequently and by smaller aircraft will function as connectors.

All airports that are part of the National Plan of Integrated Airport Systems and the Texas Aeronautical Facilities Plan function as elements of the overall multimodal transportation system.

e. Bus transit and intercity bus

Intercity bus service and major metropolitan transit systems with routes operating on highways with corridor designation receive corridor designation. All urban, rural, and demand-responsive transit systems serve connector functions.

A distinction between major and other elements will be made for intercity bus terminals and transit centers in metropolitan areas. Designation criteria include boardings and available connections to other long distance passenger services. Transit centers operated by smaller transit systems will be included at the secondary level if they provide connections to other long distance passenger services.

f. Nonmotorized

All bicycle routes on or parallel to highways designated as corridors also receive corridor designation, as do international bridges with pedestrian traffic. Links to urban areas, activity centers, and pedestrian bridges over corridors or connectors serve as nonmotorized connectors.

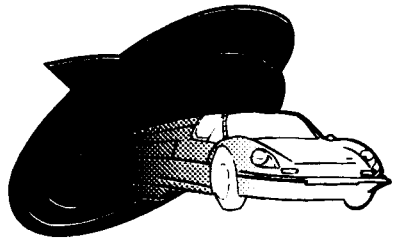
g. Pipelines

All interstate pipelines are considered corridors, while some intrastate pipelines will receive connector designation based on a yet to be determined volume threshold. The same applies to pipeline intermodal terminals.

h. Telecommunications

Thresholds for the designation of telecommunications corridors will be determined based upon later analysis.

B. Highways and Bridges



Texas has the most extensive highway system of any state in the union, reflecting the state's vast size. The 77,000 mile system under the Texas Department of Transportation's (TxDOT) jurisdiction includes interstate highways and frontage roads, United States (US) highways, state highways, and farm-to-market and ranch-to-market roads. In addition, local governments maintain 213,317 miles of county roads and city streets, bringing the total number of public road miles in Texas to almost 300,000.

1. The Existing Highway System

The following describes the components of the highway system, its use, and its condition. Its major corridors are illustrated in Figure III-3. They include all elements of the National Highway System, the Texas Trunk System, major evacuation routes, and hazardous materials routes designated by local jurisdictions.

a. System components

(1) National Highway System

The National Highway System is a major network of principal arterial routes serving major population centers, international border crossings, ports, airports, public transportation facilities, intermodal transportation facilities, and other major travel destinations. It includes the Interstate System, U.S., and many state highways that are highlighted separately below. With the December 1990 passage

of the Intermodal Surface Transportation Efficiency Act, federal policy has shifted from emphasis on completion of the Interstate System to development of the National Highway System. Out of a total of 158,674 National Highway System miles nationwide, Texas was apportioned 12,940 miles; 7,902 miles in rural areas and 5,038 in urban areas. Finalization of the Texas portion of the National Highway System is pending approval by Congress.

- **Interstate Highways.** There are fifteen Interstates in Texas. As of 1992, Texas' share of the national Interstate System totaled 3,233 miles, accounting for over seven percent of total interstate mileage in the country. Interstate highway frontage roads are also extensive, totalling 4,506 miles throughout the state. Travel on these roads accounted for approximately one-third of the state's total vehicle miles in 1992. Average daily truck volumes on segments of interstate highways in Texas ranged from a low of 1,200 on Interstate 10 from its junction with Interstate 20 to the town of Junction, to 10,400 for Interstate 10 from its junction with Interstate 610 in Houston to the Louisiana border.

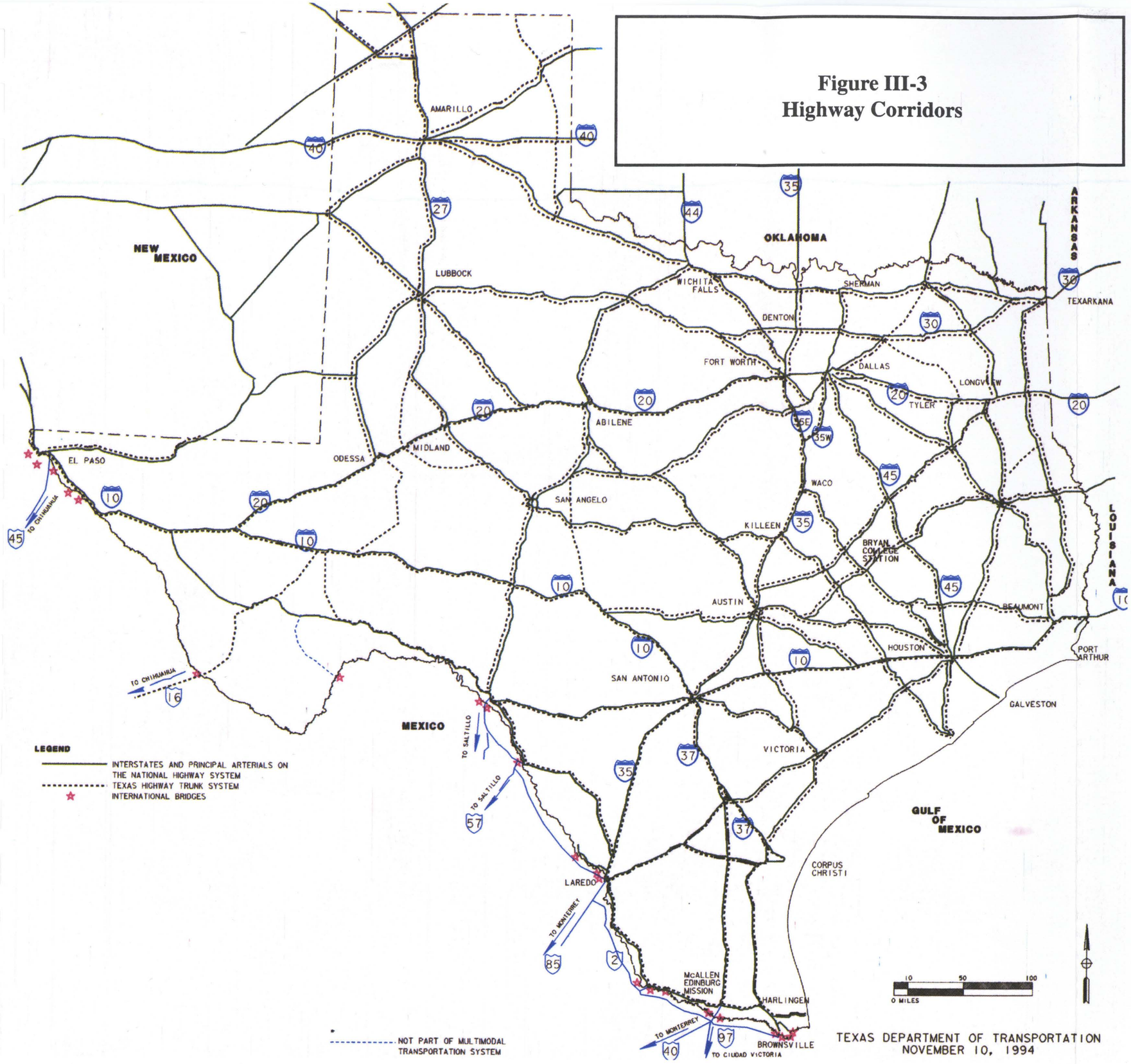
- **United States Highways.** The Texas share of the U.S. Highway System in 1992 totalled 12,099 miles. U.S. highways include but are not limited to: Routes 59 (Texarkana to Laredo), 67 (Texarkana to Presidio), 77 (Oklahoma border to Brownsville), 87 (Texline to Port Lavaca), 90 (Orange to Van Horn), 281 (Oklahoma border near Wichita Falls to Hidalgo), and 287 (Oklahoma panhandle to Port Arthur). These U.S. highways accommodated 79 million vehicle miles of travel in 1992.

- **State Highways.** The State of Texas is solely responsible for the designation of state highways and farm-to-market/ranch-to-market roads. Based on figures for 1992, state highways included 16,170 miles of roadway, 75 percent of which were in rural areas. These roads carried 78 million vehicle miles of travel in 1992. As of 1992, Texas' Farm-to-Market/Ranch-to-Market roads spanned 40,755 miles and carried 45 million vehicle miles.

(2) Texas Trunk System

In November 1990, the Texas Transportation Commission adopted a planned four-lane divided rural highway system that includes and complements parts of the Interstate, U.S., and state highway systems. This new system is planned to provide direct access to every

Figure III-3
Highway Corridors



Texas city with a population over 20,000, major ports, military installations, recreational areas, adjacent states, and Mexico. The final system will comprise approximately 10,230 miles, several four-lane divided highway upgrades, and require an estimated 30 years of work. The trunk system will be reviewed every four years to ensure that intended system goals are met.

(3) Toll roads

The Texas Legislature established the Texas Turnpike Authority in 1953 "to plan, finance through both public and private resources, build, operate and maintain a system of toll roads, bridges, and tunnels for all the people of Texas in partnership with the Texas Department of Transportation." The Texas Turnpike Authority has been responsible for the creation of the Dallas-Fort Worth Turnpike, the Dallas North Tollway, the Dallas Parkway, the Mountain Creek Lake Bridge, and the Houston Ship Channel Bridge. The Dallas-Fort Worth Turnpike was transferred to TxDOT in 1977. In 1994, the Texas Turnpike Authority continued to operate two of these facilities: Dallas North Tollway in Dallas and Collin Counties, and Mountain Creek Lake Bridge in Dallas County. The Houston Ship Channel Bridge in Harris County was transferred to the county in 1994. Current legislation prohibits the Texas Turnpike Authority from using toll revenues to cross-subsidize facilities outside of the county where the tolls are generated. Thus, Texas has no statewide system of toll roads. The Texas Turnpike Authority's potential new projects include the Addison Airport Tunnel (Dallas County) and SH-190.

In addition to the Authority, there are thirteen other entities operating toll facilities in Texas. They include Harris, Galveston, Cameron, and Starr Counties; the Cities of Del Rio, El Paso, Eagle Pass, Laredo, McAllen, and Pharr; and three private bridge companies along the border.

(4) High-occupancy-vehicle lanes

High-occupancy-vehicle lanes are designated on multi-lane roadways for the exclusive use of buses, and vehicles used by passenger van or car pools only during peak travel demand periods of the day. Some high-occupancy-vehicle lanes are reversible, allowing traffic in one direction into or out of an urban area depending upon the time of day. Currently, Houston and Dallas have high-occupancy-vehicle facilities.

Houston has five designated high-occupancy-vehicle routes: North, Northwest, Katy, Southwest, and Gulf, totaling 58.1 miles, with an additional 6.3 miles committed to construction. By the year 2000 the Houston Metropolitan Planning Organization (MPO) plans expansion to 95.5 miles, including two new routes: Eastex and Westpark. The Houston-Harris County community transportation plan calls for an expansion to 122 miles of high-occupancy-vehicle lanes by 2010.

Dallas currently has one reversible high-occupancy-vehicle lane with movable barriers on Interstate 30 between the downtown area and the Interstate 30-US 80 interchange, a distance of less than ten miles. The *Mobility 2010* long-range plan for the Dallas-Fort Worth area calls for the development of a 150-mile regional high-occupancy-vehicle lane system.

The Austin Transportation Study and Capital Metro are developing the transit element of the Austin area's long-range plan which proposes a high-occupancy-vehicle lane along Interstate 35.

The San Antonio-Bexar County metropolitan planning organization recently initiated a regional high-occupancy-vehicle study. The study may recommend high-occupancy-vehicle projects in the San Antonio area.

(5) Bridges

There are approximately 33,500 bridges on the designated state highway system which represent a majority of the some 48,000 total bridges on the state's public roads and streets. Many of these structures are in need of rehabilitation improvement and/or replacement. About 19 percent of the bridges on the state system are functionally and/or structurally deficient.

The TxDOT bridge inspection system relies upon ratings of functional and structural deficiency and sufficiency. The criteria were established by the Federal Highway administration and are used in allocating federal bridge funds to states.

Bridge maintenance funding for each district is currently apportioned according to the number of obsolete and deficient bridges. Some districts, such as those along the gulf coast, have more rapid deterioration rates than others because of salinity, air pollution, and weath-

ering characteristics of the environment. Differential deterioration rates are not presently being monitored but will be included in future forecasting models.

b. Use of the system

More than 307 million vehicle miles were traveled on Texas highways in 1992, which represents an increase of 22 percent since 1969. Texas' share of miles traveled nationwide in 1992 was 7 percent. Work related trips represented the largest proportion of household travel, both in terms of miles and in numbers of trips, which are growing longer. This is due, in part, to suburbanization that has increased the distance between work and home for many Texans.

c. Pavement condition

In 1992, 62 percent of the highways in Texas were in very good condition. Eighty-three percent in 1992 of all roadways rated either "very good" or "good". There was only a slight trend towards deterioration. As of 1992, only 6 percent of Texas highways needed remedial attention.

Figure III-4 details the condition of the different types of highways.

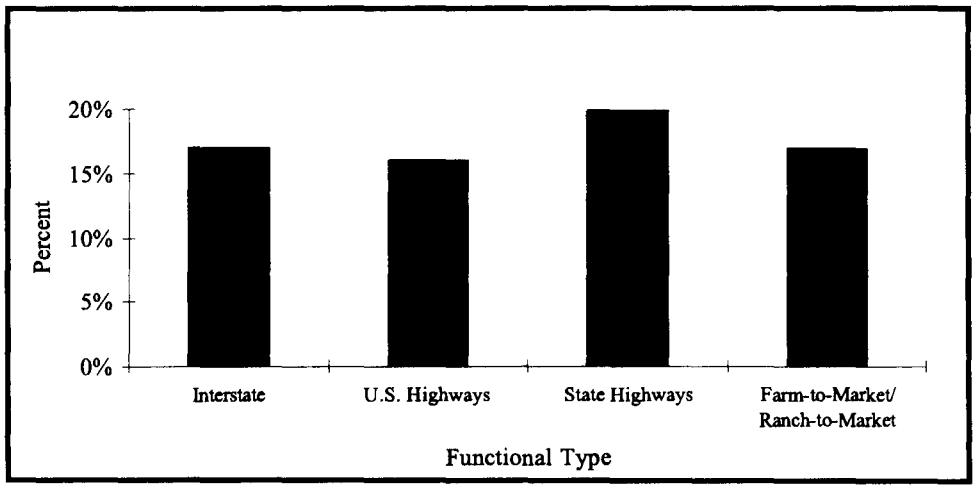


Figure III-4
Portion of Texas Roadways With Deficient Pavement in 1992

Source: Texas Department of Transportation

d. Congestion levels

Congestion results when traffic Federal highway statistics show that a considerable portion of urban highways in Texas were congested at the end of 1992. Twenty-five percent of urban interstates exceeded 95 percent of their capacity, as evident in Figure III-5, and 43 percent were operating at over 80 percent of their carrying capacity. In addition, many urban freeways and expressways (32 percent) carried over 80 percent of their capacity. Rural highways in the state had ample capacity.

e. Safety

Accident data on public roads are tabulated annually by the Texas Department of Public Safety. A total of 382,354 motor vehicle accidents occurred in Texas in 1992, which resulted in 3,057 deaths and 282,025 injuries. These figures were down from 1984 when motor vehicle accidents resulted with 3,913 deaths. Driving while intoxicated was a factor in 34,937 of these accidents. Use of safety restraints has contributed to overall safety. In 1986 66.8 percent of drivers used safety restraints, a figure that increased to 73.6 percent by 1993. In addition, safety was improved by increased use of child restraint equipment.

2. The Highway System in the Future

Use of the Texas road network is expected to increase 44.5 percent over the next 20 years, when measured in terms of vehicle miles travelled. This growth will impact all areas of the state, but focus on metropolitan areas where the greatest population and employment growth is projected. Roadway wear will become a greater issue because commercial (truck) vehicle miles travelled are projected to grow at a faster rate than passenger travel, 2.15 percent and 1.82 percent, respectively. Commercial vehicles tend to have a greater impact on roads than passenger vehicles. Preliminary projections of vehicle use are summarized in Figure III-6 that presents travel trends in Texas.

Preservation and expansion of the existing highway system will become more of a challenge in the future due to funding constraints. In order to meet all projected highway construction needs and other highway-related expenditures, such as road and bridge maintenance, bridge construction, planning, development, and design; more than $23 billion is needed during the next five years. Over the lifetime of the Plan, more than $134 billion will be needed. However, if existing revenues are projected into the future, only 62 percent of all highway and bridge needs can be met during the next five years. Cur-

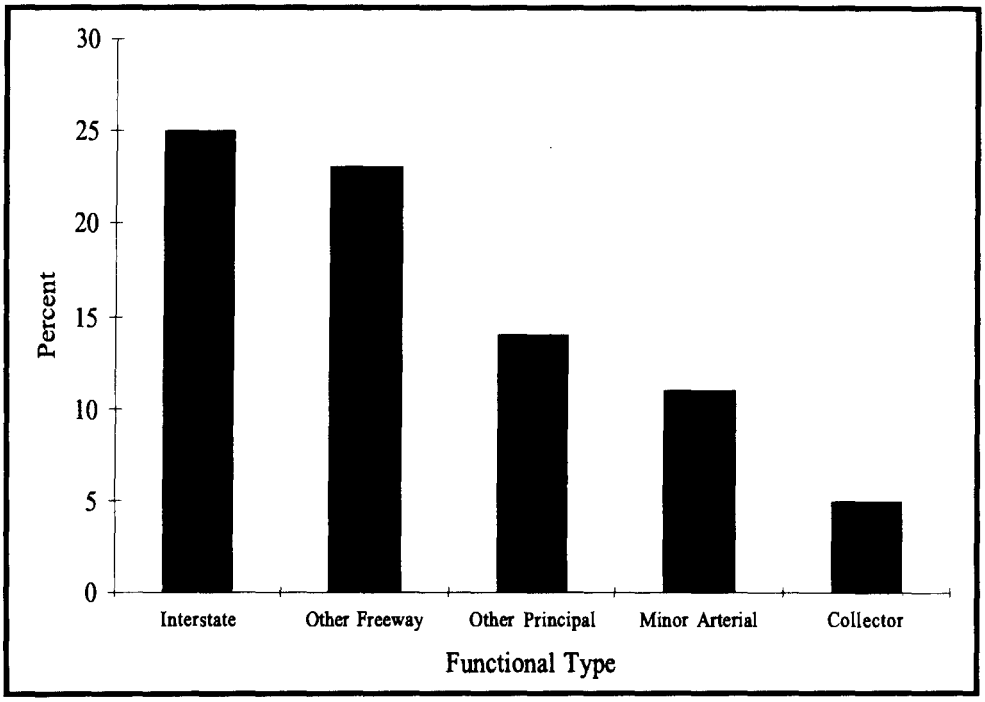


Figure III-5
Texas Roadways Operating At or Near Capacity in 1992

Source: U.S. Department of Transportation, Federal Highway Administration, Highway Statistics, 1992, 1993

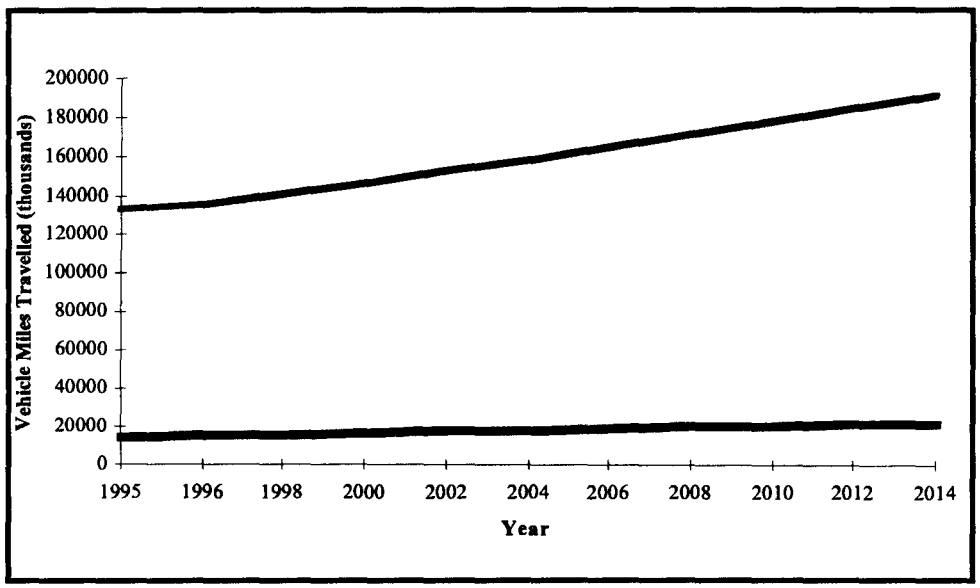


Figure III-6
Projected Travel for Passenger and Commercial Vehicles 1995-2014

Source: The Texas Transportation Plan, 1994

rent revenue sources, if they are not increased or supplemented by new sources can provide only 40 percent of the necessary funds over the lifetime of the Plan. Table III-1 illustrates this problem. Without additional investment in the highway and bridge system, there will be significant declines in the level of service, making it difficult for Texas to meet its economic and social needs.

3. Issues

The evaluation of the existing highway system in Texas has identified a number of issues that Texas must address during the lifetime of the Plan. They are briefly outlined below.

a. Unfunded road and bridge needs

Both urban and rural areas of the state have identified a backlog of needs that must be addressed over the life of the Plan. There are also bottlenecks at the border, and there are several locations in metropolitan areas where major reconstruction or capacity improvements are required to address congestion and growth-related needs.

b. Access in rural areas

The public outreach effort has shown that Texas' rural areas face significant mobility and accessibility challenges. There is a need to maintain and improve transportation linkages between these areas and the state's activity centers. Texas' highway system plays a vital role in ensuring these linkages.

c. Implementation of transportation systems and demand management measures

The analysis has shown that Texas, like other states in the country, will not be able to meet all current and future demand by increasing the physical capacity of the highway system. It will need to implement measures that reduce demand on the system roadways and ensure that the roadways operate efficiently.

d. Coordination of transportation, economic, environmental, and social goals

Need and Funding Category	Plan Period by Quartiles				Total 1995 -2014 Needs and Funding
	1995-1999	2000-2004	2005-2009	2010-2014	
Total Highways and Bridge Needs	23,025	31,666	37,760	41,795	134,246
Projected Available Funding	14,169	12,967	13,267	13,324	53,727
Projected Deficiency	8,856	18,699	24,493	28,471	80,519
Funding as a Percent of Need	62%	41%	35%	32%	40%

Table III-1 Highways and Bridges - Full Needs Scenario (costs in $ millions)

Source: The Texas Transportation Plan

Increasing the capacity of the transportation system through new highways or the addition of lanes improves mobility and supports economic development. However, there are increasing concerns about the environmental and social impacts of these improvements, making them more difficult and costly to implement. These different goals must be balanced.

e. Hazardous materials routes

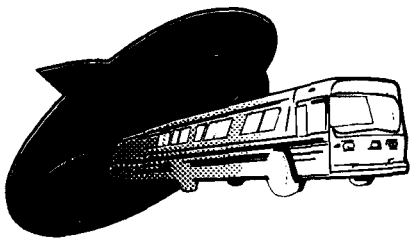
A large volume of hazardous materials is transported on Texas highways each day. While some urban areas have begun to designate routes where these materials can be transported safely, the state is still far from establishing a continuous route system.

f. Hurricane evacuation routes

Since the Texas gulf coast is especially susceptible to hurricanes, there are a number of designated evacuation routes for Texans living in coastal areas. Their safety depends on the ability of these routes to fulfill their function.

C. Bus Transit and Intercity Bus

Texas is home to 71 urbanized and nonurbanized transit systems and four of the 50 largest transit markets in North America; Austin, Dallas, San Antonio, and Houston. Over 250 nonprofit agencies provide transit service to the elderly and Texans with disabilities.



Bus transit, which includes scheduled fixed-route and demand van service, provides the foundation upon which much of the Texas public transit system is built. Bus transit plays a key role in reducing traffic congestion, improving air quality, and providing mobility to persons living in isolated areas of Texas. Bus transit also serves the mobility needs of the elderly and Texans with disabilities, and the economically disadvantaged. Intermodal facilities connecting transit and automobiles at park-and-ride lots, light and heavy passenger rail and air service, and pedestrians and bicyclists serve as linkages upon which to develop a mulititudal transportation system that is economically efficient and enviornmentally sound.

At the same time, not all Texans have access to public transportation. A total of 640,000 Texans living in fifteen counties and six urbanized areas—Harlingen, Killeen, Midland, Odessa, Texarkana, and Victoria—lack regularly scheduled or demand-responsive transit service. Furthermore, transit providers rely heavily upon sources of funding which have been unpredictable in recent years. Texas must find solutions to these problems to ensure that transit can fulfill its role in the multimodal transportation system.

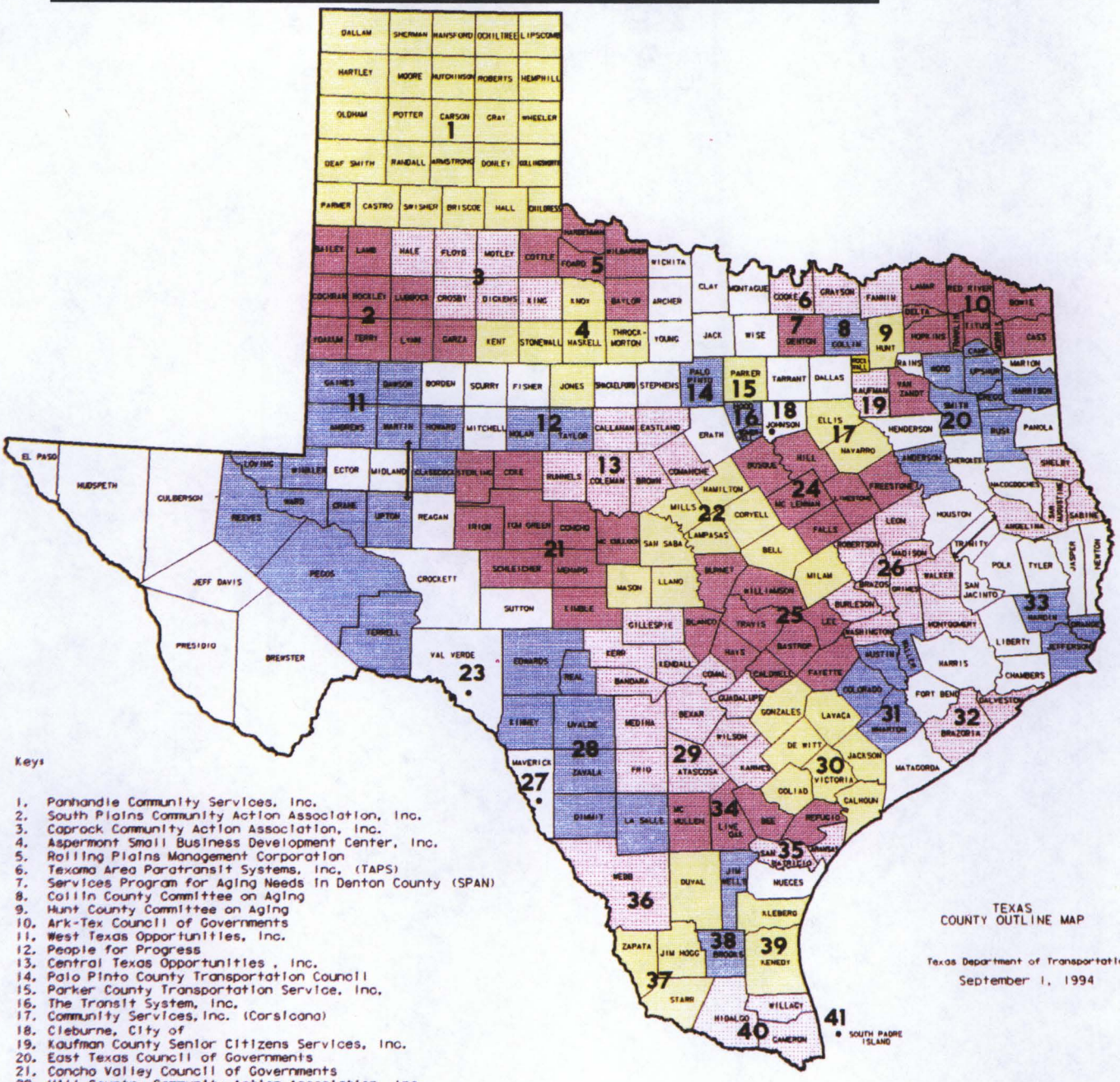
1. Texas Bus Transit and Intercity Bus Today

There are five major types of transit providers in Texas. Figure III-7 illustrates the major bus services and transfer facilities operated by intercity, metropolitan, and urban transit providers. Figure III-8 lists the rural transit systems and shows their service areas. Differences between the types of transit systems reflect the differing needs of transit users and the diversity of the differing communities and regions of Texas.

a. Metropolitan transit authorities

Metropolitan transit authorities offer fixed-route and demand-responsive public transit service in the largest urban areas in Texas. Texas' first metropolitan transit authority, VIA Metropolitan Transit, was crated in San Antonio in 1978. Since then, six others have been established in Austin, Corpus

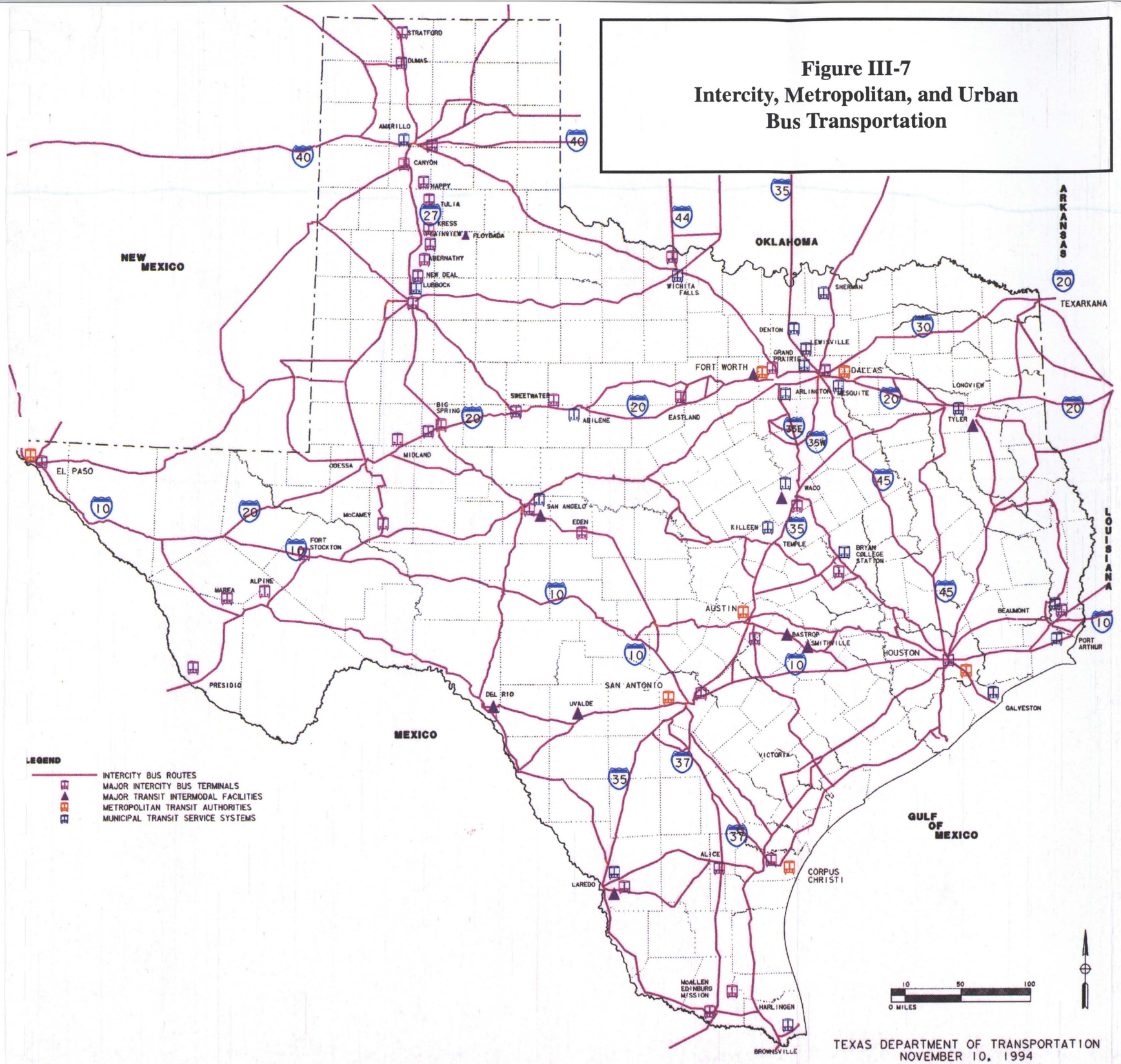
Figure III-8
Rural Transit



Keys

1. Panhandle Community Services, Inc.
2. South Plains Community Action Association, Inc.
3. Caprock Community Action Association, Inc.
4. Aspermont Small Business Development Center, Inc.
5. Rolling Plains Management Corporation
6. Texoma Area Paratransit Systems, Inc. (TAPS)
7. Services Program for Aging Needs in Denton County (SPAN)
8. Collin County Committee on Aging
9. Hunt County Committee on Aging
10. Ark-Tex Council of Governments
11. West Texas Opportunities, Inc.
12. People for Progress
13. Central Texas Opportunities , Inc.
14. Palo Pinto County Transportation Council
15. Parker County Transportation Service, Inc.
16. The Transit System, Inc.
17. Community Services, Inc. (Corsicana)
18. Cleburne, City of
19. Kaufman County Senior Citizens Services, Inc.
20. East Texas Council of Governments
21. Concho Valley Council of Governments
22. Hill Country Community Action Association, Inc.
23. Del Rio, City of
24. Heart of Texas Council of Governments
25. Capital Area Rural Transportation System (CARTS)
26. Brazos Valley Community Action Agency
27. Eagle Pass, City of
28. Community Council of Southwest Texas, Inc.
29. Alamo Area Council of Governments
30. Golden Crescent Regional Planning Commission
31. Colorado Valley Transit, Inc.
32. Gulf Coast Regional MHMR Center
33. South East Texas Regional Planning Commission
34. Bee Community Action Agency
35. San Patricio County Committee on Youth Education and Job Opportunities
36. Laredo-Webb County Community Action Agency
37. Community Action Council of South Texas
38. Rural Economic Assistance League, Inc. (REAL)
39. Kleberg County Human Services
40. Lower Rio Grande Valley Development Council
41. South Padre Island, Town of

Figure III-7
Intercity, Metropolitan, and Urban Bus Transportation



of intercity travel in Texas, buses still serve a significant portion of intercity travelers. Intercity bus service is also an important mode of travel for tourists, and for travel between Texas and Mexico.

In 1993, 21 intercity transit providers, all privately owned, connected 460 cities and towns in Texas. Greyhound Lines, Inc., the largest provider served over 100 communities in Texas and provided intercity bus service to over 2 million passengers. Also included were 4 providers engaged primarily in cross-border service.

2. Texas Bus Transit and Intercity Bus in the Future

a. Ridership

The demand for transit services is expected to grow moderately over the lifetime of the Plan for most types of service. Figure III-9 illustrates these trends. Metropolitan planning organizations with air quality problems, however, are working to increase their share of commuter trips to reduce transportation related air pollution. For example, the Houston-Galveston Area Council has developed a long range plan with transit improvements that are expected to lead to an increase in commuter ridership by 315 percent between 1990 and 2010.

b. Funding Needs

Transit agencies in metropolitan areas will be able to operate and make necessary capital investments because they can levy sales taxes. A needs analysis for bus transit over the two decades has shown that small urban, rural, and demand-responsive systems for the elderly and Texans with disabilities will require about $1.3 billion. Shortfalls in federal funding and a lack of dedicated state and local funding for these systems make it doubtful that these needs can be fully funded. Table III-2 summarizes potential funding gaps.

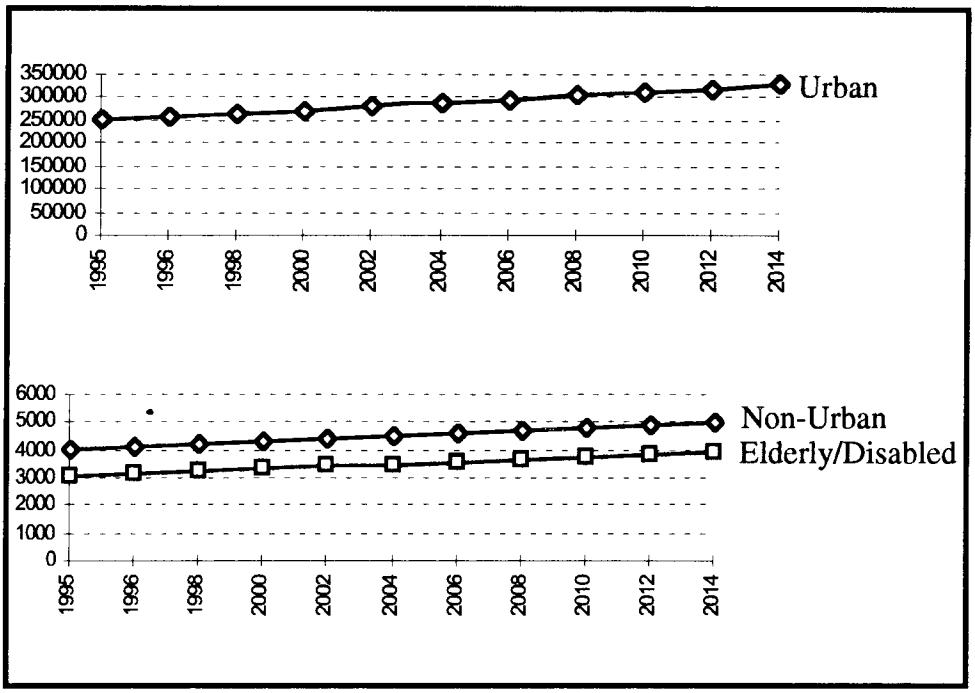


Figure III-9
Public Transportation Ridership Forecast 1995-2014

Source: The Texas Transportation Plan, 1994

3. Issues

a. Transit funding is erratic

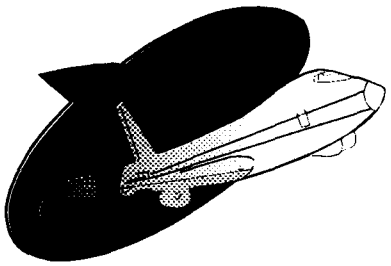
A special concern of transit system providers in Texas is the unpredictability of federal and state transit assistance. This is especially true for small municipal transit systems and for transit systems that serve the elderly and rural areas.

Previous years have seen the Texas legislature move to make up shortfalls in federal transit funding from other sources, including the general fund and the state's oil overcharge fund account. State funding has played a particularly important role in small urban and rural transit system budgets. However, there is no guarantee that funds from these sources will continue to be available in the future. Without additional revenues, continued growth and expansion of transit services will be very difficult, and existing transit service levels may have to be reduced, impairing the mobility and welfare of transit-dependent Texans.

Table III-2
Projected Needs and Funding
Elderly and Disabled, Rural and Nonurban, and Municipal Transit
(Cost in thousands)

Transit System	Short Term from Survey (FY 1996-1999)	Long Term Projected (FY 2000-2014)	Total 20 Year Plan Period
Elderly and Disabled Transit Needs	$30,006	$78,220	$108,226
Rural and Nonurbanized Transit Needs	$181,674	$473,240	$654,914
Small Municipal Transit Needs	$163,670	$426,310	$589,980
Total Transit Needs	$375,350	$977,770	$1,353,120
Projected Transit Revenues	$228,514	$552,900	$781,414
Projected Deficit	$146,836	$424,870	$571,706
Funding as a % of Needs	61.1%	56.6%	57.8%

Source: Texas Department of Transportation, 1994



b. Multimodal facilities

To make transit an effective partner in Texas' overall transportation system, the state's transit services need to be linked to other transportation modes through the provision of intermodal facilities.

D. Aviation

Because of the size, geography, and population distribution of the state, air transportation is more important in Texas than in many other states. The ability to connect rural populations with major cities and to domestic and international destinations through the aviation system is vital to the state's economy. This access is important to individuals and to the state's business community. The aviation system alone, for example, generates 650,000 jobs in Texas and contributes $50 billion to the state's economy.

Overall, the Texas aviation system has served the state well. Approximately 90 percent of the state's population lives within a one-hour drive of an airport with commercial service, which ensures access. From a safety standpoint the state is also doing well. However, there are significant problems with the condition of many general aviation airports. Limited resources for

these facilities will jeopardize the function of the state airport system over the lifetime of the Plan without additional funding. Figure III-10 illustrates the system.

1. Texas Aviation Today

Although airports are operated privately or by local governments, planning for the airport system and public funding of capital projects takes place at the state and federal government levels. At the national level, the Federal Aviation Administration has designated a system of airports of national significance, the National Plan of Integrated Airport Systems, which is eligible for federal funds. The National Plan of Integrated Airport Systems includes primary and non-primary commercial service airports, general aviation "reliever" airports, and a portion of the remaining general aviation facilities. The Federal Aviation Administration holds the authority to provide funds for the airports in the National Plan of Integrated Airport Systems, except when that authority is delegated to the state under the block grant program.

At the state level, TxDOT designates a system of airports in Texas which perform an essential role in the economic and social development of Texas and are eligible for state aviation funding. This system, described in the Texas Aeronautical Facilities Plan, includes 307 of the 409 planned and existing public-use airports and the additional 1,200 other landing facilities in Texas. Since airports must be part of this plan before becoming eligible for inclusion in the National Plan of Integrated Airport Systems, a number of the Texas Aeronautical Facilities Plan facilities are eligible for both federal and state funding. TxDOT acts as the agent responsible for applying for, receiving, and disbursing federal aviation funds for those National Plan of Integrated Airport Systems facilities which are not primary commercial or reliever airports.

a. Types of facilities

The Federal Aviation Administration designates airports in the National Plan of Integrated Airports as primary commercial, commercial, reliever, or general aviation airports. TxDOT further classifies non-reliever general aviation facilities according to the service levels which they provide and their intended role in the Texas aviation system. There are minimum design standards associated with each type of airport based upon the type and numbers of aircraft each facility is expected to serve. Table III-3 summarizes the numbers of public use facilities in each category in Texas as well as their status in the Texas Aeronautical Facilities Plan and the National Plan of Integrated Airport Systems. These service and role categories are further described below.

- **Primary commercial airports** have regularly-scheduled passenger service and at least 10,000 annual passenger enplanements. There are 26 such primary commercial service airports in Texas. A new primary commercial airport is scheduled to replace the existing facility in Austin.

- **Reliever airports** are general aviation facilities intended to alleviate capacity problems at commercial airports in metropolitan areas by providing an alternative facility for general aviation users. Reliever airports have a current or forecast activity level of at least 50 based aircraft, 25,000 annual itinerant operations, or 35,000 annual local operations. Texas has 22 reliever airports. ("Itinerant "operations are aircraft takeoffs, landings or other operations performed by aircraft not based at the airport. "Local" operations are performed by aircraft based at the airport.)

- **Transport airports** are general aviation facilities designed to accommodate turboprop and turbojet business aircraft as well as most single- and twin-engine piston-powered aircraft. Texas' 65 transport airports are designated where a moderate to high level of business activity exists or to provide capacity in metropolitan areas.

- **General utility airports** are general aviation facilities intended to provide primary access to the aviation system in smaller communities, to serve agricultural and mineral production areas, to provide capacity in metropolitan areas, and to serve recreational areas. These airports generally accommodate single- and twin-engine piston powered aircraft. Texas has 117 general utility airports, with 10 new airports planned.

- **Basic utility airports** are general aviation facilities that do not meet the criteria for reliever, transport, or general utility airports but represent a public investment that should be preserved. Texas has 63 basic utility airports.

b. System traffic

In 1993, the Texas aviation system handled an estimated 9.1 million aircraft operations. Primary commercial airports managed 3.8 million of these operations and enplaned 53.2 million passengers. Two million, three-hundred thousand operations took place at general aviation reliever airports and the remaining traffic passed through transport, general utility, and basic util-

Table III-3 Inventory of Texas Public Use Aiports

Airport Classification	National Plan of Integrated Airport Systems Existing	Planned	Non-National Plan of Integrated Airport Systems Existing	Planned	Total
Primary Commercial Service	26	1	0	0	27
Reliever	22	2	0	0	24
Subtotal TxDOT not agent.	48	3	0	0	51
Transport	65	1	0	0	66
General Utility	84	4	33	6	127
Basic Utility	11	0	52	0	63
Subtotal General Aviation	160	5	85	6	256
Private Airports	5	0	2	0	7
Subtotal TxDOT the agent	155	5	83	6	249
Total Texas Aeronautical Facilities Plan	208	8	85	6	307
Other publicly-owned	0	0	11	0	11
Private Open to Public	1	0	90	0	91
Total Open to Public	209	8	186	6	409

Source: TxDot Division of Aviation, Summary of texas aeronautical Facilities Plan Airports, July 1993

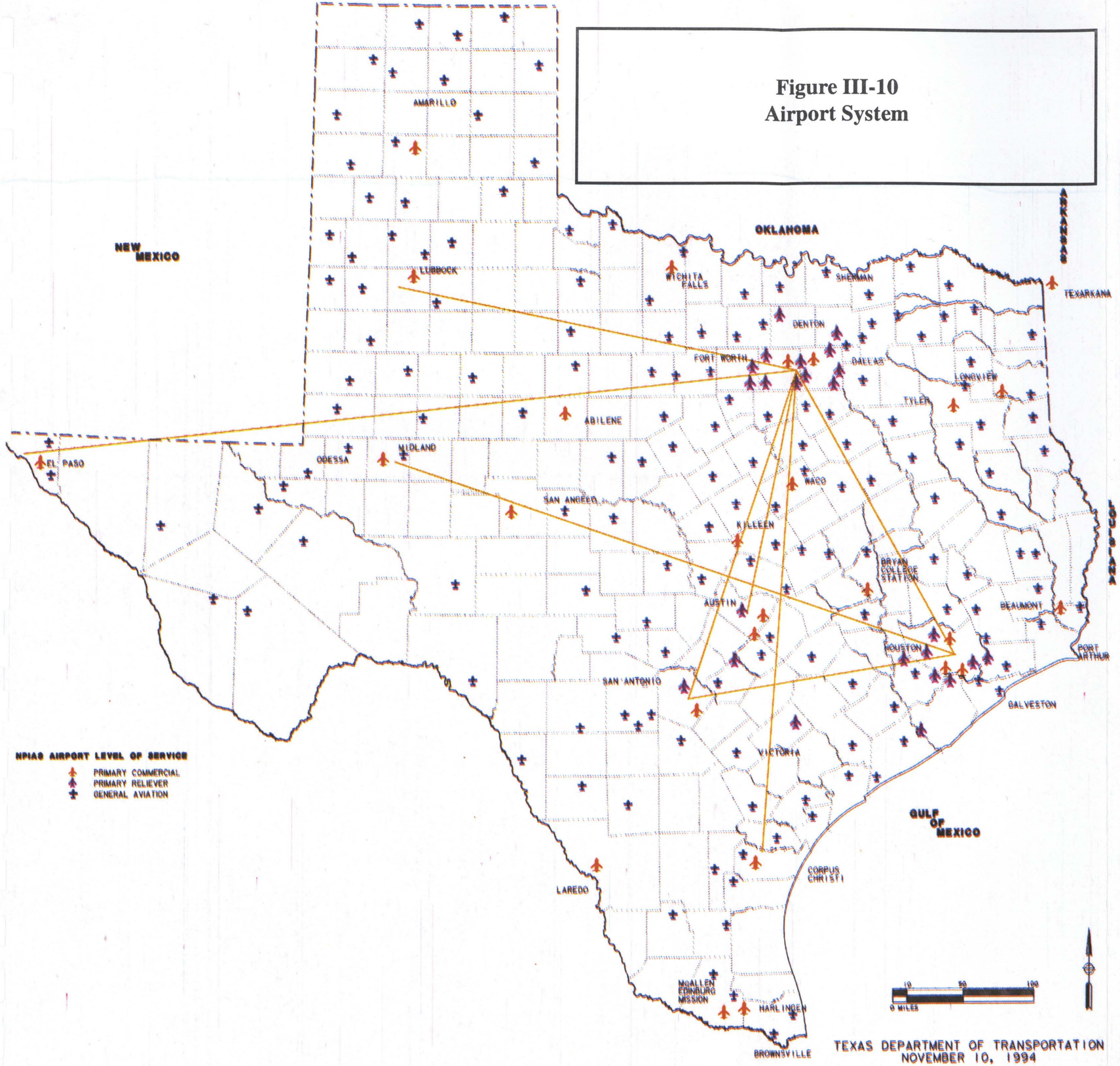
ity airports (34 percent of total traffic). More than 96 percent of commercial passenger enplanements took place at the ten busiest commercial airports in the state, as indicated in Table III-4.

These figures illustrate two characteristics of airport activity in Texas. First, commercial passenger activity is highly concentrated at the larger commercial airports, in particular Dallas-Fort Worth International Airport. Second, general aviation airports handled over one-half of all recorded aircraft operations; a statistic that emphasizes the role of general aviation airports in providing access to the aviation system and accommodating economic activity.

c. The condition of the system

Currently, the condition of the airport system is a problem and all types of airports are in danger of deterioration. Eighty-one (26.3 percent) airports do not meet the intended design standards for the 0-5 year period, 98 (31.8

Figure III-10
Airport System



percent) airports for the 6-10 year period, and 134 (43.5 percent) airports for the 11-20 year period. This means that over a quarter of the airport system cannot fulfill its intended function without capital improvements. Further work will be necessary if the airport system is to meet future service roles.

In particular, reliever airports require funding for preservation (24.6 percent) and upgrade (35.3 percent). For non-reliever general aviation airports, design standards (50 percent) and preservation (24 percent) projects account for the largest part of the development costs. Runway overlays, reconstruction, and lengthening account for the largest share of development costs at general aviation airports.

d. Funding sources for airport projects

There are currently three sources of funding for airport projects. The federal Aviation and Airways Trust Fund, administered through the Airport Improvement Program, constitutes the largest source of airport funding. Although all airports in the National Plan of Integrated Airport Systems are eligible for funding, the bulk of the Airport Improvement Program funds are dedicated by formula to airports with scheduled commercial service. Use of this funding source requires a 10 percent non-federal match (25 percent in the case of large commercial airports).

In many cases involving general aviation airports the second largest source of airport funding, the Texas Department of Transportation Fund 006, can be used to contribute half of the required local match for federally funded Airport Improvement Plan projects. In addition, it can be used to fund airports that are not included in the National Plan of Integrated Airport Systems but are part of the Texas Aeronautics Facilities Plan. However, funding from this source is very limited and currently, there is no dedicated aviation funding source at the state level.

Other aviation funding sources are local facility owners, airport authorities, cities, and counties. Commercial airports are usually able to collect sufficient funds at the local level. These local sources, however, are typically very limited for general aviation airports because aviation projects must compete with many other local funding needs. In addition, general aviation facilities have a very limited ability to generate enough revenue to fund capital projects.

City	Airport	Annual Enplanements	Percent of Total	Cumulative Percentage
Dallas/Ft. Worth	International	25,113,763	47.1%	47.1%
Houston	Intercontinental	10,147,462	19.0%	66.2%
Houston	Hobby	4,175,766	7.8%	74.0%
Dallas	Love Field	3,188,209	6.0%	80.0%
San Antonio	International	2,824,782	5.3%	85.3%
Austin	Mueller	2,324,696	4.4%	89.7%
El Paso	International	1,772,675	3.3%	93.0%
Lubbock	International	601,312	1.1%	94.1%
Midland	International	546,084	1.0%	95.1%
Harlingen	Rio Grande Valley Intl.	535,724	1.0%	96.2%
Corpus Christi	International	503,481	0.9%	97.1%
Amarillo	International	453,520	0.9%	97.9%
McAllen	Miller Intl.	272,711	0.5%	98.5%
Beaumont	County	114,049	0.2%	98.7%
Laredo	International	100,474	0.2%	98.9%
College Station	Easterwood	85,925	0.2%	99.0%
Tyler	Pounds Field	77,020	0.1%	99.2%
Abilene	Municipal	67,351	0.1%	99.3%
Houston	Ellington Field	60,300	0.1%	99.4%
Killeen	Municipal	57,034	0.1%	99.5%
San Angelo	Mathis Field	57,000	0.1%	99.6%
Waco	Regional	49,580	0.1%	99.7%
Texarkana	Municipal	45,716	0.1%	99.8%
Wichita Falls	Municipal	45,113	0.1%	99.9%
Longview	Gregg County	38,168	0.1%	100.0%
Victoria	Regional	22,479	0.0%	100.0%
	Total	53,280,394		

Table III-4. Primary Commercial Service Airports Ranked by 1993 Passenger Enplanements

Source: TxDOT Division of Aviation, Quarterly Aviation Activity Report For Commercial Carrier Airports, 4th Quarter 1993

2. The Future of the Texas Aviation System

a. Future use

Enplanements in Texas grew at a faster rate than the national average between 1980 and 1991 due to commercial air service deregulation, declining fuel prices, and a larger discretionary travel market. After 1984, the peak growth year, the number of enplanements has grown less rapidly and some airports have experienced traffic reductions. Enplanements at commercial service airports are projected to increase at a rate close to the national average over the next 20 years.

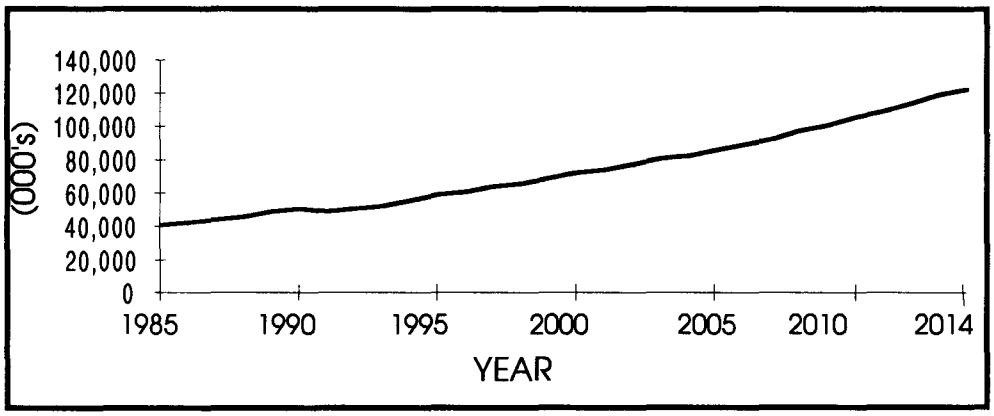
Total commercial enplanements will more than double from the current 56,458,000 enplanements to 121,985,000 in 2014. Annual aircraft operations will increase by approximately 70 percent, from 6,361,000 to 10,802,000 by the year 2014. These trends are indicated in Figures III-11 and III-12.

One factor that will continue to inflate the number of enplanements is the practice of airline "hubbing", where frequent connecting flights from smaller cities are fed into hub airports such as Dallas/Fort Worth International. Hubbing increases the number of enplanements in excess of the number of people traveling because each change of flight by a passenger is counted as a new enplanement. As a result, the seven largest airports in Texas will account for most statewide enplanement increases, potentially worsening the capacity situation at these airports. Dallas/Fort Worth will account for a disproportionate share of increased enplanements, which could make capacity a concern in the future.

General aviation activity in Texas, as measured by flight hours and operations, has declined in recent years. However, general aviation operations and flight hours are expected to increase at a modest rate over the next five years. The exceptions to this trend are single-engine piston aircraft and turboprop aircraft activity. Formal general aviation activity forecasts are not available beyond the year 2005. However, general aviation operations do account for a portion of the total operations presented in Figure III-12. The future trends for general aviation activity alone are identified by Figure III-13.

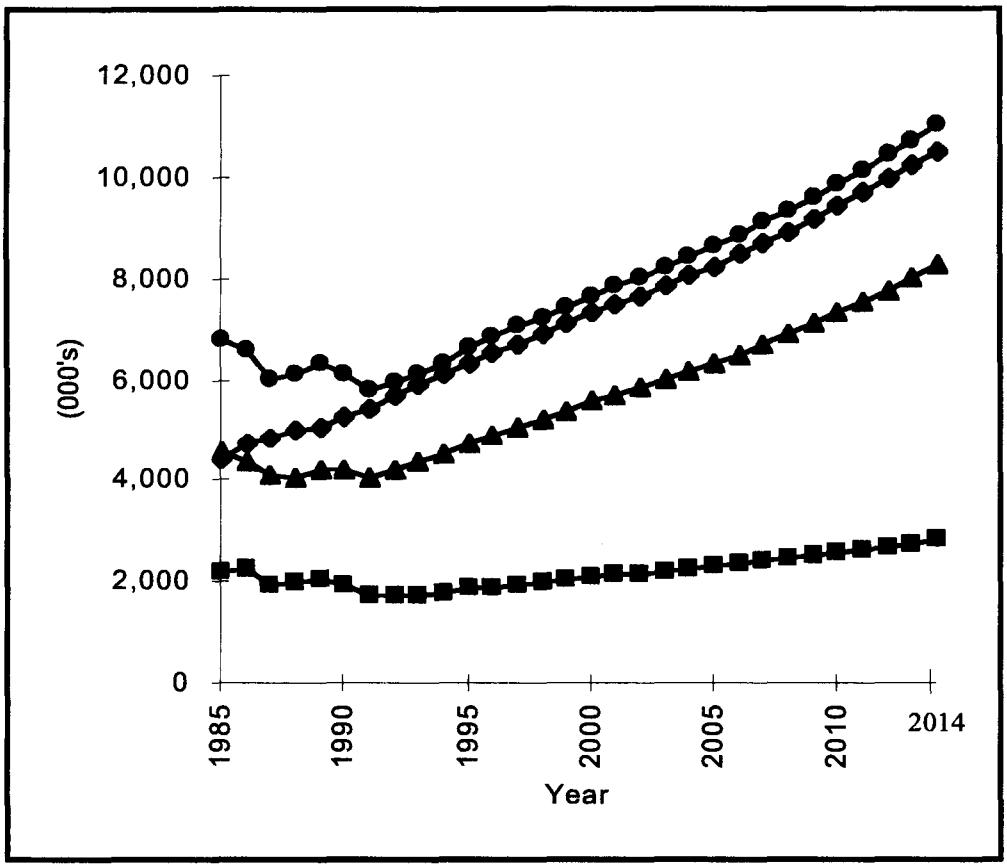
b. Future needs

Forecast air traffic in Texas suggests that airport needs will grow considerably in the future. These needs raise serious funding and capacity considerations.



Source: Federal Aviation Administration

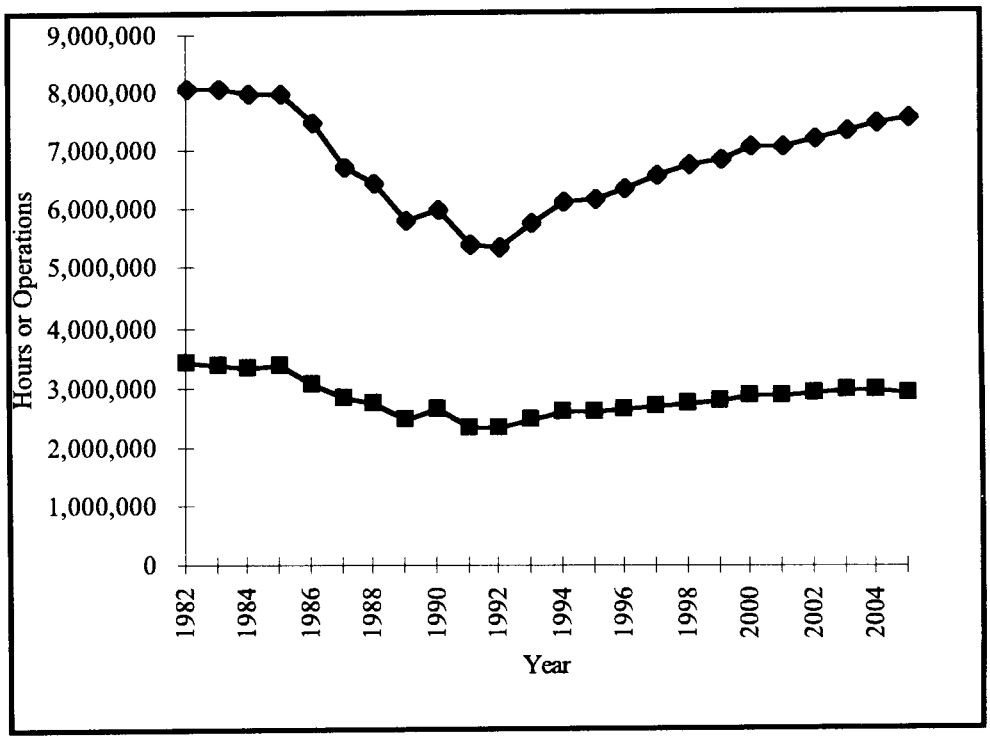
Figure III-11. Trend in Total Enplanements at 12 Federally-Monitored Airports



Source: Federal Aviation Administration

Figure III-12. Aircraft Operations Trends at Federally-Monitored Airports

Figure III-13. General Aviation Activity Trends



Source: Texas Transportation Institute, TAFP Forecasts.

Comparing the projected available funding from federal, state, and local sources to the Texas Aeronautics Facilities Plan airport development costs for the next five years reveals a funding shortfall of almost $400 million. While the funding shortfall is largest at the primary commercial airports ($172.8 million), these airports are also best able to raise revenue and fund capital projects on their own. There are also significant funding shortfalls for needed reliever airport projects ($91.3 million) and other general aviation projects ($138.8 million). In the longer term (6-20 year period), airport development costs are more speculative, particularly in the case of primary commercial and reliever airports. If current (0-5 year period) funding and needs trends are projected forward, sizable shortfalls result ($518 million and $274 million for primary commercial and reliever airports, respectively).

In the case of non-reliever general aviation airports, the Texas Aeronautics Facilities Plan development costs are more a complete and representative estimate of actual airport project needs over the longer term (6-20 year period). Given existing funding levels, non-reliever general aviation airports will likely face funding shortfalls over the longer term as well. Projecting existing funding and needs trends into the future results in a funding shortfall of $416.4 million over the lifetime of the Plan.

Forecasting funding sufficiency over a long time frame is difficult. However, the above analysis suggests that a "best case" scenario might be a funding deficiency of $402 million over 20 years (shortfalls in the 0-5 year period only). A "worst case" scenario might be a funding deficiency of at least $1.2 billion over 20 years (assuming existing trends continue). The consequences of any funding deficiencies will be most severe at the smaller general aviation and commercial airports whose volume of activity does not support the ability to raise significant capital. In contrast, the high volume of activity at primary commercial airports enables them to raise capital through bond issues, leases, concessions, and landing fees.

3. Issues

a. Funding the general aviation airport system

For general aviation airports, a key issue is finding adequate funding to maintain and bring existing facilities up to standard. The Texas Aeronautics Facilities Plan airport development costs indicate that significant investment will be required. Without the necessary infusion of capital, some facilities could deteriorate to the point where it is no longer economically feasible to continue operations and communities could lose access to the aviation system. This issue is made more serious by the inability of general aviation airports to raise sufficient funds for major capital improvements.

b. Poor accessibility and congestion at busy commercial airports

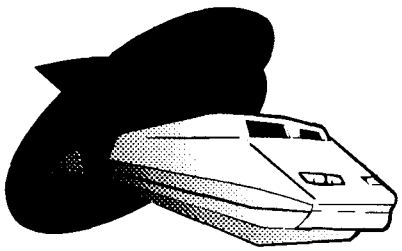
Increasing levels of passenger travel and air cargo traffic are having both land and airside impacts at the state's busiest airports. Airports are experiencing congestion of airspace, runway, and terminal capacity. Increasing air traffic levels have also worsened congestion on streets and highways providing access to airports. Several airports have cited the lack of adequate public transit service as a factor contributing to airport accessibility deficiencies.

Access is also a problem for the increasing levels of international trade that require efficient, accessible, and convenient ports-of-entry. Currently, only ten airports in Texas have authority to process international arrivals, a situation that is straining these facilities. Obtaining port-of-entry status from the U.S. Customs is a lengthy and difficult process.

c. Provision of air service to small communities

An important issue facing smaller communities is the lack of regularly-scheduled airline service. The availability and quality of air service is an important economic development factor. Many businesses, for example, require air freight as well as passenger service as a prerequisite for location. Regular air service is also important in providing access to specialty medical facilities. In the past, air service to smaller communities was subsidized through the federal Essential Air Service program. However, only one Texas airport still receives assistance, which compounds the effects of service reductions in many smaller Texas communities following airline deregulation.

d. Environmental impact of airports



The environmental impacts of airports are also of concern, particularly with respect to noise and contaminated runoff. As air traffic increases, communities near airports usually experience increasing noise impacts. In addition, incompatible development and land use near airports increases noise problems and, in some cases, constrains airport operations and expansions. Another significant concern stems from the impact of aircraft emissions upon air quality.

E. Freight and Passenger Rail

Rail is an important element of Texas' multimodal transportation system, illustrated in Figure III-14. It has two components; freight and passenger. Freight and passenger rail share certain common features, although each has unique development and operating characteristics. Reflecting these differences, in the following freight rail is profiled separately from passenger rail.

With 11,370 miles, Texas has more miles of rail than any other state. In 1991, the state ranked second in the nation in terms of rail employment, with over 16,000 workers. They moved over 4.1 million rail cars carrying over 230 million tons of freight.

1. Freight Rail

a. Freight rail today

The following outlines the freight rail system in Texas.

(1) Railroad classes in Texas

The Interstate Commerce Commission categorizes freight railroads into the following three classifications based upon operating revenues. Class I railroads have annual revenues in excess of $250 million, Class II earn between $20 and $250 million, while Class III earn less than $20 million. Class III are typically local and short-haul freight rail operators and switching and terminal companies. In 1993, there were 43 freight railroads operating in Texas: Five Class I, one Class II, and 37 Class III. This was an increase from 1978, when there were 33 freight railroads operating in Texas.

❖ **Class I Railroads.** The five Class I freight railroads in Texas operated 10,429 miles, accounting for 85 percent of all rail lines operation in Texas 1993. Between 1989 and 1993, Class I rail miles declined by almost 9 percent. The decline in rail mileage being operated by Class I railroads in Texas is consistent with a national trend in which major rail carriers are abandoning marginally profitable lines. System cutbacks have improved Class I railroad efficiency and profitability. Class I operator revenues grew over 10 percent between 1989 and 1993.

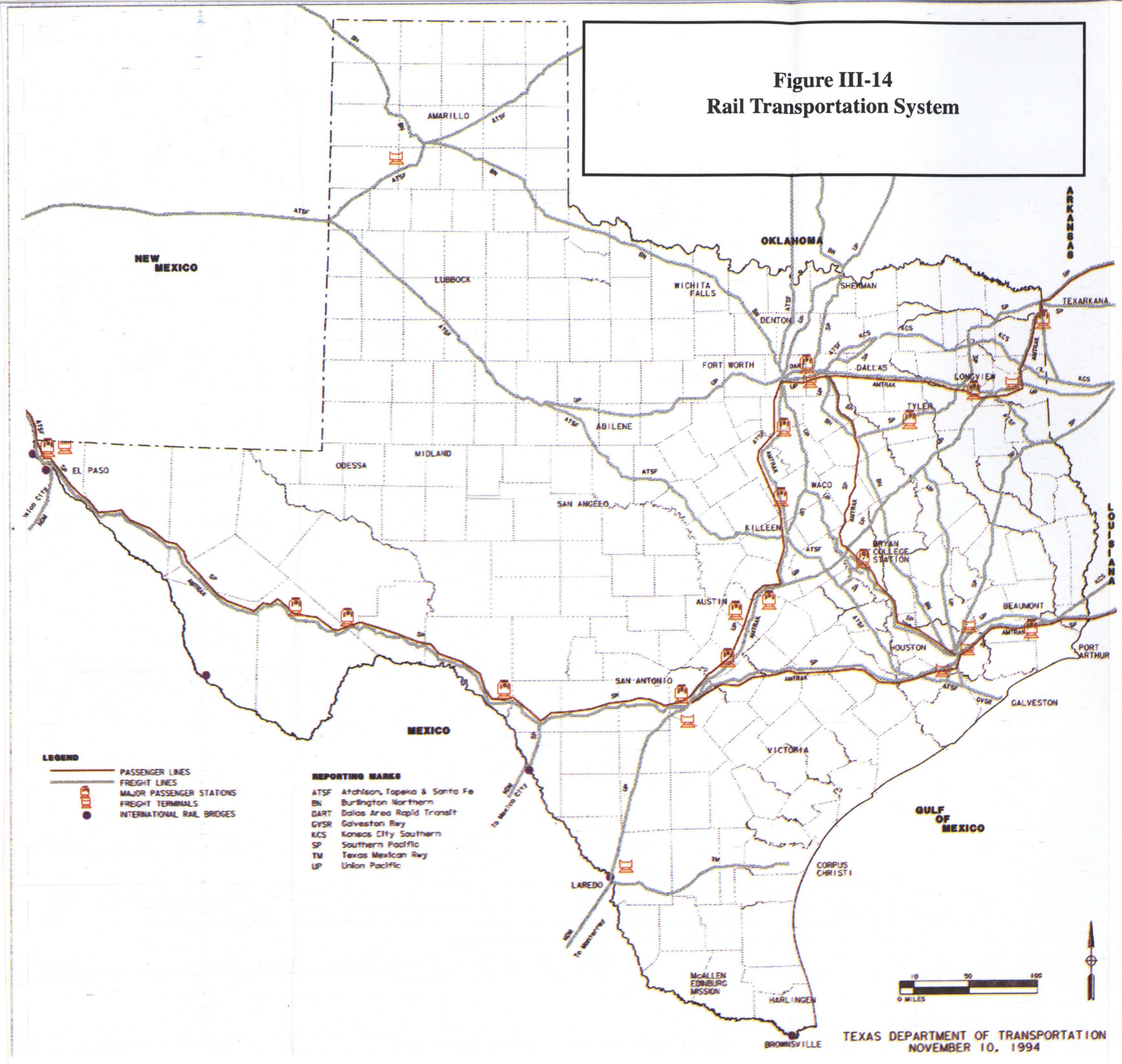
An overwhelming majority of Class I revenues in Texas were derived from interstate operations. In 1993, 78 percent of revenues were attributable to interstate traffic. It is notable, however, that the remaining 22 percent of revenue, involving intrastate freight movement, grew at five times the rate of interstate revenues.

Another trend affecting the freight rail industry is the rise of mergers. Railroads have viewed mergers as a way of cutting delays and boosting operational efficiency. Within the past year, four of the five Class I railroads serving Texas have been involved in merger proposals. The most notable involves the Burlington Northern Railroad and Santa Fe Railroads. The implications of a merger between Burlington Northern and Santa Fe are not completely clear. However, a merged Burlington Northern-Santa Fe railroad is likely to challenge Union Pacific Railroad as the largest rail operator in Texas.

The following describes current Class I railroads in Texas.

❖ **Union Pacific Railroad.** The Union Pacific Railroad is the largest freight rail operator in Texas, both in terms of rail mileage and intrastate revenues. The 3,568 miles of rail operated by the company account for 30 percent of all rail in the state. Union Pacific also generated nearly 50 percent of total Class I rail intrastate revenues in Texas in 1993.

Figure III-14
Rail Transportation System



- **Southern Pacific Lines.** Southern Pacific Lines operates the second largest rail network in Texas, with 2,972 miles in 1993. Southern Pacific was the only Class I railroad to increase its operating track mileage in recent years. In 1989, it operated 2,594 miles of rail.

- **Atchison, Topeka, and Santa Fe Railway.** The Atchison, Topeka, and Santa Fe Railway operated just under 2,500 miles of railroad in Texas in 1993, a 20 percent decline from 1989.

- **Burlington Northern Railroad.** The amount of rail mileage operated by Burlington Northern in Texas declined between 1989 and 1993, to 1,106 from 1,225 miles. However, the railroad's proportion of rail traffic remained stable. In June of 1994, Burlington Northern announced plans to acquire Atchison, Topeka, and Santa Fe Railway.

- **Kansas City Southern Railway Company.** The Kansas City Southern Railway Company operates less trackage than any other Class 1 railroad in Texas. With 293 miles of rail in operation Kansas City Southern represented only 5 percent of total Texas rail operations in 1993.

- **Class II and Class III Railroads.** The number of Class II and III railroads serving Texas grew from 33 in 1978 to 38 in 1993. In 1993, 1,619 miles of track were operated by Class III railroads, which carried approximately 450,000 carloads. The rise in the number of Class III rail operators is in part a response to rail abandonment by larger Class I railroads. Class III operators are moving to take over some short line operations which, although only marginally or unprofitable for the larger Class I rail operators, can be profitably operated by short line railroads. There is only one Class II railroad currently operating in Texas, this being the Texas-Mexican Railway, which operates 157 miles of track.

  The rise in the number of Class III rail operators is in part a response to rail abandonment by larger Class I railroads. Class III operators are moving to take over some short line operations which, although only marginally or unprofitable for larger Class I rail operators, can be profitably operated by shortline railroads.

(2) Intermodal facilities

Intermodal facilities are crucial to the railroad industry. These locations enable the transfer of freight to and from waterborne and highway freight traffic. There are numerous facilities located throughout the state that provide opportunities for intermodal transfers. Intermodal facilities in Texas are listed in Tables III-5 and III-6.

(3) Commodities

Rail is a mode of transportation that is currently used predominantly for the movement of less time-sensitive bulk goods. This is reflected in the commodities carried by the freight rail system in Texas.

Chemicals accounted for 32 percent of the freight rail tonnage originating in Texas in 1991, which reflects the state's large chemical and petrochemical manufacturing industry. Another 20 percent of freight rail cargo consisted of nonmetallic minerals such as sand, gravel, crushed stone, and cement. Petroleum products accounted for 7 percent of the tonnage originating in Texas, while farm products accounted for 6 percent. Overall, approximately 86.5 million tons of rail cargo originated in Texas in 1991.

Coal filled 28 percent of the carloads terminating in Texas in 1991. Most of the coal transported to Texas by rail is used for electricity. Nonmetallic minerals and farm products followed coal in terms of carloads, with 14 percent each. The majority of farm products shipped by rail comprised of grain and was transported to ports for export by ship. Chemicals and food products conclude the list of the top five commodities rail brings to Texas. Combined, these and other commodities accounted for over 140 million tons brought to Texas by rail in 1991.

b. Future freight rail conditions

Freight rail projections indicate the emergence of several trends in Texas. Freight rail demand is projected to grow at an annual rate of approximately 1.5 percent during the next 20 years. Terminating carloads and tonnage are expected to grow at a slightly slower rate, as evident in Figure III-15. Demand will grow more rapidly for transportation of packaged materials than for transportation of bulk commodities.

On the left:
Table III-5
Truck Facilities Connected to Rail

Truck Facilities	Railroads
Amarillo	Santa Fe Railroad
Dallas/ Ft. Worth	Kansas City Southern Railway Company, Santa Fe Railroad, Southern Pacific Lines, Union Pacific Railroad
El Paso	Santa Fe Railroad, Southern Pacific Lines
Harlingen	Union Pacific Railroad
Houston	Southern Pacific Lines, Santa Fe Railroad, Union Pacific Railroad
Laredo	Union Pacific Railroad
Marshall	Union Pacific Railroad
San Antonio	Union Pacific Railroad

Source: Railroads Operating in Texas, 1994

On the right :
Table III-6
Port Facilities Connected to Rail

Port Facilities	Railroads
Beaumont	Atchison, Topeka, and Santa Fe Railway; Kansas City Southern Railway Company; Southern Pacific Lines
Brownsville	Brownsville & Rio Grande International Railroad, Southern Pacific Lines, Union Pacific Railroad
Corpus Christi	Southern Pacific Lines, Texas Mexican Railway Company, Union Pacific Railroad
Freeport	Union Pacific Railroad
Galveston	Atchison, Topeka, and Santa Fe Railway; Galveston Railroad, Southern Pacific Lines; Texas City Terminal Railway Company; Union Pacific Railroad
Houston	Atchison, Topeka, and Santa Fe Railway; Houston Belt & Terminal Railway Company; Port Terminal Railroad Association; Southern Pacific Lines; Union Pacific Railroad
Lavaca	Point Comfort & Northern Railway Company, Southern Pacific Lines Orange Southern Pacific Lines, Sabine River & Northern Railroad Company, Union Pacific Railroad
Port Arthur	Kansas City Southern Railway Company, Southern Pacific Lines

Source: Railroads Operating in Texas, 1994

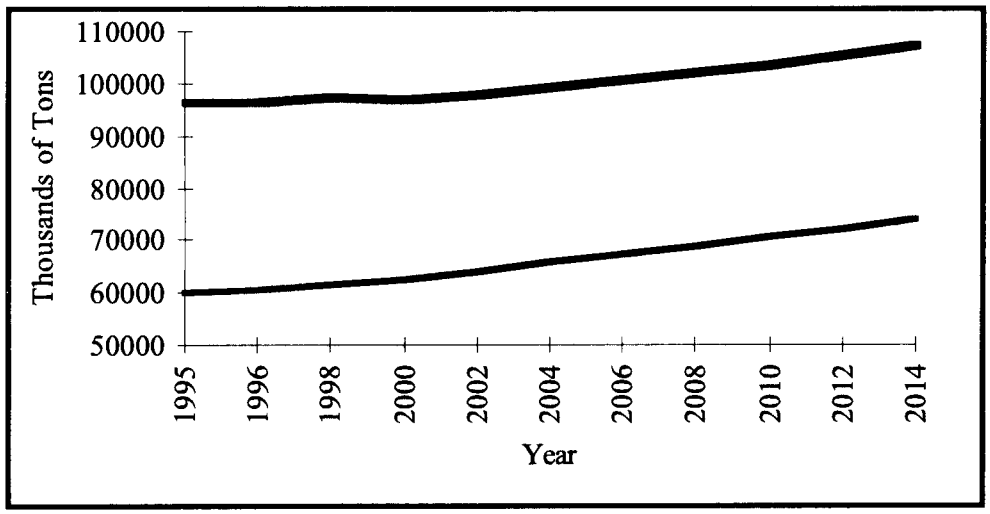


Figure III-15
Freight Rail Demand
1995 - 2014

Source: Texas Transportation Plan Forecasts

c. Freight rail issues

Freight rail issues of importance to the Plan include:

(1) Grade crossing safety

Texas has more rail grade crossings than any other state in the country. Texas has the highest number accidents and fatalities at grade crossings among all U.S. states. To address this issue, a number of actions should be considered:

- Elimination of unnecessary grade crossings.
- Grade separation at dangerous crossings.
- Adequate funding for installation and upgrade of warning signals and other safety features.
- Implementation of public awareness programs.

It should be noted that safety issues arising from grade crossings pertain to passenger rail as well as freight rail.

(2) Impacts of consolidation of railroad operations

It may be beneficial to consolidate the operations of multiple railroad companies into single corridors. A benefit-cost analysis should evaluate the impacts of a consolidation of operations into single corridors within and between urban areas as well as to ports. Also addressed should be the potential for consolidated intermodal facilities in or near major population centers.

(3) Involvement of rail operators in statewide and regional planning and decision-making

There are many regulatory, planning, and policy issues that impact the operation of freight rail. An example is the potential of rail to help reduce transportation-related air pollution in major metropolitan areas by removing truck traffic from the roadway system, as proposed by the Port of Houston. There is a need for a mechanism that allows rail operators to be involved in transportation planning and decision making processes that affect them.

(4) Intermodal access

Access to intermodal terminals is one of the most important issues facing the freight rail industry in Texas. Intermodal terminals allow transfers between rail and truck, and between rail and marine shipping. Adequate facilities are crucial to the industry because intermodal freight movements have increased recently, and indicators suggest significant future growth associated with the North American Free Trade Agreement. Both demand for intermodal Trailer-on-Flatcar service between the US, Canada and Mexico that will likely pass through Texas and interstate trucking deregulation will increase the demand for intermodal rail access. Class I railroads and large trucking companies are likely to seek to extend their intermodal freight service to combat competition from smaller motor carriers.

(5) Rural rail preservation

Between 1981 and 1993, over 2,100 miles of rail lines were abandoned in Texas, with 50 percent abandoned between 1989 and 1993. The extent of line abandonment is the product of consolidation and mergers, economic downturns in large areas of Texas during the 1980s, and the diversification of traditional oil producing and agricultural areas that no longer require the freight rail service. Abandonments reflect the rail companies' effort to become more efficient in response to market forces.

However, small rural communities with agriculture or natural resource-based economies are vulnerable to the impacts of rail line abandonment. Abandonment affects these communities by increasing shipping costs, which decrease opportunities for growth and economic development. Abandonment also increases local road wear. Trucks moving freight formerly carried by rail impose strains upon roadways that, in many cases, were not designed to support heavy freight loads.

The Texas Railroad Commission, in cooperation with the Federal Railroad Administration, has been active in assisting in the preservation of several miles of "essential" rail service. However, these routes serve only a fraction of demand and ultimately railroad operators will not be willing to operate unprofitable lines.

(6) Rail links to Mexico

There are currently five rail ports-of-entry between Mexico and Texas. US railroads serving Mexico have recently initiated efforts to expedite rail car exchange at the border because roadway entry points are at capacity, which slows highway freight. For example, Union Pacific recently constructed a $25 million rail yard near Laredo and a $60 million rail bridge up river from Laredo. The Brownsville & Matamoros Bridge Company has plans to improve rail facilities linking the U.S. and Mexico. The South Orient Railroad has preserved the rail port of entry at Presidio-Ojinaga. These efforts are clearly intended to enhance linkages between Texas and Mexico. However, the degree to which future demand grows will determine the need for additional improvements.

2. Passenger Rail

a. Passenger rail today

Texas is currently served by only one major type of passenger rail: Intercity rail transports individuals between major metropolitan areas, cities and towns, and rural communities. Texas is also served by several special excursion rail lines that are not detailed here.

The National Railroad Passenger Corporation (Amtrak) is the provider of intercity rail in Texas. Amtrak is a federally subsidized, nonprofit corporation that has provided intercity passenger rail service through and within Texas since it was created by Congress in 1971.

Amtrak operates three routes in Texas. They serve 20 cities and cover over 1500 miles. The *Texas Eagle* provides tri-weekly service along two routes, one running between Chicago and Houston via Ft. Worth. Texas stations served by this leg are Texarkana, Marshall, Longview, Dallas, Corsicana, Bryan-College Station, and Houston. The other *Texas Eagle* route runs between Chicago and Los Angeles via Ft. Worth and San Antonio, with additional stops in Texarkana, Marshall, Longview, Dallas, Cleburne, McGregor,

Temple, Taylor, Austin, San Marcos, San Antonio, Del Rio, Sanderson, Alpine, and El Paso. Tri-weekly service is also offered between Los Angeles and Miami on the *Sunset Limited,* which serves intercity passengers in El Paso, Alpine, Sanderson, Del Rio, San Antonio, Houston, and Beaumont.

Amtrak does not own any stations or track miles in Texas. Track is leased from freight rail operators, while stations are leased from cities, freight lines, or the private sector. Several of the 20 stations are not staffed, and many are in disrepair. Others have been purchased and upgraded by communities as multi-use facilities. Often their intended purpose is to serve as a community center, a transit hub, and an Amtrak station.

Passenger rail use in Texas has fluctuated dramatically over the years in response to changing socio-economic and technological conditions that have redefined passenger transportation. Fluctuations in Texas demand parallel national trends.

b. Future passenger rail in Texas

In the future, Texans will be able to chose among several other rail options for work and other trips. They are described below.

(1) Commuter rail service

Commuter rail service transports commuters and other travelers between residential areas and major business centers. A commuter rail project in progress is the Railtran commuter rail line connecting Dallas and Ft. Worth. In anticipation of future commuting needs, the Railtran concept was created in the early 1980s. Railtran will serve ten stations once completed, with plans for future stations at Dallas-Fort Worth International Airport and possibly the Dallas Convention Center. Implementation of commuter rail service is projected to increase mobility and provide many travel-related benefits, including the elimination of an estimated 9,000 commuter vehicles, the reduction of vehicle miles traveled, and the concomitant reduction in fuel consumption and vehicle emissions.

(2) Light rail

Light rail's purpose is to transport commuters and other travelers from residential areas to business centers, as well as to connect locations within urban center concentrations. The Dallas Area Rapid Transit (DART) system is currently in the process of developing the first light rail line in Texas.

(3) High speed rail

In addition to conventional intercity passenger rail services, Texans may be able to take high speed rail at some point in the future. While a recent proposal to develop high speed rail passenger service in Texas fell through, it may be revived at some point in the future. The chosen route consisted of a three-leg system connecting Ft. Worth-Dallas, San Antonio, and Houston with stations in Austin, Bryan-College Station, Waco, and Dallas-Ft. Worth International Airport. Texas TGV, the consortium of private companies working on the project, however, was unable to meet a December 1993 deadline for raising the initial $170 million and the initiative was terminated for a lack of financial support. The Texas High Speed Rail Authority, created by the Texas legislature in 1989 to oversee the project, has initiated legal proceedings to cancel the Texas TGV contract, further postponing the development of high speed rail in Texas. It is possible, however, that the concept will be revived at some point in the future.

c. Passenger rail issues

(1) Intermodal passenger connectivity

Current intercity rail passenger services in Texas are poorly connected to other transportation modes, which makes their use inconvenient. For example, local public transportation is rarely coordinated with passenger rail service.

(2) Accessibility

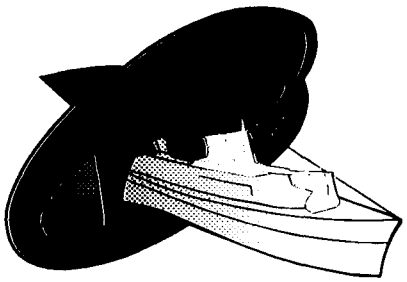
Amtrak stations are exempt from the Americans with Disabilities Act, making passenger rail travel difficult for some segments of the population. Exemption from these requirements were granted largely because of financial reasons. Future compliance will only be realized if station owners chose to undertake facility improvements.

(3) Competitiveness

The competitiveness, or attractiveness, of transportation modes is often a series of trade-offs between cost, travel time, schedule, weather, and availability. Conventional passenger rail service competes well for short distance travelers (under approximately 300 miles) in terms of travel time and cost. The frequency and schedules for present Amtrak services, however, deter travelers from using the service for intrastate travel, shifting travelers to use intercity bus, intrastate airline service, or an automobile.

(4) High or higher speed rail

With the apparent termination of the recent Texas high speed rail initiative, there is an open question about the prospects for a system in the future. Some believe high speed rail was a good concept, but not well implemented in the previous initiative. For example problems with the acquisition right-of-way could be avoided by using existing rights-of-way and through better communication with landowners. Some states, such as Washington, are moving in an evolutionary fashion toward high speed rail by increasing the speeds of rail using conventional tracks, possibly applying "tilt train" technology. There appears to be interest in Texas in examining this as well as in reevaluating high speed rail within corridors with existing rights-of-way.



F. Marine

Ports and waterways are critical to the Texas economy. Facilities for marine transportation, which is the most efficient mode for liquid bulk freight, are a vital infrastructure for an oil-producing state with large capacity for refining crude oils. In fact, in 1992 petroleum products accounted for more than 70 percent of the freight handled by Texas ports. The state hosts some of the largest and busiest marine transportation facilities in the world. The Port of Houston is the nation's second largest port both in terms of total and international tonnage, and the largest port for the shipment of petroleum products in the U.S. Three other Texas ports, Corpus Christi, Texas City, and Port Arthur are among the 20 largest ports in the U.S. The Gulf Intracoastal Waterway, Texas' main artery for waterborne commerce, is the third busiest waterway in the nation. Figure III-16 locates the waterway and major ports.

In addition, TxDOT operates ferries in two locations on the Gulf Coast. The following is a description of these marine transportation facilities.

1. Maritime Texas Today

a. The Gulf Intracoastal Waterway

The Gulf Intracoastal Waterway is a canal that parallels the coastline of the Gulf of Mexico from Brownsville, Texas to St. Marks, Florida. Its Texas portion is 426 miles long. The channel is man-made and maintained by the U.S. Army Corps of Engineers at an authorized width of 125 feet and a depth of 12 feet, which defines it as a shallow-draft (less than 25 feet deep) canal.

Barge traffic is its most effective use. In addition to the Gulf Intracoastal Waterway, the Corps of Engineers maintains eight deep-draft and 32 shallow-draft channels in Texas in navigable condition. The waterway is directly linked with Texas' deep-draft channels and increases the level of access and service to a number of tributary channels.

(1) TxDOT's role

In 1975, the state legislature passed the Texas Coastal Waterway Act. This act authorized the State of Texas to act as the nonfederal sponsor to the waterway and designated what is now the Texas Transportation Commission to act in this capacity.

TxDOT fulfills the function of local sponsor on behalf of the Transportation Commission. The nonfederal sponsor works closely with the United States Army Corps of Engineers to provide local cooperation and input into federal projects. It also is responsible for the acquisition of right-of-way for disposal of dredging materials for the waterway.

(2) Activity on the waterway

Throughout the last decade, the waterway has played an important role in freight transportation. In 1991, the waterway in its entirety carried an estimated 110.82 million metric tons of commodities. Since the waterway is a shallow-draft facility, almost all of this traffic is internal, only in recent years small volumes of cargo destined for other parts of the U.S. or international cargo moved on the waterway. Over 50 percent of the commodities transported were petroleum and coal products, and more than 10 percent chemicals and related products. In addition, the waterway is used by commercial fishing boats and work boats serving the oil and gas industry in the Gulf of Mexico. To many Texans, the waterway also has recreational value.

Information on through-traffic on different segments of the waterway indicates that the waterway is busiest on its northern-most segment and least busy on its southernmost segment. Throughout the 1980s, the upper third, the segment from the Sabine River to Galveston, carried about two-thirds of all through-traffic, the middle segment from Galveston to Corpus Christi about one-third, and lower segment from Corpus Christi to the Mexican border carried less than 5 percent of the traffic. The lower portion may receive more

traffic in the future if the continued function of the waterway can be guaranteed. The current uncertainty about the future of the waterway is apparently hampering investment in the Southwest Texas region and its port facilities.

(3) Impact of potential closure

Clearly, the waterway helps to ensure freight mobility in Texas. Concerns about the environmental impacts of the waterway have led to suggestions that some segments be closed. Damage to wildlife habitat is among the chief concerns. However, a 1992 TxDOT impacts report showed that the volume of freight moved on the waterway in 1990 - 82.3 million tons on 38,279 barges - would have required about 574,185 railroad cars or 2,296,740 semitrailer truck loads if moved by rail or road. This, in turn, would have negative environmental impacts due to runoff, air pollution, and related factors. Such a large number of trucks would also have resulted in considerable wear and tear on roadway surfaces in Texas.

b. Texas ports

Texas has 12 deep draft and 11 shallow-draft seaports. They are listed in Tables III-7 and II-8.

Table III-7
Texas Deep Draft Ports

Deep Draft Ports
Port of Beaumont
Port of Port Arthur Navigation District
Orange County Navigation and Port District
Port of Houston Authority
Texas City Terminal Railway Company
Port of Galveston
Port of Freeport
Calhoun County Navigation District
Port of Corpus Christi Authority
Brownsville Navigation District
Sabine Pass
Port Isabel

Source: TxDOT, Gulf Intracoastal Waterway Office, June 1994.

Shallow Draft Ports
Port Aransas (Aransas County Navigation District No. 1)
Chambers-Liberty Counties Navigation District (Liberty Channel)
Jackson County Navigation District
Jefferson County Navigation District (Serves Subine Pass, Beaumont, and Port Arthur - all deep draft ports)
Port of Bay City Authority of Matagorda County
Port of Harlingen Authority
Port Lavaca
San Patricio County Navigation District No. 1
Victoria County Navigation District (channel to Victoria)
West Side Calhoun County Navigation District (Channel to Scudriff)
Willacy County Navigation District - Port Mansfield

Table III-8
Texas Shallow Draft Ports

Source: TxDOT, Gulf Intracoastal Waterway Office, June 1994.

Texas ports, particularly deep-draft ports, are among the busiest ports in the nation. In 1992, four Texas ports, Houston (2), Corpus Christi (7), Texas City (13), and Port Arthur (20) were among the 20 U.S. ports handling the largest amounts of freight. Ports are not only vital infrastructure for Texas businesses but they are an important economic factor in themselves. The Port of Houston alone is estimated to generate more than $3 billion annually for the state and national economy and to directly or indirectly affect over 140,000 jobs. The tonnage moved through the ten largest ports in 1992 is illustrated in Figure III-14 below. The Port of Houston by itself handled almost 40 percent of all freight moving through Texas ports. It is one the world's busiest ports and leads the nation in foreign waterborne commerce.

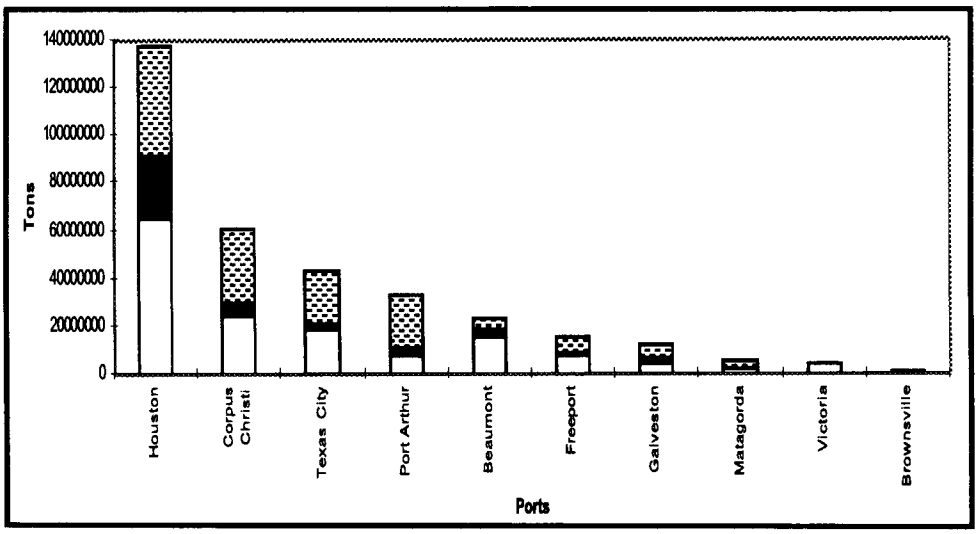


Figure III-17
Foreign and Domestic Commerce Through the Ten Major Ports in Texas in 1992 (in short tons)

Source: U.S. Army Corps of Engineers, Waterborne Statistics, 1992

In recent years, several Texas ports have worked to increase their general cargo handling, and in particular their container handling capacity. This is particularly true for the Port of Houston and the Port of Galveston which handle most of the containerized freight in Texas. This improvement in container handling capacity enabled them to significantly increase the amount of containerized cargo handled. However, they have suffered losses of market share to East and West Coast ports that were able to take advantage of double-stack train and mini-landbridge services since 1984.

The following briefly outlines general trends in waterborne freight traffic in Texas.

(1) Commodities

In 1992, petroleum products comprised 72 percent of all products shipped through Texas ports and waterways, while chemicals accounted for 16 percent. Crude materials and farm products accounted for approximately 10 percent of the cargo. Primary manufactured goods, equipment, and machinery totaled only 2 percent of the cargo shipped through Texas ports. This demonstrates the liquid and dry bulk and break bulk cargo focus of the Texas port industry.

(2) Foreign trade

Ports are vital for in the import and export of goods to and from Texas. In 1992, over 50 percent of the goods imported to Texas arrived by sea, and 44 percent of the goods exported moved through Texas ports. Table III-9 indicates the mode of travel for imports and exports to Texas.

Table III-9 Percentage of Imports and Exports Moving Through Texas Ports, 1992

	Imports				Exports	
Mode	Percent of Total Value		Percent of Total Volume		Percent of Total Value	
	World	Mexico	World	Mexico	World	Mexico
Sea	49%	9%	51%	12%		
°Container					15%	1%
°Noncontainer					25	3
Air	6	1	less than 1	less than 1	18	4
Surface	45	90	49	88	42	92
Total	100%	100%	100%	100%	100%	100%

Source: U.S. Department of Commerce

c. Ferry service

The Texas Department of Transportation currently operates ferries in two locations on the gulf coast. Both provide 24 hour service. One connects State Highway 361 to Port Aransas across the channel, the other connects State Highway 87 from Galveston to Port Bolivar.

2. Future Conditions

Detailed information on freight flow patterns and development is not available, making future demand for port facilities difficult to project.

Overall, there is currently enough berth capacity to deal with anticipated future demand. Based on economic and commodity forecasts, demand for waterborne transport of international freight is expected to increase by about 9 percent, coastwise freight transport demand by 12 percent, and internal freight transport demand by 18 percent over the next 20 years as indicated in Figure III-18, below.

However, a number of ports in Texas, foremost Houston and Corpus Christi, are in the process of updating, improving, and expanding their facilities. Their goal is to improve competitiveness and increase the contribution to economic growth and development in their respective regions. These efforts may in the future require improvements to both terminal and landside access infrastructure which are at present difficult to quantify.

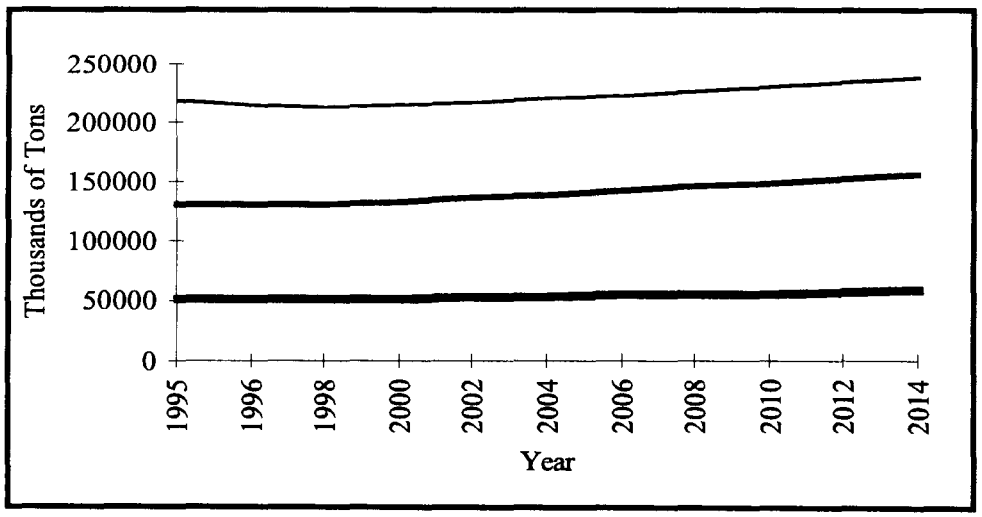


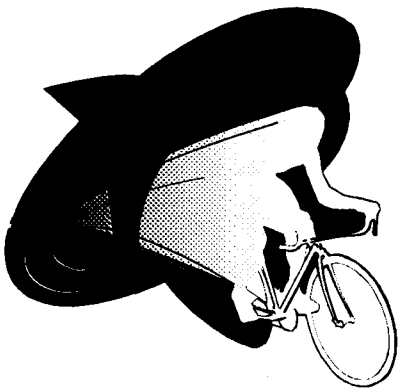
Figure III-18
Waterborne Transport Demand
1995-2014 Projected Total Tonnage

Source: The Texas Transportation Plan, 1994

3. Issues

a. Dredging and environmental protection

The Gulf Intracoastal Waterway, its tributary channels, and Texas ports are continually exposed to shoaling that is caused by wind, waves, and currents that fill them with sediment and thereby reduce their depth. The sediment must be removed by dredging to mitigate the effects of shoaling and to ensure continued use of the waterways. Dredging, however, is an issue of concern for many different interests. In particular, environmental interests have expressed increasing concern in recent years about the potential adverse impacts of dredging and disposal activities on the environment. Based on data from the U.S. Corps of Engineers, about 45 percent of the Texas portion of the Gulf Intracoastal Waterway crosses environmentally sensitive areas where dredging could have a negative impact.



b. Intermodal connections

Landside access to ports is a critical issue. Maritime interests cite insufficient access to the state and interstate highway system and a general lack of rail service and\or infrastructure as factors contributing to this problem. However, most ports view landside access constraints more as a factor hampering their competitive position rather than an actual constraint in handling current or projected freight volumes. Several ports indicated that they were currently improving highway and/or rail access as a means of improving their competitiveness.

G. Nonmotorized

Walking and bicycling are popular modes of transportation for commuting and recreation in Texas, although they have not historically been considered a major component of the state transportation system. Because of its historical standing, little information regarding bicycle and pedestrian travel is available nationally, with even less available at the state level.

The National Personal Transportation Survey estimated 18 billion walking trips nationwide in 1990, which represents roughly 7 percent of all trips. Four percent of all workers, or 4.5 million people, walked to work. As a contrast, only one half of one percent of work trips were bicycled in 1990.

1. The Texas Bicycle System Today

There are three basic types of bicycle facilities and several types of pedestrian oriented facilities. A bike path is a facility separated from automobile traffic and within an independent right-of-way or the right-of-way of another facility. A bike lane is a portion of a roadway that has been designated by striping, signing, and/or pavement markings for the preferential or exclusive use of bicyclists. Bicycle routes are roadways designated for bicycle use that are shared with automobiles. Pedestrian facilities include sidewalks, trails, and/or other walkways such as bridges, tunnels, or boardwalks and some roadway shoulders.

The Texas Outdoor Recreation Plan, which is primarily recreational in content, is the most comprehensive bicycle and pedestrian plan available in Texas. According to the Plan, Texas had 614 miles of multi-use trails and 640 miles of hiking trails in 1986. Not included were bike lanes or routes designated along public streets and roadways and sidewalks and pedestrian bridges.

a. TxDOT's role in nonmotorized transportation

The Intermodal Surface Transportation Efficiency Act and state legislation (Senate Bill 352 of 1991) have significantly increased TxDOT's role in pedestrian and bicycle transportation. The legislation required the enhancement of the state highway system for use by bicyclists, authorized the appointment of state and district bicycle coordinators, established rules regarding bicycling on the state highway system, and created a Bicycle Rules Advisory Committee to advise the Texas Transportation Commission on bicycle issues and matters. As a result, in 1994 TxDOT enacted a policy that states "accommodation for both bicycle and pedestrian traffic shall be considered on all projects, including those under construction where reasonably possible". Subsequently, the Bicycle Rules Advisory Committee made recommendations to the Texas Transportation Commission that sought the development of a statewide comprehensive bicycle plan that includes: an inventory and assessment of existing state highways to determine and map those most suitable for bicycle use, a statewide route map, a comprehensive study of bicycle use in Texas, and goals and objectives for enhancing the state highway system for bicycle use. Overall, it is TxDOT's policy to view bicycles as a component of the multimodal transportation mix.

In addition, in 1992 TxDOT adopted the American Association of State Highway and Transportation Officials' "Guide for the Development of Bicycle Facilities" to replace the bicycle facility section of the Department's

design manual. Adoption of this guide makes Texas facilities consistent with national design guidelines for roadway improvements that facilitate bicycle transportation. In addition, TxDOT has funded 61 bicycle and pedestrian facility projects that will cost an estimated $71 million through the Intermodal Surface Transportation Efficiency Act Enhancement Program.

b. Local and metropolitan efforts

Many Texas cities have bike lanes and bike paths. Under the provisions of the Intermodal Surface Transportation Efficiency Act, each metropolitan planning organization is required to include a nonmotorized element in its plan. In addition, many local communities have developed plans.

c. International pedestrian travel

The 22 international bridges with Mexico are the largest and most heavily used pedestrian facilities in Texas. Over 40 million pedestrian crossings between Texas and Mexico take place every year. The U.S. Customs Service reports that nearly 5.7 million pedestrians made northbound crossings in the El Paso area alone in 1992. Table III-10 lists the busiest bridges.

2. Nonmotorized Transportation in the Future

The absence of an identified system of corridors for development of nonmotorized facilities limits the state's ability to quantify deficiencies in its nonmotorized system. Metropolitan planning organizations are required under the Intermodal Surface Transportation Efficiency Act to develop bicycle and pedestrian elements in regional transportation plans. In many of the plans, metropolitan planning organizations have identified additional nonmotorized facilities that will be needed in the future. Texas areas in violation of Clean Air Act regulations of the National Ambient Air Quality Standards have already adopted nonmotorized elements as part of the State Implementation Plan to achieve regulatory conformity.

Demand for nonmotorized facilities in Texas is expected to grow for work and recreational travel. Demand for new facilities is expected to be highest in major metropolitan areas that already have trail systems. Additional demand in developing areas of the state should also be anticipated. The identification of future nonmotorized corridors along parts of Texas' existing highway system should provide a means to estimate facility deficiencies.

BRIDGE NAME	LOCATION	24 HOUR PEDESTRIAN-COUNT
Gateway, Brownsville	Brownsville -Matamoros	30,166
Bridge of Americas	Nuevo Laredo	27,355
Paso del Norte	El Paso - Juarez	20,543
Hidalgo - Reynosa	Reynosa	8,778
B & P, Progreso	Nuevo Progreso	8,632
Eagle Pass	Peidras Negras	4,557
Good Neighbor	El Paso - Ciudad Juarez	4,451
Bridge of the Americas	El Paso - Ciudad Juarez	3,629
Roma	Ciudad Miguel Aleman	2,280
B & M, Brownsville - Matamoros	Brownsville -Matamoros	1,452
Zaragosa Road	Ysleta-Zaragosa	1,282
Del Rio	Ciudad Acuna	557
Los Ebanos Ferry	Los Ebanos	507
Fabens	Caseta	131
Presidio	Ojinaga	125
Rio Grande City - Camargo	Camargo	79
Fort Hancock	El Porvenir	15
La Linda	Big Bend	12
Total		**114,551**

Table III-10 Pedestrian Crossings, Texas-Mexico Border

Source: Texas Department of Transportation, Texas-Mexico International Border Crossings: Background Information, 1991

3. Issues

The following issues must be addressed:

a. Inventory of bicycle and pedestrian facilities

TxDOT's current policy of incorporating bicycle facility considerations in all design projects is a useful step towards multimodal and intermodal transportation. However, presently there is no inventory of transportation corridors where bicycle facilities would be appropriate or easily retrofitted.

b. Coordination between bicycle facility planning and transit operators

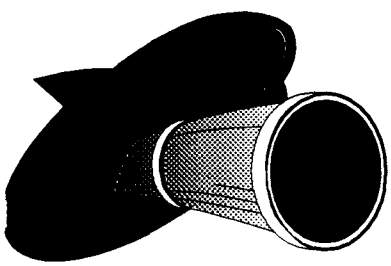
There is a need to expand communication between the bicycle community and transit operators. This is an important deficiency recognized by the current Bicycle Rules Advisory Committee.

c. Training in bicycle facility planning, selection, and design criteria for District Engineers

The state's bicycle coordinator has developed a training program for district engineers to help them in making bicycle improvements to highways. Increased technical awareness of design criteria nonmotorized facilities will enhance implementation of TxDOT policies regarding bicycle facilities.

d. Institutionalization of bicycle transportation as a viable means of transportation

In some circles, there is a perception that bicycles are not a viable means of transportation. Pedestrian and bicycle oriented projects are often not a high priority for local and state transportation interests. In addition, there is a general lack of educational programs to expand the knowledge of bicyclists, road users, transportation planners, and law enforcement personnel about laws on bicycle operation, safe road-sharing techniques, and the benefits of bicycling.



H. Pipelines

Pipelines are a primary mode of transportation for two of the most important commodities produced in Texas, crude oil and natural gas. They also carry other products that are important to the state's economy, including refined petroleum products, chemicals, carbon dioxide, and helium.

1. The Existing Pipeline System

a. Types of pipelines

There are two primary types of pipeline systems: trunk pipelines and grid pipelines. Trunk pipelines transport crude oil from wellheads to refineries and intermodal facilities where petroleum and petroleum by-products destined for markets elsewhere in the United States and export are transferred to ship, truck, or train. The majority of grid pipelines in Texas distribute natural gas from centralized distribution stations operated by local distribution companies to individual and business consumers. In addition to these pipelines for liquid and gas and gas, there is a coal-slurry line from Mount Pleasant to Houston.

There are an estimated 172,000 miles of petroleum pipeline in Texas, and pipeline transportation of crude oil in Texas totalled an estimated 6.9 billion barrels in 1993. In the same year, Texas pipelines also carried an estimated 4.6 billion barrels of refined petroleum products.

Trunk pipelines also transport natural gas from wellhead to large industrial companies using gas for industrial processes, and to local distribution companies, which use grid pipelines to provide gas service to households and businesses. Texas is a net exporter of natural gas, and trunk pipelines are used to transport gas to markets in the midwest, northeast, and southeastern United States. There are an estimated 196,000 miles of natural gas pipeline in Texas. About 54,000 miles consists of trunk line, with the remainder being grid pipeline. In 1991, Texas pipelines transported about 4.5 trillion cubic feet of natural gas.

b. Pipeline corridors

Petroleum and natural gas are often found together in the earth. For this reason, oil and natural gas pipelines are often located side by side. Six areas in Texas are home to particularly dense networks of oil and gas pipelines.

(1) The Gulf Coast-South Texas Coast

Running along the Texas Gulf coast from Louisiana to the Rio Grand, this corridor is focused on processing centers in the Port Arthur, Houston-Galveston, Victoria, and Corpus Christi areas. This is the largest natural gas producing region in Texas.

(2) Permian Basin-El Paso

This pipeline corridor connects oil and gas production fields in the Midland-Odessa region and El Paso and Pecos County to refineries and markets elsewhere, especially in California. A limited amount of international trade with Mexico also occurs via this pipeline corridor. This region is the second largest producer of natural gas and the largest oil producing area in the state.

(3) Metroplex-Gulf Coast

This corridor runs between the Dallas-Ft. Worth and greater Houston areas and is connected to gas and oil producing fields located west of Fort Worth.

(4) Metroplex-Oklahoma

This corridor is a primary route for the shipment of crude oil and chemical products from Texas to markets elsewhere in the United States.

(5) East Texas-Louisiana

Centered on the Tyler and Kilgore County areas, this corridor is a major source of shipping oil to the midwest, northeast, and southeastern United States.

(6) The Panhandle-High Plains

This corridor connects the oil and gas producing fields of the Texas panhandle with markets in the central and western United States. It is also the principal source for shipping helium from Texas to locations elsewhere.

2. The Future of the Pipeline System

Texas is both a major supplier and consumer of pipeline products. As the state and region grow, that balance will likely turn more sharply toward intrastate and intra-regional consumption. In particular, in-state reserves of natural gas are projected to be depleted by about 68 percent over the life of the Plan. This indicates that other supply areas, specifically Louisiana, will increasingly shift their flows toward Texas.

It is expected that there will be some increase in capacity provided on interstate routes to meet demands in other regions. Texas is competitive with other source areas in meeting those demands and thus the provision of additional capacity is primarily a function of ensuring that Texas-based products are effectively marketed to growth regions. For natural gas, the following corridors are expected to be developed further during the planning horizon:

Panhandle to Oklahoma. Upgrading of capacity here would allow the region to be increasingly competitive with U.S. and Canadian Rocky Mountain sources which supply the central and northeast states.

Oklahoma to Metroplex. Increased capacity here would meet projected increased demand over the planning horizon.

Permian Basin to Dallas Fort Worth. A serious need for a pipeline between the Permian Basin and the Dallas-Fort Worth area exists.

3. Issues

a. Unimpeded movement

The most important measure of pipeline performance is the degree to which pipeline capacity is adequate to provide unimpeded commodity movement between desired locations at any given time. Currently, pipeline capacity in Texas is more than sufficient to meet demand in most corridors. This is especially true in the case of oil pipelines: depressed energy prices have driven demand below what can be handled by an oil pipeline system that experienced extensive expansion during the oil boom years of the late 1970s and early 1980s. There is a need, however, for a pipeline from the Permian Basin to the Dallas/Fort Worth area.

It will be important to ensure that pipeline movements remain both unimpeded and at sufficient capacity in the future. One problem arises from right-of-way conflicts between pipelines and other surface transportation modes. Unimpeded pipeline movement requires clearly established pipeline rights-of-way and adequate buffer areas between pipeline rights-of-way and incompatible land uses, including residential areas.

b. Preventing deterioration

Care also must be exercised to prevent the deterioration of underutilized segments of the existing pipeline system. Otherwise, overcapacity could lead to deferred maintenance on little utilized pipeline segments and to pipeline deterioration to a point at which a resurgence in demand cannot be met without extensive rehabilitation.

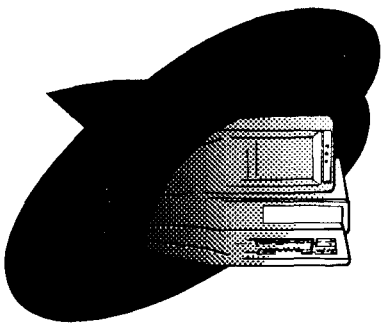
c. Environmental protection

Protecting the environment against pipeline spills is also important. This is a special concern at pipeline compressing stations and locations with interconnections and hookups between pipelines or between pipelines and processing areas, where the potential for venting, spillage, or other accidents is greater than along other segments.

I. Telecommunications and Information Technology

Telecommunications and information technology could play an important role in the transportation future of Texas. They could also change overall travel demands and services, serve as a travel substitute, and improve the overall performance of the transportation system. The potential contributions of telecommuting, Intelligent Transportation Systems and the "Information Superhighway" are discussed in this section.

1. Advanced Transportation Systems Today



a. Intelligent Transportation Systems

Intelligent Transportation Systems are defined as the use of computer, electronic, and communication technologies to increase the effectiveness of the transportation system. Intelligent Transportation Systems technologies could be used for all types of vehicles and for all parts of the transportation system. For example, the Intermodal Surface Transportation Efficiency Act of 1991 includes $660 million for research and development of Intelligent Transportation Systems and challenges states to compete for leadership in developing new systems.

To guide implementation of Intelligent Transportation Systems, Congress asked the U.S. Department of Transportation (USDOT) to prepare a strategic plan. The USDOT, in turn, asked the Intelligent Transportation Systems Society of America for assistance in preparing this plan. It has prepared a draft strategic plan that identifies both operational and institutional goals for the Intelligent Transportation Systems program. Operational goals are to: Improve safety, reduce congestion and improve accessibility, energy efficiency and environmental quality, and enhance economic productivity. Institutional goals include: Develop the U.S. Intelligent Transportation Systems industry, revitalize the transportation profession, and serve as a model for technology development and deployment.

(1) The six types of Intelligent Transportation Systems

Following are the types of Intelligent Transportation Systems:

Advanced Traffic Management Systems are infrastructure-based monitoring systems that allow for on-road surveillance and control of traffic. These include signal synchronization, accident-detection, highway-and-corridor-control systems.

Advanced Vehicle-Control Systems attempt to automate all or part of a trip by requiring less driver interaction with the vehicle. These systems include collision warning and avoidance devices, and automatic steering controls.

Advanced Traveler Information Systems provide information to travelers that help determine what high-occupancy-vehicle to use or what travel route is the least congested. These technologies include in-vehicle replication of maps and signs, pre-trip electronic route planning, traffic information broadcasting systems, safety warning systems, in-vehicle navigation systems and other capabilities.

Commercial Vehicle Operations support a variety of functions including preclearance and weigh-in-motion of trucks that allow passing of checkpoints at highway speeds, automated roadside safety inspections, and electronic vehicle registration and licensing to allow passing "seamlessly" across state borders.

Advanced Public Transportation Systems provide travelers with constantly updated ("real time") transit and ridesharing information, safety services, and give transit operators improved management of vehicles, facilities, planning and personnel management.

Advanced Rural Transportation Systems address applications such as vehicle location, emergency signaling, and traveler information.

(2) Texas Intelligent Transportation Systems initiatives

TxDOT, metropolitan planning organizations, and local governments have been aggressive in piloting and implementing Intelligent Transportation Systems applications in Texas. The following highlights some of these initiatives:

Advanced traffic management systems. TxDOT is building an infrastructure of smart highways. It is installing traffic management systems that will operate major arterial streets, freeways, freeway frontage roads, and high-occupancy-vehicle lanes. Table III-11 provides a description of some of the current TxDOT initiatives.

Other Intelligent Transportation Systems projects. TxDOT has initiated a number of projects that address other types of Intelligent Transportation Systems: advanced vehicle control, traveler in-

formation, commercial vehicle operations, and public transportation systems. Some projects also have traffic management components. Preliminary implementations of these Intelligent Transportation Systems initiatives have been undertaken in many Texas urban areas.

(3) Intelligent Transportation Systems assessment.

It is anticipated that Intelligent Transportation Systems will have a significant impact on transportation mobility, accessibility, safety, environmental quality, and economic productivity. While data are not available from Texas Intelligent Transportation Systems initiatives, national research summarizes some of the potential impacts. For example, research suggests that sophisticated advanced traffic management systems could reduce travel time by 13 percent, stops by 35 percent, fuel consumption by 12 percent, vehicle emissions by 10 percent, increase average speeds by 15 percent, and achieve a benefit-cost ratio of over ten to one.

Although Intelligent Transportation Systems promise to enhance mobility, and safety, some analysts point to potential negative impacts. For example, by increasing automotive mobility, Intelligent Transportation Systems could increase energy consumption, urban sprawl and pollution due to greater efficiencies that would allow additional vehicle use. Intelligent Transportation Systems would not necessarily induce changes in travel behavior either. It has been suggested that in meeting the objectives of reduced congestion, cleaner air, and reduced fuel consumption, Intelligent Transportation Systems would have to be coordinated with transportation demand management programs such as congestion pricing and ridesharing programs, in addition to pursuing alternative vehicle technologies. Some of the principal Texas Intelligent Transportation Systems programs are seeking to avoid some of these problems by focusing on multimodal, transit, and high-occupancy-vehicle lane strategies along with increasing roadway efficiency.

b. Telecommunications

Telecommunications applies to a wide range of electronic media including voice, data, and video. Messages can be exchanged using telephone lines, computers, airwaves, cable television wires and other means. Growth in telecommunications, and most recently proposals for an Information Superhighway, have increased speculation about telecommunication's impact on transportation.

Table III-11
Selected TxDOT Intelligent Transportation Management Systems

Location	Project	Description
Houston	Six freeway projects (62miles)	Traffic Management Systems, High Occupancy Vehicle Lane System Freeway frontage road system
	Houston Traffic Management Center	Central traffic control facility
	City of Houston and Houston Metro	Regional computerized traffic signal system
Ft. Worth	Four freeway projects (17 miles)	Traffic Management Systems
San Antonio	One freeway project (27 miles)	Traffic Management Systems
El Paso	Two freeway projects	Traffic Management Systems
Dallas	Intelligent Transportation Systems early deployment planning	Urban area and I-35 corridor
Austin	Intelligent Transportation Systems early deployment planning	Urban area and I-35 corridor
Texas and bordering states	Commercial Vehicle operations transport borders project	Identify institutional barriers to transparent borders and plan of action.
National	Heavy equiptment liscense plate project	Track and monitor commercial vehicles. Streamline permit process.
Texas	Comprehensive Intelligent Transportation Systems plan	Advance Intelligent Transportation Systems applications. Coordinate Intelligent transportation Systems work with other agencies.
National	Intelligent Transportation Systems Architecture Program	Design national Intelligent Transportation Systems.

Source: TxDOT, Traffic Management Section, August 1994.

(1) Relationships between telecommunications and transportation

The relationships between telecommunications and transportation are complex. Examples of the telecommunications-transportation link are the use of telecommunications as a substitute for transportation, including telecommuting and teleconferencing. They show that telecommunications technology can provide reductions in travel, energy consumption and emissions. On the other hand, telecommunications contact between individuals increases the prospect that individuals will follow up their contacts with personal visits.

Because of the complex nature of the relationship between transportation and telecommunications, and a limited amount of data, it is not yet possible to quantify the transportation impacts of telecommunications technology.

(2) Telecommuting and teleconferencing

Telecommuting and teleconferencing are being proposed with increasing frequency as substitutes for travel. Telecommuting involves working full or part-time at home or in neighborhood work centers. Another form of telecommuting involves decentralization of some staff to satellite work centers near employees' residences, by a company or a group of companies who pool resources to operate a neighborhood work center. Disabled individuals, people with child rearing responsibilities, and rural and suburban residents also benefit from telecommuting. It benefits both employers and employees by enabling companies to reach otherwise unavailable labor markets, increase employee productivity, and reduce absenteeism.

Teleconferencing is accomplished by audio, video, and/or computer connections between sites that reduce the need for business trips. Telecommuting and teleconferencing can reduce overall vehicle trips thereby cut emissions and vehicle miles travelled. The benefits of telecommuting are realized most significantly during peak hours of traffic.

TxDOT recently initiated a telecommuting program for its employees. Some metropolitan planning organizations in air quality nonattainment areas mention telecommuting as a transportation control measure that should be pursued.

Another program currently under development in Texas is pending state and federal funding. The project would demonstrate the added

efficiencies and improved competitiveness of video and data networking technology. If funded, this network would provide video and data connections to state agencies in rural areas. The project would allow telecommuting from outlying communities, "distance education," and provide for the possibility of "telemedicine" applications. This project would serve to initiate significant telecommunications investment and application in Texas, potentially reducing the demand for travel.

(3) Telecommuting assessment

Although statistics are not available for Texas, telecommuting appears to be growing nationally. A national survey indicated that 4.2 million workers were telecommuters in 1992; a 27 percent increase over 1991. This constituted 3.3 percent of the work force. USDOT projections forecast more than 30 million telecommuters by 2010. The USDOT also estimated that by 2002 telecommuters will reduce vehicle miles traveled by 17 to 35 billion, or by 1 to 1.5 percent. However, by the same measure increased telecommuting could increase traffic flows, activate latent demand, and increase urban sprawl.

2. Future Conditions

a. Intelligent Transportation Systems and telecommunications

Intelligent Transportation Systems are in their infancy. Consequently, their transportation benefits will be forthcoming. In addition, Intelligent Transportation Systems and telecommunications technologies are changing so rapidly that predictions on the technologies that will be used are difficult. It will be important to monitor transportation impacts as systems are implemented.

b. The Information Superhighway

There has been considerable discussion about a proposed "Information Superhighway". The concept involves a high speed, high capacity telecommunications network that would bring a broad range of new services to homes, schools, and offices. However, statutory changes will be necessary at the state and federal levels should the network become a priority. Current antitrust and communication laws restrict the ability to construct the national communication architecture necessary to make the Information Superhighway a reality.

No estimates exist of the transportation impacts of the Information Superhighway, but to the extent that trips are reduced by services provided through the network, the impacts could be significant. One infrastructure impact on transportation is the desire for telecommunication companies to use transportation rights-of-way for fiber-optic cabling. This occurs to a certain extent already, but it will likely be an issue for some time.

3. Issues

a. Documenting the transportation impact of Intelligent Transportation Systems

Although Intelligent Transportation Systems can enhance the performance of the existing transportation system, they can also lead to increased automotive travel and auto emissions. It will be necessary to evaluate the impact of Intelligent Transportation Systems on mobility and safety compared to other investments such as infrastructure. To provide this information, it will be necessary to develop monitoring and evaluation systems. Intelligent Transportation Systems will collect important new data for the management systems and future planning efforts.

b. Documenting the transportation impact of telecommunications

The long term impact of telecommunications on transportation is unknown. In particular, the roles of telecommuting and teleconferencing need to be monitored and evaluated, and factored into future planning processes.

c. Complementary use of rights-of-way for telecommunications

There is increasing interest in the use of transportation rights-of-way for fiber-optic cable by companies that currently do not have legal grounds to request it. Although such use could expedite the development of telecommunications as a transportation alternative, the issue involves a number of legal and financial issues that must be resolved.

d. Separation between communications and computing companies

Currently, there is an enforced separation between communications and computing companies. Likewise, communication laws separate telephone companies from television companies, and telephone companies are either local, rural, regional, long-distance, or telephone manufacturing companies.

Television broadcasting companies cannot become television cable companies. Legislation currently before Congress (HR 3636 and S 18322) would end the local telephone and cable television monopolies in specific geographic areas and set the conditions for allowing the seven regional Bell companies to enter the long-distance market and manufacturing.

Appendix A: Glossary

Air Carrier: A provider of commercial transportation services. Included are certified air carriers, air taxis (including commuters), supplemental air carriers, commercial operators of large aircraft, and air travel clubs that hold certificates of public convenience and necessity.

Americans with Disabilities Act of 1990 (ADA): The Americans with Disabilities Act mandates sweeping changes in building codes, transportation, and hiring practices to prevent discrimination against persons with disabilities, in projects involving federal dollars, including federally funded transportation projects.

Clean Air Act Amendments of 1990 (CAA): The Clean Air Act Amendments identify mobile sources (vehicles) as primary sources of pollution and call for stringent new requirements in metropolitan areas and states where attainment of National Ambient Air Quality Standards is or could be a problem.

Drayage System: The drayage system refers to the restriction that precludes the same vehicle from being used to transport freight in both directions across the United States-Mexico border.

Federal Highway Administration (FHWA): The agency of the U.S. Department of Transportation with jurisdiction over highways.

Federal Transit Administration (FTA): The agency of the U.S. Department of Transportation with jurisdiction over transit. Formerly the Urban Mass Transit Administration.

General Aviation: That portion of civil aviation that encompasses all facets of aviation except air carriers.

High occupancy vehicle (HOV): A vehicle carrying enough people to travel in the HOV or Diamond Lane, or a vanpool or bus.

Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA): Signed into law on December 18, 1991, the Intermodal Surface Transportation Efficiency Act implemented broad changes in the way transportation decisions are made by emphasizing diversity and balance of modes and pres-

ervation of existing systems over construction of new facilities, especially roads, and by proposing a series of social, environmental, and energy factors that must be considered in transportation planning, programming, and project selection.

Intelligent Transportation Systems (ITS): Generally refers to the advanced technology applications that automate highway and vehicle systems to enable the more efficient and safer use of existing highways.

Intermodal: Refers to transfer facilities where freight or passengers change modes of transport. For example, an airport is an intermodal facility where freight and passengers make intermodal transfers between motorized vehicles and airplanes.

Major Investment Studies: These efforts are required prior to the implementation of major transportation plans, programs, or projects. Major Investment Studies involve an investigation of life cycle costs and cost benefit analyses.

Metropolitan Planning Organization (MPO): An agency designated by the governor (or governors in multi-state areas) to administer the federally required transportation planning process in a metropolitan area. An MPO must be in place in every urbanized area over 50,000 population. The MPO is responsible for the 20-year long range plan and the Transportation Improvement Program. The official name for an MPO may also be Council of Governments, Planning Association, Planning Authority, Regional or Area Planning Council, or Regional or Area Planning Commission. The Intermodal Surface Transportation Efficiency Act provides procedures under which local governments and governors may designate or redesignate an MPO.

Mode: A form of transport. For example, airplanes and trains are both transportation modes.

Multimodal: Refers to a plan or program that accounts for the needs and/or trends of multiple modes. The Texas Transportation Plan is an example of a multimodal plan.

National Ambient Air Quality Standards (NAAQS): Air Quality Standards set up by the Environmental Protection Agency to help mitigate the health impacts of air pollution. National Ambient Air Quality Standards exist for six pollutants: carbon monoxide, ozone, particulate matter, lead, sulfur dioxide, and nitrous oxide.

The National Highway System (NHS): The National Highway System will be designated by Congress in 1995 and contain all Interstate routes, a large percentage of urban and rural principal arterials, and strategic highways and connectors.

Nonattainment Area: A nonattainment area does not meet National Ambient Air Quality Standards.

State Implementation Plan (SIP): State plans for attainment of National Ambient Air Quality Standards. There are separate State Implementation Plan for different pollutants in different areas.

Statewide Transportation Improvement Program (STIP): The Statewide Transportation Improvement Program is a three-year transportation investment strategy, required at the state level, which addresses the goals of the state long-range plan and lists priority projects and activities throughout the state.

Telecommuting: The substitution of electronic or telephone systems for traditional forms of transportation. A person that uses a personal computer at their home or at a neighborhood work station, that is linked by a modem or facsimile machine to their work place or co-workers, is telecommuting when they can substitute a journey to work electronically. This can also apply to other travel substitutions, for example teleconferencing, telemedicine, etc.

Transportation Control Measures (TCM): Transportation Control Measures are implemented to enable nonattainment areas to meet their emissions goals. They can include TDM measures, parking policies and pricing, or other system improvements that reduce congestion.

Transportation Demand Management (TDM): Transportation Demand Management measures try to reduce the proportion of person-trips traveling by single occupancy vehicle. They can include promotion of non-single occupancy vehicle modes of transportation, car and vanpool formation assistance, transit subsidies, and a variety of other measures.

Transportation Improvement Program (TIP): A Transportation Improvement Program is a three-year transportation investment strategy required under the Intermodal Surface Transportation Efficiency Act which addresses the goals of long-range transportation plans and lists regional transportation priority projects and activities.

Transportation Management Area (TMA): Under the Intermodal Surface Transportation Efficiency Act, any urban area over 200,000 population is automatically a Transportation Management Area, which subjects it to additional planning requirements but also entitles it to funds earmarked for large urbanized areas under ISTEA.

Transportation System Management (TSM): TSM improves the flow of traffic through traffic signal synchronization, freeway on-ramp signals, the construction of high occupancy vehicle (HOV) lanes, left turn restrictions, and other measures.

Vehicle Miles Travelled (VMT): A measure of transportation system use reflecting the number of miles traveled during a trip, multiplied by the total number of trips made.

APPENDIX B: MATRIX OF POLICIES AND ISTEA PLANNING FACTORS

Factor	Addressed in Policies, Strategies, and Actions Sections
A Broader Role for Transportation Planning	
❖ Consider the overall social, economic, energy, and environmental effects of transportation decisions.	•Maximize personal mobility using a full range of transportation solutions. •Maximize the efficiency and effectiveness of freight transportation. •Preserve the Gulf Intracoastal Waterway. •Maximize connections between all transportation modes. •Coordinate statewide transportation and economic development policies. •Develop environmentally sound transportation infrastructure, facilities, and programs. •Minimize Risk from transportation of hazardous materials. •Ensure transportation system capacity during emergencies and disasters. •Maximize safety of all transportation modes.
❖ Consider the effects of transportation policy decisions on land use and development.	•Increase mobility and accessibility through closer integration of transportation and land use.
❖ Consider access to specific types of locations including ports, intermodal facilities, recreational areas, and military installations.	•Maximize the efficiency and effectiveness of freight transportation. •Encourage cost effective private sector participation in transportation solutions. •Preserve the Gulf Intercoastal Waterway.

	•Maximize connections between all transportation modes. •Ensure adequate transportation capacity to meet international trade related demands.
❖Consider the consistency of transportation planning with federal, state, and local energy goals.	•Focus policies, strategies, and actions on the Texas multimodal transportation system. •Maintain up–to–date information for transportation planning, programming, and decision making. •Develop environmentally sound transportation infrastructure, facilities, and programs.
❖Consider the transportation needs of areas outside metropolitan areas through consultation with local elected officials.	•Maximize personal mobility using a full range of transportation solutions. •Maximize the efficiency and effectiveness of freight transportation. •Maintain and enhance essential transportation infrastructure and services in rural Texas. •Fund special needs.
❖ Consider state plans developed under the Federal Water Pollution Control Act.	•Increase mobility and accessibility through closer integration of transportation and land use. •Preserve the Gulf Intercoastal Waterway. •Develop environmentally sound transportation infrastructure, facilities, and programs.
❖Consider recreational travel and tourism.	•Focus policies, strategies, and actions on the Texas multimodal transportation system. •Maximize personal mobility using a full range of transportation solutions. •Coordinate statewide transportation and economic development policies.

❖Consider investment strategies to improve roads that support rural economic growth, tourism development, and other economic activities.	•Maximize the efficiency and effectiveness of freight transportation . •Maintain and enhance essential transportation infrastructure and services in rural Texas. •Ensure transportation capacity adequate to meet international trade related demands. •Fund special needs.
❖Consider the concerns of Indian tribal governments.	•Focus policies, strategies, and actions on the Texas multimodal transportation system. •Maintain and enhance essential transportation infrastructure and services in rural Texas. •Coordinate statewide transportation and economic development policies.
Developing a Balanced Transportation System	
❖Include methods to expand and enhance transit services to increase their use.	•Maximize personal mobility using a full range of transportation solutions. •Maintain and enhance essential transportation infrastructure and services in rural Texas. •Increase mobility and accessibility through closer integration of transportation and land use. •Maximize connections between all transportation modes.
❖Consider the transportation needs identified through the use of the management systems.	•Focus policies, strategies, and actions on the Texas multimodal transportation system. •Maximize the efficiency and effectiveness of freight transportation . •Maintain up–to–date information for transportation planning, programming, and decision making.

	•Maximize connections between all transportation modes. •Ensure transportation capacity adequate to meet international trade related demands. •Work on funding to address emerging issues.
❖Preserve rights–of–way for construction of future transportation projects.	•Focus policies, strategies, and actions on the Texas multimodal transportation system. •Maximize the efficiency and effectiveness of freight transportation. •Maximize preservation of existing transportation infrastructure and services for all modes of transportation. •Maximize connections between all transportation modes. •Ensure adequate transportation capacity to meet international trade related demands. •Ensure implementation of regionally approved projects.
❖Consider the connectivity between metropolitan areas within and outside Texas.	•Focus policies, strategies, and actions on the Texas multimodal transportation system. •Maximize the efficiency and effectiveness of freight transportation. •Maintain and enhance essential transportation infrastructure and services in rural Texas. •Preserve the Gulf Intracoastal Waterway. •Ensure maximum intermodal connections between all transportation modes. •Ensure adequate transportation capacity to meet international trade related demands.

❖Incorporate bikeways and pedestrian facilities in projects.	•Maximize personal mobility using a full range of transportation solutions. •Maximize the efficiency and effectiveness of freight transportation. •Maintain and enhance essential transportation infrastructure and services in rural Texas.
❖Address long–range needs of the state transportation system.	•Focus policies, strategies, and actions on the Texas multimodal transportation system. •Maintain and enhance essential transportation infrastructure and services in rural Texas. •Increase mobility and accessibility through closer integration of transportation and land use. •Maximize preservation of existing transportation infrastructure and services for all modes of transportation. •Encourage cost effective private sector participation in transportation solutions. •Maintain up–to–date information for transportation planning, programming, and decision making. •Preserve the Gulf Intracoastal Waterway. •Maximize connections between all transportation modes. •Ensure organizational capacity for multimodal transportation planning. •Maintain the purchasing power of existing transportation revenue sources.
❖Coordinate and reconcile metropolitan and statewide plans to ensure connectivity.	•Focus policies, strategies, and actions on the Texas multimodal transportation system. •Increase mobility and accessibility through closer integration of transportation and land use.

	•Ensure adequate transportation capacity to meet international trade related demands. •Ensure implementation of regionally approved projects. •Ensure organizational capacity for multimodal transportation planning.
❖Consider strategies for identifying and implementing transportation enhancements.	•Focus policies, strategies, and actions on the Texas multimodal transportation system. •Utilize technology to increase transportation mobility. •Encourage cost effective private sector participation in transportation solutions. •Maintain up–to–date information for transportation planning, programming, and decision making. •Preserve the Gulf Intracoastal Waterway. •Ensure adequate transportation capacity to meet international trade related demands. •Minimize risk from transportation of hazardous materials. •Expedite the project development process. •Ensure organizational capacity for multimodal transportation planning.
Increasing Transportation System Efficiency	
❖Preserve existing facilities and meet transportation needs by using them more efficiently.	•Maximize personal mobility using a full range of transportation solutions. •Maximize the efficiency and effectiveness of freight transportation. •Maintain and enhance essential transportation infrastructure and services in rural Texas. •Maximize preservation of existing transportation infrastructure and services for all modes of transportation.

	•Balance expansion and preservation of over– and under– utilization of transportation modes and corridors. •Encourage cost effective private sector participation in transportation solutions. •Maintain up–to–date information for transportation planning, programming, and decision making. •Preserve the Gulf Intracoastal Waterway. •Maximize connections between all transportation modes. •Minimize risk from transportation of hazardous materials. •Ensure transportation system capacity during emergencies and disasters.
❖Consider the life–cycle costs of transportation systems.	•Optimize the use of existing funding sources.
❖Consider methods to enhance the efficient movement of commercial motor vehicles.	•Maximize the efficiency and effectiveness of freight transportation. •Utilize technology to increase transportation mobility. •Maintain up–to–date information for transportation planning, programming, and decision making. •Ensure adequate transportation capacity to meet international trade related demands. •Increase flexibility in the use of transportation resources.
❖Consider any metropolitan area plan.	•Focus policies, strategies, and actions on the Texas multimodal transportation system. •Maximize personal mobility using a full range of transportation solutions. •Ensure the organizational capacity for multimodal transportation planning.

❖Relieve congestion and prevent congestion from occurring where it does not now occur.	•Focus policies, strategies, and actions on the Texas multimodal transportation system. •Maximize personal mobility using a full range of transportation solutions. •Maximize the efficiency and effectiveness of freight transportation. •Utilize technology to increase transportation mobility. •Increase mobility and accessibility through closer integration of transportation and land use. • Balance expansion and preservation of over– and under– utilization of transportation modes and corridors. • Maintain up–to–date information for transportation planning, programming, and decision making. • Ensure adequate transportation capacity to meet international trade related demands.
❖Consider innovative financing of projects.	•Maximize the efficiency and effectiveness of freight transportation. •Encourage cost effective private sector participation in transportation solutions. •Optimize the use of existing funding sources. •Maintain the purchasing power of existing transportation revenue sources. •Obtain sufficient revenues to meet essential transportation needs. •Fund special needs. •Implement the combination of funding sources that provides cost responsibility. •Increase flexibility in the use of transportation resources. •Work on funding to address emerging issues.

APPENDIX C: DEMOGRAPHIC AND ECONOMIC TRENDS

A. Introduction

Demographic and economic forces are the primary factors shaping the character of Texas transportation. System performance and needs are closely tied to the economy of the state, which in turn is shaped by the people of Texas. As the population and employment base of Texas increases there will be new challenges for the transportation system. Workers will need to get to work, either by traditional modes such as the automobile and public transportation, or by using new technologies to telecommute and teleconference. Other populations groups will also place new demands on the transportation system. Elderly residents will require suitable means of mobility. Economic forces are changing rapidly and will most likely continue to do so well into the future. Structural changes in the state's economy will cause further shifts that will require modifications to the state's existing transportation infrastructure.

B. Demographic Trends

Texas is projected to grow steadily through the 20 year planning horizon, with the state's population exceeding 23 million by 2014. The 1990 population of Texas was 16.9 million and 18.1 million in 1994, representing a considerable growth of 1.8 percent, on average, annually. This rate is expected to continue into the future, at a slightly slower pace of 1.5 percent annually, over the next 20 years. Children of current residents and migrants from other states and countries will account for this growth. As the population of Texas grows larger, it will age. Aging "Baby Boomers" will cause the average age of a typical Texan to increase from 30.6 years in 1990 to nearly 38 years in 2014.

It is likely that aging residents will need alternative means of transport, other than the private automobile, once they no longer desire or are able to drive. Because these residents will increase in number, traditional public transportation capacity expansions may be necessary, in addition to new types of flexible paratransit service. This will result with increased demand for flexible rural, urban, and intercity public transportation across the state. Meeting

these needs may be difficult due to competing financial demands for health care, social services, housing, and other social needs.

As the population grows older and larger there will be more Texans at an age that enables them to drive. This will result in significantly higher volumes of vehicles on roadways that will not be able to absorb the additional traffic. Congestion will be most serious in metropolitan areas where a larger proportion of the state's population will be living, especially the "Texas Triangle," in 20 years.

Overall, Texans will be more numerous, older, and more urbane in 20 years. The state's population will grow more ethnically diverse and more metropolitan, which will be paralleled by internationalization of the Texas economy.

C. Economic Indicators

Historically, the Texas economy focused on the production of raw materials associated with agriculture, petroleum, and natural gas. Much of the raw materials produced in Texas were shipped out of state for processing and then were returned to Texas for the consumer market. In recent years, economic development efforts have focused on retaining the raw materials in Texas for processing, thus adding value and creating jobs within the state. This trend toward processing and value–added manufacturing will be important in the future to maintain stability in resource–based industries.

The economy of Texas is changing. In recent years, Texas employment has grown at an average annual rate of 1.6 percent, statewide. In 1982, 6.1 million Texans held jobs, a statistic that grew to 7.1 million by 1992. This overall employment growth was supported by several factors including the disproportionate rise of service industries such as financial, insurance, and real estate professions, and state and local government jobs. Major declining employment sectors included petroleum production and agriculture, although many of these losses were absorbed by the growing petro–chemical industry.

Future employment growth is projected to parallel that of the 1982–1992 period. Service and government employment is projected to outstrip growth in other economic sectors. However, although significant growth will occur in these sectors, there will be notable expansions in others as the Texas economy internationalizes to compete in the global marketplace.

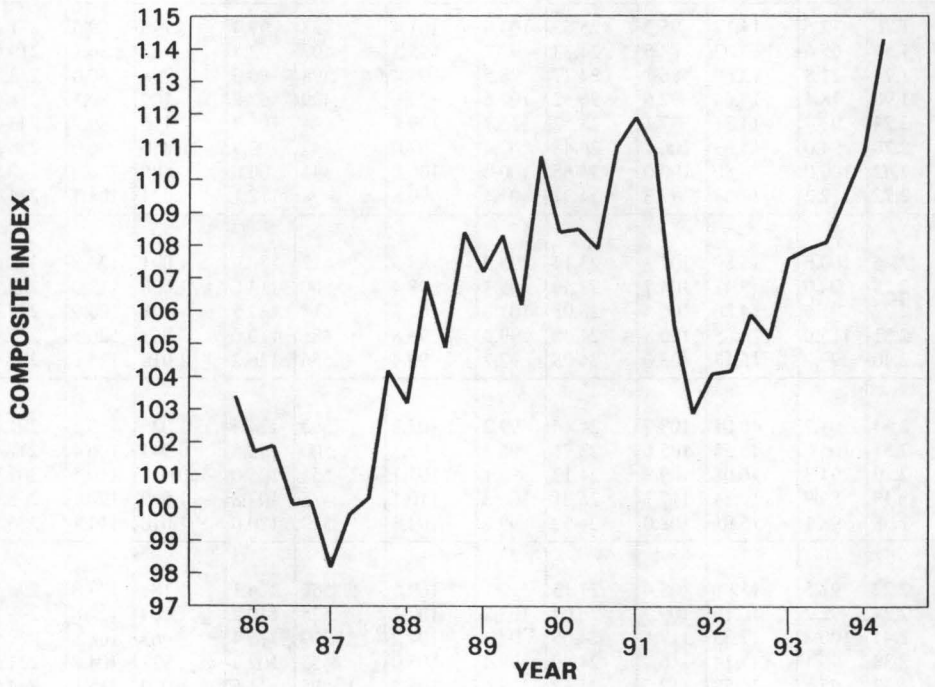
U.S. Department
of Transportation
**Federal Highway
Administration**

PRICE TRENDS for FEDERAL–AID HIGHWAY CONSTRUCTION

1987 BASE **THIRD QUARTER 1994**

THREE-QUARTER MOVING INDEX PRICE TRENDS

1987 BASE



The three-quarter moving composite price index is the weighted average of the indices for three consecutive quarters.

The Composite Bid Price Index is composed of six indicator items: common excavation, to indicate the price trend for all roadway excavation; portland cement concrete pavement and bituminous concrete pavement, to indicate the price trend for all surfacing types; and reinforcing steel, structural steel, and structural concrete, to indicate the price trend for structures. Descriptions of the six indicator items can be found in Federal-aid Policy Guide G–6011–10.

Development of the index is discussed in some detail in PUBLIC ROADS magazines, volume 31, No. 10, October 1961; volume 36, No. 4, October 1970; and volume 45, No. 1, June 1981.

Average contract prices shown herein are for completed work and include costs of materials, labor, equipment, overhead and profit.

**Office of Engineering
Federal-Aid and Design Division
(202) 366–4636**
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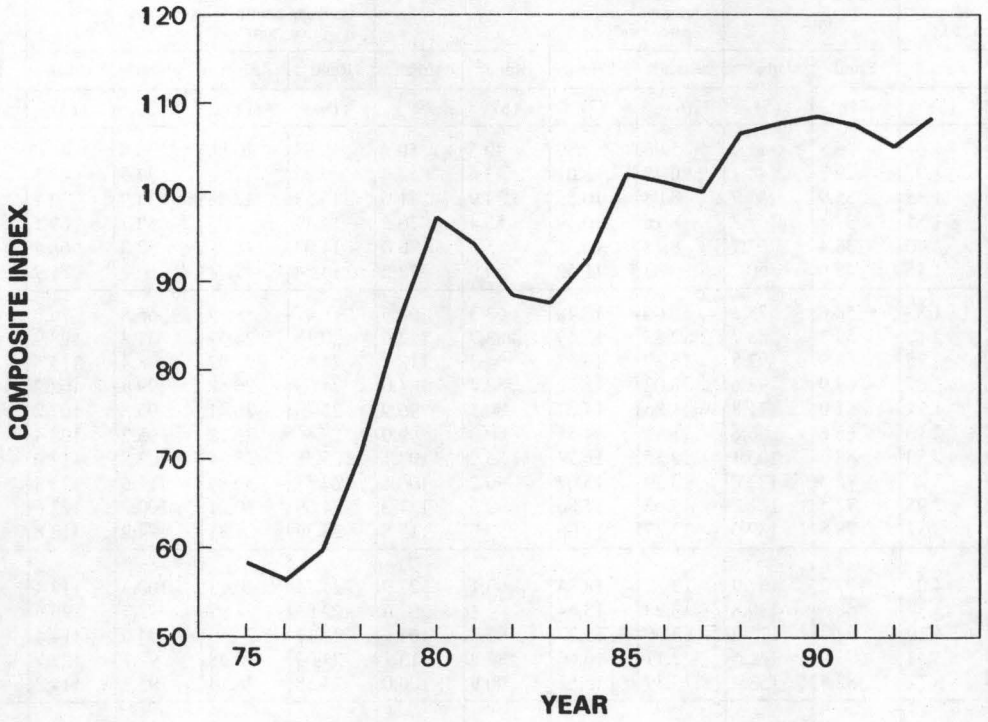
PRICE TRENDS FOR FEDERAL-AID HIGHWAY CONSTRUCTION

1987 Base

Year	Common excavation		Surfacing					Structures							Composite index
			Portland cement concrete [2]		Bituminous concrete		Surfacing index	Reinforcing steel		Structural steel		Structural concrete		Structures index	
	Average contract price (cu. yd.)	Index	Average contract price (sq. yd.)	Index	Average contract price (ton)	Index		Average contract price (lb.)	Index	Average contract price (lb.)	Index	Average contract price (cu. yd.)	Index		
1972	.72	29.7	6.42	43.6	9.23	37.5	39.5	.181	41.1	.342	38.6	100.17	41.6	40.7	38.6
1973	.80	33.0	7.00	47.5	10.02	40.7	42.9	.207	47.0	.372	42.0	111.81	46.4	45.4	42.5
1974	1.00	41.2	8.88	60.3	14.74	59.8	60.0	.339	76.9	.551	62.3	136.80	56.8	61.7	57.9
1975	1.03	42.5	8.88	60.3	15.13	61.4	61.0	.297	67.4	.554	62.6	138.76	57.6	60.6	58.1
1976	1.03	42.5	8.92	60.6	14.83	60.2	60.3	.258	58.5	.484	54.7	139.59	58.0	57.2	56.3
1977	1.16	47.8	9.95	67.5	15.47	62.8	64.3	.272	61.7	.520	58.8	143.51	59.6	59.7	59.8
1978	1.54	63.5	11.90	80.8	17.16	69.6	73.3	.316	71.7	.603	68.1	172.41	71.6	70.7	70.7
1979	1.62	66.8	14.02	95.2	21.21	86.1	89.0	.421	95.5	.759	85.8	211.33	87.8	88.6	85.5
1980	1.83	75.5	14.92	101.3	25.29	102.6	102.2	.483	109.6	.941	106.3	226.68	94.1	100.0	97.2
1981	1.76	72.6	14.17	96.2	25.63	104.0	101.4	.438	99.4	.790	89.3	231.64	96.2	94.9	94.2
1982	1.59	65.6	13.03	88.5	24.33	98.7	95.3	.407	92.4	.762	86.1	219.63	91.2	90.0	88.5
1983	1.74	71.8	12.69	86.1	24.27	98.5	94.4	.398	90.3	.708	80.0	213.85	88.8	86.7	87.6
1984	1.90	78.4	13.64	92.6	26.52	107.6	102.7	.409	92.8	.709	80.1	218.02	90.5	88.2	92.6
1985	2.24	92.4	14.31	97.1	28.52	115.7	109.6	.444	100.7	.796	89.9	243.60	101.2	98.1	102.0
1986	2.28	94.0	15.63	106.1	26.48	107.4	107.0	.442	100.3	.850	96.0	236.37	98.2	98.0	101.1
1987	2.42	100.0	14.80	100.0	24.65	100.0	100.0	.441	100.0	.885	100.0	240.81	100.0	100.0	100.0
1988	2.72	112.2	14.33	97.3	24.91	101.1	99.8	.494	112.1	.924	104.4	274.12	113.8	111.0	106.6
1989:															
First quarter	2.44	100.6	15.80	107.3	23.14	93.9	98.3	.612	138.9	1.091	123.3	312.62	129.8	129.6	112.4
Second quarter	2.28	94.0	15.42	104.7	23.50	95.3	98.4	.500	113.5	1.008	113.9	262.95	109.2	111.2	103.4
Third quarter	2.22	91.6	14.80	100.5	25.08	101.8	101.3	.615	139.5	.946	106.9	299.35	124.3	122.3	109.1
Fourth quarter	2.81	115.9	14.85	100.8	24.48	99.3	99.8	.485	110.0	1.063	120.1	257.49	106.9	110.9	107.1
Annual	2.40	99.0	15.17	103.0	24.08	97.7	99.4	.556	126.2	1.018	115.0	283.40	117.7	118.4	107.7
1990:															
First quarter	2.54	104.7	16.01	108.7	24.44	99.2	102.3	.592	134.4	1.023	115.5	291.00	120.8	121.8	111.2
Second quarter	2.55	105.0	15.55	105.6	23.71	96.2	99.3	.500	113.5	0.941	106.4	277.41	115.2	112.6	106.0
Third quarter	2.29	94.3	16.08	109.2	24.17	98.1	101.7	.551	125.0	0.978	110.5	301.76	125.3	121.4	109.2
Fourth quarter	2.18	89.9	17.34	117.7	26.21	106.3	110.1	.475	107.8	1.099	124.1	265.51	110.3	113.5	108.5
Annual	2.38	98.1	15.91	108.0	24.52	99.5	102.3	.529	120.0	1.010	114.1	286.18	118.8	117.8	108.5
1991:															
First quarter	2.22	91.5	15.96	108.4	27.13	110.1	109.5	.556	126.1	1.184	133.8	296.59	123.2	126.5	114.3
Second quarter	2.24	92.2	16.16	109.7	26.07	105.8	107.1	.525	119.2	1.104	124.8	296.79	123.2	123.0	111.8
Third quarter	2.44	100.8	17.33	117.6	24.05	97.6	104.2	.509	115.4	.963	108.8	269.55	111.9	111.7	107.0
Fourth quarter	2.38	98.1	17.14	116.4	24.49	99.4	105.0	.453	102.7	.922	104.2	221.58	92.0	97.1	100.4
Annual	2.32	95.5	16.58	112.5	25.52	103.6	106.5	.505	114.6	1.030	116.4	264.98	110.0	112.5	107.5
1992:															
First quarter	2.13	87.8	17.08	116.0	25.31	102.7	107.0	.470	106.6	.869	98.2	255.52	106.1	104.1	102.9
Second quarter	2.27	93.5	18.24	123.9	24.55	99.6	107.6	.482	109.4	1.003	113.3	299.19	124.2	118.8	110.4
Third quarter	2.28	94.0	17.73	120.4	23.19	94.1	102.7	.599	136.0	.864	97.7	214.51	89.1	99.3	99.9
Fourth quarter	1.93	79.5	18.23	123.8	25.27	102.5	109.5	.485	110.0	.901	101.8	291.09	120.9	114.0	107.0
Annual	2.20	90.8	17.80	120.8	24.66	100.1	106.9	.520	117.9	.916	103.5	259.61	107.8	108.4	105.1
1993:															
First quarter	2.60	107.2	18.37	124.7	25.13	102.0	109.4	.465	105.5	.974	110.0	271.18	112.6	110.7	109.7
Second quarter	2.74	113.1	17.99	122.1	24.46	99.2	106.7	.489	111.0	.851	96.2	278.13	115.5	109.6	109.0
Third quarter	2.31	95.3	17.54	119.1	29.06	117.9	118.3	.450	102.2	.826	93.3	247.72	102.9	100.2	106.9
Fourth quarter	2.40	98.9	21.56	146.4	27.25	110.6	122.3	.466	105.8	.846	95.5	254.45	105.7	103.0	110.3
Annual	2.50	103.2	18.81	127.7	26.26	106.6	113.5	.467	106.0	.861	97.3	261.89	108.7	105.3	108.3
1994:															
First quarter	2.98	122.9	19.51	132.4	26.21	106.3	114.9	.529	120.1	.762	86.1	272.60	113.2	107.2	112.7
Second quarter	2.46	101.6	21.73	147.5	27.54	111.7	123.5	.520	117.9	.774	87.4	258.97	107.5	104.0	111.6
Third quarter	3.12	128.6	21.09	143.2	30.29	122.9	129.5	.490	111.1	.858	96.9	285.08	118.4	111.5	121.4
Fourth quarter															
Annual															

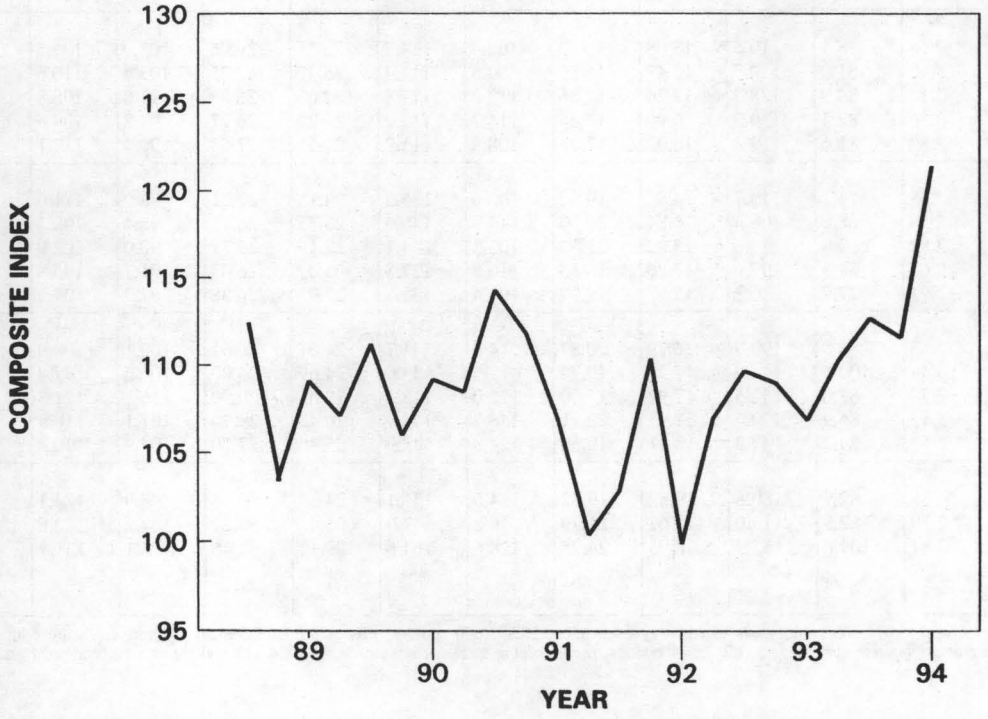
ANNUAL PRICE TRENDS

1987 BASE



QUARTERLY PRICE TRENDS

1987 BASE



PRICE TRENDS FOR FEDERAL-AID HIGHWAY

1987 Base [1]

Year	Common excavation				Portland cement concrete surface [2]				Bituminous concrete surface				Surfacing	
	Average contract price (cu. yd.)		Index		Average contract price (sq. yd.)		Index		Average contract price (ton)		Index		Index	
	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
1972 [2]	.65	1.01	26.8	41.7	5.96	7.39	40.5	50.2	8.63	10.84	35.0	44.0	36.8	46.0
1973	.72	1.07	29.7	44.1	6.42	8.01	43.6	54.4	9.25	11.70	37.5	47.5	39.5	49.7
1974	.87	1.35	35.9	55.7	8.08	10.55	54.9	71.6	13.53	17.43	54.9	70.7	54.9	71.0
1975	.91	1.51	37.5	62.3	8.16	10.39	55.4	70.5	14.47	17.03	58.7	69.1	57.6	69.6
1976	.93	1.40	38.4	57.7	8.18	10.31	55.5	70.0	14.04	16.85	57.0	68.4	56.5	68.9
1977	1.09	1.46	45.0	60.2	8.83	11.52	59.9	78.2	14.84	17.71	60.2	71.9	60.1	73.9
1978	1.42	1.83	58.6	75.5	10.06	13.78	68.3	93.5	16.47	18.74	66.8	76.0	67.3	81.8
1979	1.45	2.15	59.8	88.7	12.33	16.59	83.7	112.6	20.15	24.37	81.8	98.9	82.4	103.4
1980	1.67	2.25	68.9	92.8	13.89	16.57	94.3	112.5	24.26	27.97	98.4	113.5	97.1	113.2
1981	1.55	2.27	63.9	93.6	13.02	15.32	88.4	104.0	24.63	26.68	99.9	108.2	96.1	106.9
1982	1.48	1.74	61.0	71.8	11.86	14.27	80.5	96.9	23.46	26.41	95.2	107.2	90.4	103.8
1983	1.59	2.10	65.6	86.6	11.83	14.58	80.3	99.0	23.46	26.72	95.2	108.4	90.3	105.3
1984	1.66	2.50	68.5	103.1	12.55	15.77	85.2	107.1	25.58	28.84	103.8	117.0	97.7	113.7
1985	1.85	3.20	76.3	132.0	13.29	15.67	90.2	106.4	27.51	30.89	111.6	125.3	104.6	119.1
1986	1.88	2.95	77.5	121.7	13.63	17.86	92.5	121.2	24.69	30.21	100.2	122.6	97.7	122.1
1987	1.91	3.37	78.8	139.0	13.37	17.06	90.8	115.8	23.39	27.81	94.9	112.8	93.5	113.8
1988:														
First quarter	2.60	4.07	107.2	167.9	13.72	18.84	93.1	127.9	24.71	29.18	100.3	118.4	97.9	121.5
Second quarter	1.66	3.39	68.5	139.8	13.28	13.64	90.1	92.6	22.86	24.27	92.7	98.5	91.9	96.5
Third quarter	2.29	4.20	94.4	173.2	13.99	15.27	95.0	103.7	23.17	28.19	94.0	114.4	94.3	110.9
Fourth quarter	1.90	3.43	78.4	141.5	12.11	16.66	82.2	113.1	24.09	30.48	97.7	123.7	92.6	120.2
Annual	2.00	3.72	82.5	153.4	13.39	15.62	90.9	106.0	23.58	28.14	95.7	114.2	94.1	111.5
1989:														
First quarter	1.88	3.31	77.5	136.5	12.60	19.70	85.5	133.7	20.13	29.84	81.7	121.1	82.9	125.2
Second quarter	2.10	2.64	86.6	108.9	14.05	17.49	95.4	118.7	22.22	26.84	90.2	108.9	91.9	112.1
Third quarter	2.01	2.76	82.9	113.8	13.24	16.40	89.9	111.3	23.40	29.36	94.0	119.1	93.3	116.6
Fourth quarter	2.04	4.39	84.1	181.1	15.10	14.76	102.5	100.2	22.25	29.01	90.3	117.7	94.3	112.0
Annual	2.01	3.20	82.9	132.0	13.56	16.67	92.0	113.2	22.17	28.66	89.9	116.3	90.6	115.3
1990:														
First quarter	1.84	3.41	76.0	140.6	13.87	17.84	94.2	121.1	22.67	26.92	92.0	109.2	93.0	113.1
Second quarter	2.26	3.25	93.4	133.9	15.73	17.44	106.8	118.4	22.43	29.63	91.0	120.2	96.2	119.6
Third quarter	1.91	3.27	78.9	134.7	15.12	17.29	102.7	117.4	23.12	26.62	93.8	108.0	96.7	111.1
Fourth quarter	1.85	3.06	76.2	126.4	15.59	19.17	105.8	130.1	24.69	30.99	100.2	125.7	102.0	127.2
Annual	1.98	3.27	81.6	134.9	14.50	17.43	98.5	118.3	23.20	27.84	94.1	113.0	95.5	114.7
1991:														
First quarter	1.90	2.68	78.4	110.5	15.08	16.87	102.4	114.5	26.11	29.96	105.9	121.5	104.8	119.2
Second quarter	1.96	2.68	81.0	110.7	15.41	16.85	104.6	114.4	25.49	27.25	103.4	110.6	103.8	111.8
Third quarter	2.06	3.11	84.9	128.2	17.26	17.36	117.2	117.8	22.63	26.83	91.8	108.8	100.1	111.8
Fourth quarter	1.99	3.16	82.3	130.2	16.90	17.34	114.7	117.7	23.21	26.77	94.2	108.6	100.9	111.6
Annual	1.98	2.89	81.6	119.2	16.02	17.08	108.8	115.9	24.51	27.63	99.4	112.1	102.5	113.4
1992:														
First quarter	1.80	2.68	74.2	110.7	14.82	19.92	100.6	135.2	24.15	27.51	98.0	111.6	98.8	119.3
Second quarter	2.15	2.58	88.6	106.4	16.84	20.70	114.3	140.5	23.75	26.70	96.4	108.3	102.3	118.9
Third quarter	1.52	3.82	62.8	157.6	15.22	21.24	103.3	144.1	22.19	25.37	90.0	102.9	94.4	116.5
Fourth quarter	1.67	2.61	68.8	107.6	17.20	18.83	116.8	127.8	25.07	26.07	101.7	105.8	106.7	113.0
Annual	1.88	2.91	77.7	120.2	15.97	19.99	108.4	135.7	23.97	26.38	97.3	107.0	100.9	116.4
1993:														
First quarter	2.13	4.63	88.0	190.9	16.79	20.87	114.0	141.7	24.67	26.61	100.1	108.0	104.7	119.0
Second quarter	2.44	3.44	100.6	141.9	17.28	19.74	117.3	134.0	24.69	24.00	100.2	97.4	105.8	109.4
Third quarter	2.01	3.70	83.0	152.5	17.97	17.00	122.0	115.4	28.61	29.90	116.1	121.3	118.0	119.3
Fourth quarter	2.11	3.15	86.9	129.7	21.91	20.91	148.7	141.9	26.42	29.20	107.1	118.5	120.8	126.1
Annual	2.16	3.57	89.2	147.3	18.41	19.50	124.9	132.3	25.86	27.20	104.9	110.4	111.5	117.6
1994:														
First quarter	2.01	4.38	82.9	180.8	19.82	19.32	134.5	131.1	24.39	30.58	98.9	124.1	110.6	126.4
Second quarter	2.12	2.79	87.3	115.0	21.63	21.79	146.8	147.9	26.42	30.21	107.2	122.6	120.2	130.9
Third quarter	2.66	3.81	109.6	157.3	18.95	24.25	128.6	164.6	29.11	32.46	118.1	131.7	121.6	142.5
Fourth quarter														
Annual														

[1] Base for composite index, 1987, involves 210,078,000 cubic yards of roadway excavation, 30,893,690 square yards of portland cement concrete surfacing with an average thickness of 9 inches, 37,760,443 tons of bituminous concrete surfacing, 577,753,544 pounds of reinforcing steel for structures, 444,924,141 pounds of structural steel and 3,498,333 cubic yards of structural concrete.

CONSTRUCTION RURAL AND URBAN

Structural reinforcing steel				Structural steel				Structural concrete				Structures		Composite		
Average contract price (lb.)		Index		Average contract price (lb.)		Index		Average contract price (cu. yd.)		Index		Index		Index		Ratio of urban prices to rural prices
Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	
(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)	(29)	(30)	(31)	(32)
.178	.182	40.4	41.3	.333	.346	37.6	39.1	100.68	99.66	41.8	41.4	40.5	40.8	36.9	43.0	1.17
.204	.208	46.3	47.2	.391	.355	44.2	40.1	111.48	112.07	46.3	46.5	45.7	45.0	40.8	46.8	1.15
.339	.340	76.9	77.1	.508	.573	57.4	64.7	138.76	135.35	57.6	56.2	60.9	62.0	54.7	64.8	1.18
.287	.307	65.1	65.1	.523	.582	59.1	65.8	135.00	143.27	56.1	59.5	58.4	62.1	54.9	65.2	1.19
.269	.248	61.0	56.3	.478	.488	54.0	55.1	141.20	138.08	58.6	57.3	57.8	56.6	54.4	61.8	1.14
.274	.270	62.2	61.3	.523	.517	59.1	58.4	145.33	141.68	60.3	58.8	60.3	59.1	57.9	65.4	1.13
.323	.309	73.3	70.1	.586	.615	66.2	69.5	173.49	171.30	72.0	71.1	70.7	70.5	67.5	75.9	1.12
.416	.425	94.4	96.4	.768	.753	86.8	85.1	219.07	205.25	91.0	85.2	90.4	87.1	82.5	94.0	1.14
.463	.498	105.1	113.0	.777	1.012	87.8	114.3	241.38	217.76	100.2	90.4	97.8	100.6	93.1	104.6	1.12
.440	.436	99.8	98.9	.773	.800	87.3	90.4	254.71	216.49	105.8	89.9	99.9	91.6	92.9	98.1	1.06
.414	.403	93.9	91.4	.705	.778	79.7	87.9	237.52	210.03	98.6	87.2	92.8	88.1	87.0	92.1	1.06
.391	.402	88.7	91.2	.672	.731	75.9	82.6	217.00	211.84	90.1	88.0	86.1	87.1	84.7	94.5	1.11
.408	.409	92.6	92.8	.667	.724	75.4	81.8	226.17	213.60	93.9	88.7	88.8	87.6	89.4	100.6	1.13
.441	.446	100.1	101.2	.794	.797	89.7	90.1	240.45	245.36	99.8	101.9	97.2	98.6	97.1	112.0	1.15
.448	.440	101.7	99.8	.832	.856	94.0	96.7	260.72	228.50	108.3	94.9	103.4	96.2	97.1	110.7	1.14
.456	.436	103.5	98.9	.848	.900	95.8	101.7	258.21	234.95	107.2	97.6	103.6	98.9	95.7	111.0	1.16
.504	.506	114.4	114.8	.854	.912	96.5	103.0	267.91	305.3	111.2	126.8	107.9	118.5	103.7	127.1	1.23
.465	.479	105.5	108.7	.819	.896	92.5	101.2	280.19	251.10	116.3	104.3	108.2	104.2	95.6	106.4	1.11
.494	.502	112.1	113.9	1.041	.959	117.6	108.4	260.29	290.42	108.1	120.6	111.3	116.2	101.8	122.6	1.20
.462	.500	104.8	113.5	.873	.962	98.6	108.7	241.95	265.48	100.5	110.2	100.7	110.4	94.1	119.1	1.27
.481	.498	109.1	113.0	.890	.932	100.6	105.3	262.23	278.33	108.9	115.6	106.7	112.4	97.9	118.2	1.21
.495	.636	112.3	144.3	1.050	1.107	118.6	125 1	252.03	331.02	104.7	137.5	109.7	135.4	93.9	131.4	1.40
.472	.513	107.1	116.4	.943	1.035	106.6	116.9	246.59	270.68	102.4	112.4	104.3	114.3	96.5	112.6	1.17
.518	.672	117.5	152.5	1.034	.913	116.8	103.2	315.75	290.48	131.1	120.6	125.0	121.4	105.7	118.3	1.12
.484	.485	109.8	110.0	.954	1.094	107.8	123.6	257.17	257.55	106.8	106.9	107.6	111.9	98.6	122.3	1.24
.495	.576	112.3	130.7	.994	1.026	112.3	115.9	273.78	286.88	113.7	119.1	113.1	120.3	99.4	120.0	1.21
.630	.580	142.8	132.1	.957	1.05	108.1	118.3	288.19	291.75	119.7	121.1	120.6	122.3	102.5	121.3	1.18
.510	.510	115.6	116.0	.963	.94	108.8	106.4	270.57	289.52	112.4	120.2	112.0	115.9	102.7	120.1	1.17
.731	.480	165.9	107.8	.886	1.01	100.1	113.6	348.94	278.95	144.9	115.8	136.6	113.9	111.6	115.9	1.04
.471	.482	106.9	108.2	.926	1.16	104.6	131.3	266.09	265.18	110.5	110.1	108.3	115.4	100.9	121.9	1.21
.580	.510	131.6	115.7	.934	1.04	105.6	117.5	297.22	281.33	123.4	116.8	120.1	116.8	104.3	118.7	1.14
.535	.570	121.4	129.2	.878	1.28	99.2	145.1	329.63	277.44	136.9	115.2	124.3	125.5	109.4	120.7	1.10
.526	.520	119.3	118.9	.945	1.15	106.8	130.1	284.01	300.90	117.9	124.9	115.2	125.3	105.4	117.6	1.12
.465	.530	105.4	120.7	.938	0.97	106.0	109.6	263.41	272.36	109.4	113.1	107.8	113.5	101.2	115.0	1.14
.458	.450	103.9	102.1	.975	0.90	110.2	102.2	238.68	214.41	99.1	89.0	102.9	94.7	99.0	107.0	1.08
.492	.510	111.5	115.7	.939	1.06	106.1	119.8	276.49	259.65	114.8	107.8	111.9	112.3	103.5	113.8	1.10
.476	.470	107.9	105.9	.818	.88	92.5	99.9	263.93	251.50	109.6	104.4	104.8	103.5	97.8	111.1	1.14
.492	.480	111.5	108.5	.901	1.13	101.8	128.0	283.98	308.26	117.9	128.0	112.6	124.7	104.8	119.6	1.14
.479	.610	108.6	139.3	.951	.84	107.5	94.6	274.70	206.43	114.1	85.7	111.4	97.2	97.1	114.2	1.18
.481	.490	109.2	110.3	.846	.93	95.6	105.4	296.98	287.45	123.3	119.4	113.6	114.1	104.0	112.7	1.08
.482	.530	109.5	120.9	.879	.94	99.3	106.0	281.19	250.79	116.8	104.1	110.9	107.5	101.8	113.1	1.11
.463	.470	105.1	105.6	1.064	.91	120.3	102.3	258.75	277.38	107.4	115.2	110.4	110.2	104.7	125.9	1.20
.493	.487	112.0	110.4	.767	.91	86.7	102.6	290.54	272.45	120.6	113.1	110.2	109.9	107.0	114.5	1.07
.512	.419	116.2	94.9	.845	.811	95.5	91.6	260.47	241.25	108.2	100.2	106.2	97.0	107.5	114.5	1.07
.495	.445	112.2	101.0	.869	.827	98.1	93.4	243.44	263.90	101.0	109.6	102.2	103.9	107.5	116.8	1.08
.492	.453	111.6	102.7	.859	.863	97.1	97.5	259.52	263.29	107.7	109.3	105.6	105.0	105.5	116.5	1.10
.493	.542	111.9	122.9	.860	.729	97.1	82.3	262.58	277.11	109.0	115.1	106.4	107.8	104.6	126.4	1.21
.518	.520	117.6	118.0	.738	.795	83.4	89.8	276.15	252.40	114.7	104.8	106.9	103.1	109.4	116.3	1.06
.483	.494	109.6	112.1	.961	.829	108.6	93.6	303.10	273.70	125.9	113.6	118.5	108.1	118.4	129.6	1.09

[2] Starting with 1972, prices for portland cement concrete surfacing reflect adjustments to a standard 9″ thickness in each State. Prices do not include costs for reinforcing steel and joints.

PRICE TRENDS FOR FEDERAL-AID HIGHWAY CONSTRUCTION

1987 Base [1]

THREE-QUARTER MOVING INDEX

Year	Common excavation		Surfacing					Structures							Composite index
			Portland cement concrete [2]		Bituminous concrete		Surfacing index	Reinforcing steel		Structural steel		Structural concrete		Structures index	
	Average contract price (cu. yd.)	Index	Average contract price (sq. yd.)	Index	Average contract price (ton)	Index		Average contract price (lb.)	Index	Average contract price (lb.)	Index	Average contract price (cu. yd.)	Index		
1986:															
First quarter	2.27	93.6	14.88	101.0	27.62	112.1	108.4	.439	99.6	.826	93.3	241.12	100.1	98.2	101.7
Second quarter	2.33	96.1	15.32	104.0	27.01	109.6	107.7	.440	99.8	.852	96.3	238.71	99.1	98.5	101.9
Third quarter	2.29	94.4	15.62	106.0	25.90	105.1	105.4	.443	100.5	.843	95.3	233.02	96.8	97.0	100.1
Fourth quarter	2.31	95.3	15.84	107.5	25.70	104.3	105.3	.440	99.8	.855	96.6	232.34	96.5	97.1	100.2
1987:															
First quarter	2.34	96.5	15.08	102.4	24.07	97.7	99.2	.448	101.7	.876	99.0	231.23	96.0	97.8	98.2
Second quarter	2.42	99.8	14.38	97.6	24.77	100.5	99.6	.442	100.3	.885	100.0	241.06	100.1	100.1	99.8
Third quarter	2.44	100.6	14.88	101.0	24.65	100.0	100.3	.442	100.3	.888	100.3	240.66	99.9	100.1	100.3
Fourth quarter	2.59	106.8	15.20	103.2	25.44	103.2	103.2	.451	102.3	.877	99.1	258.33	107.3	104.3	104.2
1988:															
First quarter	2.54	104.8	14.80	100.5	24.32	98.7	99.3	.465	105.5	.888	100.3	263.19	109.3	106.3	103.2
Second quarter	2.77	114.2	14.32	97.2	24.41	99.0	98.4	.494	112.1	.913	103.2	280.61	116.5	112.2	106.9
Third quarter	2.62	108.1	14.12	95.9	24.63	99.9	98.6	.491	111.4	.930	105.1	268.37	111.4	109.8	104.9
Fourth quarter	2.56	105.6	14.81	100.5	24.83	100.7	100.7	.534	121.2	.989	111.7	283.00	117.5	116.6	108.4
1989:															
First quarter	2.43	100.2	15.15	102.8	24.44	99.2	100.4	.537	121.8	.998	112.8	278.31	115.6	115.9	107.2
Second quarter	2.30	94.9	15.26	103.6	24.00	97.4	99.4	.582	132.1	1.001	113.1	293.31	121.8	121.3	108.3
Third quarter	2.39	98.6	15.00	101.8	24.33	98.7	99.7	.534	121.2	1.003	113.3	273.54	113.6	114.8	106.2
Fourth quarter	2.68	110.6	16.20	110.0	24.73	100.3	103.5	.557	126.4	1.004	113.4	280.61	116.5	117.4	110.7
1990:															
First quarter	2.72	112.3	15.74	106.8	24.13	97.9	100.8	.514	116.7	1.021	115.4	271.63	112.8	114.1	108.4
Second quarter	2.45	100.9	15.65	106.2	24.06	97.6	100.5	.546	123.8	0.978	110.5	291.44	121.0	118.7	108.5
Third quarter	2.34	96.5	16.14	109.5	24.54	99.6	102.8	.512	116.2	1.007	113.8	284.02	117.9	116.6	107.9
Fourth quarter	2.24	92.3	16.24	110.2	25.88	105.0	106.7	.532	120.7	1.076	121.6	292.29	121.4	121.3	111.0
1991:															
First quarter	2.22	91.6	16.28	110.5	26.51	107.6	108.5	.522	118.4	1.127	127.3	289.85	120.4	121.9	111.9
Second quarter	2.30	94.7	16.42	111.5	25.79	104.7	106.9	.529	120.0	1.074	121.4	287.56	119.4	120.0	110.8
Third quarter	2.35	96.8	16.84	114.3	24.94	101.2	105.5	.491	111.5	.994	112.3	255.91	106.3	108.8	105.6
Fourth quarter	2.32	95.7	17.18	116.7	24.54	99.6	105.2	.475	107.7	.919	103.9	244.71	101.6	103.2	102.9
1992:															
First quarter	2.27	93.5	17.55	119.2	24.71	100.3	106.5	.468	106.3	.933	105.5	253.65	105.3	105.5	104.1
Second quarter	2.23	91.9	17.70	120.2	24.32	98.7	105.7	.528	119.8	.922	104.2	251.80	104.6	107.1	104.2
Third quarter	2.22	91.6	18.05	122.5	24.54	99.6	107.1	.533	120.8	.934	105.5	260.89	108.3	109.7	105.9
Fourth quarter	2.30	94.8	18.07	122.6	24.71	100.2	107.6	.538	122.0	.908	102.6	249.85	103.8	106.5	105.2
93:															
First quarter	2.29	94.3	18.20	123.6	24.96	101.3	108.6	.480	108.9	.894	111.0	280.93	116.7	111.2	107.6
Second quarter	2.56	105.4	18.09	122.8	25.82	104.8	110.7	.468	106.1	.867	98.0	265.21	110.1	106.2	107.9
Third quarter	2.47	102.1	19.00	129.0	26.61	107.9	114.9	.468	106.1	.841	95.1	259.28	107.6	104.1	108.1
Fourth quarter	2.55	105.1	19.43	131.9	27.28	110.7	117.6	.483	109.5	.812	91.7	257.48	106.9	103.4	109.5
4:															
rst quarter	2.57	106.2	20.69	140.4	27.01	109.6	119.7	.501	113.7	.795	89.8	261.19	108.4	104.4	110.9
cond quarter	2.80	115.5	20.58	139.7	27.95	113.4	122.0	.515	116.9	.797	90.0	268.38	111.4	106.7	114.3
ird quarter															
arth quarter															

Base for composite index, 1987, involves 210,078,000 cubic yards of roadway excavation, 30,893,690 square yards of portland cement concrete surfacing with an average thick- 9 inches, 37,760,443 tons of bituminous concrete surfacing, 577,753,544 pounds of reinforcing steel for structures, 444,924,141 pounds of structural steel and 3,498,333 cubic f structural concrete.

ANNUAL PRICE TRENDS FOR FEDERAL-AID HIGHWAY CONSTRUCTION-1987 Base [1]

Year: 1993

Composite Index

Region	State	*1984*	*1985*	*1986*	*1987*	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*
1	Connecticut	62.1	69.4	125.2	100.0	85.9	81.8	96.9	79.02	64.67	81.27
	Maine	90.6	101.3	107.7	100.0	96.2	105.1	95.4	96.47	97.87	96.03
	Massachusetts	45.0	49.2	48.2	100.0	109.5	85.5	68.4	75.3	60.24	50.97
	New Hampshire	99.7	105.0	101.5	100.0	107.8	114.9	130.1	112.30	103.52	114.46
	New Jersey	54.9	62.9	81.7	100.0	90.5	88.0	73.7	80.99	67.80	81.27
	New York	96.7	88.1	101.1	100.0	117.2	136.2	109.3	159.55	97.45	95.95
	Rhode Island	61.6	86.3	81.3	100.0	116.3	100.9	88.9	130.02	71.47	84.96
	Vermont	74.6	99.2	90.5	100.0	92.6	142.1	127.6	97.60	83.76	95.24
	Puerto Rico	73.8	69.6	72.1	100.0	96.4	103.9	97.8	91.26	81.96	89.70
3	Delaware	112.5	153.5	140.2	100.0	129.6	540.2	123.1	126.36	107.57	120.42
	District of Columbia	59.3	85.9	82.6	100.0	102.7	96.1	91.5	67.54	81.16	69.50
	Maryland	70.8	82.8	84.9	100.0	89.9	97.3	108.8	81.87	76.47	74.42
	Pennsylvania	76.4	98.3	88.2	100.0	109.6	93.7	100.1	102.98	96.79	93.99
	Virginia	74.1	85.1	87.1	100.0	103.1	104.4	100.1	104.46	97.13	99.48
	West Virginia	81.1	98.8	82.6	100.0	90.6	95.8	119.2	78.47	77.65	84.87
4	Alabama	88.1	99.3	95.2	100.0	88.5	98.1	94.9	113.31	91.36	95.41
	Florida	82.4	87.9	99.0	100.0	104.9	100.9	95.4	93.44	98.69	83.54
	Georgia	96.6	111.8	106.1	100.0	98.8	96.2	112.9	101.76	111.49	110.18
	Kentucky	86.2	98.4	95.1	100.0	96.3	111.5	118.4	106.43	96.44	143.79
	Mississippi	88.3	105.8	96.1	100.0	94.4	125.0	112.1	118.02	107.79	112.75
	North Carolina	89.6	104.0	108.7	100.0	104.2	102.3	103.8	105.66	90.75	107.94
	South Carolina	89.3	97.4	90.0	100.0	114.2	84.2	105.7	97.39	95.94	100.22
	Tennessee	84.2	95.5	99.9	100.0	95.3	101.7	102.8	108.06	118.70	109.82
5	Illinois	88.8	96.8	100.4	100.0	99.1	98.3	105.6	103.06	105.13	107.32
	Indiana	106.3	111.3	105.6	100.0	103.9	105.9	106.1	112.12	109.83	116.06
	Michigan	100.0	113.2	120.5	100.0	125.8	114.0	128.0	128 12	138.39	144.65
	Minnesota	96.0	94.3	103.4	100.0	101.7	104.9	99.6	101.28	119.39	94.26
	Ohio	89.6	86.5	88.6	100.0	114.9	104.6	131.3	117.56	147.57	86.33
	Wisconsin	106.1	109.8	98.0	100.0	103.1	100.9	95.4	116.65	118.91	121.78
6	Arkansas	99.2	110.2	104.9	100.0	92.9	93.7	104.2	96.37	99.78	96.82
	Louisiana	100.3	102.7	110.3	100.0	108.0	113.0	121.2	106.25	118.53	130.12
	New Mexico	105.1	104.0	105.2	100.0	87.6	87.5	85.9	97.77	105.15	94.97
	Oklahoma	98.2	104.8	97.0	100.0	93.4	94.3	118.3	120.21	103.41	109.56
	Texas	93.5	101.0	114.6	100.0	92.6	96.8	85.3	83.08	103.53	102.82
7	Iowa	101.6	97.8	103.3	100.0	100.1	98.8	108.6	119.93	119.58	120.56
	Kansas	94.6	106.0	103.5	100.0	106.0	100.1	76.2	83.24	78.65	94.70
	Missouri	110.1	116.2	111.4	100.0	98.1	104.2	108.4	100.53	108.39	109.75
	Nebraska	113.1	113.0	105.1	100.0	110.9	107.8	122.4	137.10	122.60	130.46
8	Colorado	119.1	114.8	104.6	100.0	106.7	105.1	103.8	110.15	114.36	114.12
	Montana	140.5	129.0	114.0	100.0	131.6	112.1	100.0	138.06	125.20	148.35
	North Dakota	101.7	109.4	96.9	100.0	127.2	81.0	98.8	111.80	109.54	195.91
	South Dakota	116.3	126.9	117.5	100.0	99.2	105.8	111.1	106.99	95.39	110.30
	Utah	106.4	104.2	108.2	100.0	113.0	114.3	147.4	127.80	125.71	147.46
	Wyoming	123.3	139.1	110.0	100.0	95.6	92.4	116.9	132.79	133.62	111.92
9	Arizona	85.4	93.8	91.0	100.0	86.0	85.5	131.2	90.67	101.16	111.40
	California	92.3	91.7	97.1	100.0	105.5	114.5	110.7	101.31	120.79	99.32
	Hawaii	115.5	104.8	135.5	100.0	131.7	107.7	74.5	99.83	43.86	79.10
	Nevada	98.7	95.4	94.1	100.0	100.4	117.6	111.6	123.69	130.36	123.18
10	Alaska	146.8	109.7	99.0	100.0	0.0	94.8	99.2	152.22	133.28	108.67
	Idaho	104.3	99.8	82.3	100.0	91.3	95.8	191.3	114.55	99.79	106.52
	Oregon	100.3	105.0	114.8	100.0	118.6	122.2	129.4	128.98	120.15	111.49
	Washington	96.0	116.7	109.9	100.0	130.1	113.0	139.3	143.81	147.76	127.29
	UNITED STATES	92.6	102.0	101.1	100.0	106.6	107.7	108.5	107.49	105.12	108.33

[1] Indices are based on information submitted for Federal-aid construction contracts over $500,000. In some instances, individual State indices may not be truly representative of long-term price trends because of comparatively low volumes of work for the period reported, or because of unusual projects awarded during the period. Also, differences in bid item specifications among the States might account for some of the differences in unit prices in the various States.

The base for each State index is its own particular ''market basket'' of quantities and costs during the base period. The composite index for each State measures the change in that State's index since base year 1987. (In 1987 each State's index equalled 100.)

In Texas, and nationally, new industries are emerging as global competition forces the reorganization of established industries and trade patterns. As the economy continues to change, transportation services and facilities will transform to meet new needs. The role of the TxDOT will be to track these changes and shape the transportation system to meet changing needs. However, today's constraints will remain, making adaptation of existing infrastructure to new needs crucial.

Stabilization of the economy is a priority in Texas so that the impacts of industry specific downturns can be mitigated. The effects of industrial crises, such as the decline of petroleum in the 1980s, can be better avoided by diversifying the state's economy. This has been happening throughout the state in recent years, but still more opportunities exist. Increased investment in value–added production and foreign trade will have implications for the transportation system, that must adapt to meet new needs. It will be particularly important to ensure adequate access to the state's freight system and borders so that competition in the global economy may be fruitful.

Future infrastructure decisions will involve a more complicated process that considers many issues, including the following economic factors:

1. Declining importance of petroleum and agricultural exports

Traditionally, the economy of Texas was resource–based, concentrated in cattle, cotton, and oil, earning most of its income from the export of raw agricultural and petroleum products. However, the economy changed substantially during the past two decades. For example, the contribution of oil and gas to the economy declined in importance from 26 percent of the state's total economy to less than 12 percent. Similar trends have struck the agriculture industry. Although agricultural productivity has not declined, there is increased pressure to add value and capture the local and export market by processing yields within Texas. Emerging industries associated with agricultural processing will utilize all modes of transportation, depending upon the specific product and process.

2. Emergence of a service and trade economy

Another factor in the statewide shift away from an economy based upon natural resources and heavy manufacturing is the national emergence of a service and trade economy. Growth in services, trade, and government is

projected to continue through 2014, at which time over 30 percent of non–agricultural employment in Texas will be in the service sector and 23 percent in the trade sector. These growth sectors have significantly different transportation needs than those of traditional Texas industries. The service sector requires rapid movement of people, information, and high value goods and will therefore create a strong demand for air travel and telecommunications access.

3. Growth in international trade

The North American Free Trade Agreement is expected to result in a steady increase in the demand for Texas services and products. It also positions Texas as a major cross–roads for North American and hemispheric trade, giving the state the opportunity to become an international warehousing and distribution center. Associated demands will change travel patterns on the Texas transportation network, particularly along major north–south corridors, such as Interstate 35. These demands will primarily involve motorized and rail freight.

APPENDIX D: GLOSSARY OF ACRONYMS

Acronym	Definition
AASHTO	American Association of Highway and Transportation Officials
BMS	Bridge Management System
CMS	Congestion Management System
DOT	Department of Transportation
DPS	Department of Public Safety
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
GIS	Geographic Information Systems
GIWW	Gulf Intracoastal Waterway
HOV	High Occupancy Vehicle
IMS	Intermodal Management System
ISTEA	Intermodal Surface Transportation Efficiency Act
ITS	Intelligent Transportation Systems
MIS	Major Investment Studies
MPO	Metropolitan Planning Organization
MTS	Multimodal Transportation System
NAFTA	North American Free Trade Agreement
NEPA	National Environmental Policy Act

APPENDIX D: GLOSSARY OF ACRONYMS

Acronym	Definition
PMS	Pavement Management System
PTMS	Public Transportation Management System
RI	Road Inventory
SIP	State Implementation Plan
SMS	Highway Safety Management System
STIP	State Transportation Improvement Program
TCM	Transportation Control Measures
TIP	Transportation Improvement Programs
TMA	Transportation Management Area
TNRCC	Texas Natural Resources Conservation Commission
TRC	Texas Railroad Commission
TSM	Transportation System Management
TTA	Texas Turnpike Authority
TTC	Texas Transportation Commission
TxDOT	Texas Department of Transportation
VMT	Vehicle Miles Travelled
WASHTO	Western States Association of Highway and Transportation Officials
ZEV	Zero Emission Vehicles

APPENDIX E

SUMMARY OF TEXAS METROPOLITAN PLANNING ORGANIZATION DRAFT PLANS

Major Issues and Initiatives

Metropolitan Planning Organization	Major Issues	Key Initiatives
Abilene	·Roadway and bridge preservation and maintenance ·Transportation related historic preservation,and aesthetic improvements ·Nonmotorized mobility	·Transportation system management (turn lanes, signalization, ramp upgrades, one way streets, signage) ·Additional general purpose lanes ·Nonmotorized supporting infrastructure (pedestrian paths and 40.9 miles of bikeways)
Amarillo	*Plan unavailable at time of publication*	
Austin	·Promotion of alternative transportation modes ·Financial and air quality constraints on construction ·Historic and projected population and employment growth cannot be absorbed by current system ·Air quality (stay in attainment) ·Roadway congestion	·Light rail system ·Transportation demand management (ridesharing, parking management, alternative work hours, and telecommuting) ·Nonmotorized supporting infrastructure (bikeways and pedestrian paths) ·Transit supportive/dense land use policies ·Transportation system management (signal synchronization, one way streets, high occupancy vehicle lanes) ·Intelligent transportation systems
Beaumont-Port Arthur·	*Plan unavailable at time of publication*	
Brownsville	*Plan unavailable at time of publication*	
Bryan-College Station	·Roadway conditions ·Urban and suburban growth ·Roadway congestion	·Roadway preservation, maintenance, expansion and construction (primarily capacity expansion)
Corpus Christi	*Plan unavailable at time of publication*	

SUMMARY OF TEXAS METROPOLITAN PLANNING ORGANIZATION DRAFT PLANS

Major Issues and Initiatives

Metropolitan Planning Organization	Major Issues	Key Initiatives
Dallas-Fort Worth	·Inadequate finances to meet needs ·Air quality nonattainment ·Roadway congestion ·Population and employment growth in excess of transportation system capacity	·Transportation system management (44 miles of high occupancy vehicle lanes, 5,600 traffic signal improvements, 1,700 intersection improvements, 330 miles of incident detection/response) ·Transportation demand management (1,000 vanpools, 20 park and ride facilities, employer trip reduction program) ·Regional passenger rail (20 miles of light rail and 34 miles of commuter rail) ·Nonmotorized supporting infrastructure ·Preservation, maintenance, expansion and construction (410 miles of new freeway)
El Paso	·U.S.- Mexico border congestion ·Roadway congestion	·Transportation system management (500 new signals, signal synchronization, turn lanes, intersection improvements) ·Nonmotorized supporting infrastructure (253 miles of new bikeways) ·Transportation demand management (park-and-ride lots) ·Roadway preservation, maintenance, expansion, and construction
Harlingen - San Benito	• Roadway congestion • Non motorized mobility	• Roadway preservation, maintenance, expansion, and construction (160 miles of improvements and expansion, 2 new bridges, and 13 intersection improvements).

SUMMARY OF TEXAS METROPOLITAN PLANNING ORGANIZATION DRAFT PLANS
Major Issues and Initiatives

Metropolitan Planning Organization	Major Issues	Key Initiatives
		·Nonmotorized supporting infrastructure (50 miles of bikeways and sidewalks). ·Transportation system management (turn lanes, removal of some on-street parking, intersection improvements, and channelization).
Hidalgo County	*Plan unavailable at time of publication*	
Houston-Galveston area	·Inadequate finances to meet needs ·Air quality nonattainment ·Roadway congestion ·Population and employment growth in excess of transportation system capacity	·Roadway construction, expansion, preservation, and maintenance (up to 350 miles of new freeway/tollway) ·Transportation Demand Management (ridesharing, parking management, funding for 50 vanpools) ·Transportation System Management (construct 1 new high occupancy vehicle lane, 6,600 additional park and ride spaces, 4 new park and ride lots, 185 additional peak-hour buses) ·Nonmotorized supporting infrastructure (1,035 miles of new bikeways)
Killeen and Temple	·Roadway congestion	·Roadway construction, expansion, preservation, and maintenance (widening and extensions) ·Nonmotorized supporting infrastructure(extension of bikeways)
Laredo	*Plan unavailable at time of publication*	

SUMMARY OF TEXAS METROPOLITAN PLANNING ORGANIZATION DRAFT PLANS

Major Issues and Initiatives

Metropolitan Planning Organization	Major Issues	Key Initiatives
Longview	·Roadway congestion	·Roadway construction and expansion (widenings and realignments) ·Transportation System Management (signal improvements, turn lanes, signage, realignments) ·Nonmotorized supporting infrastructure (proposed bikeways and pedestrian trails)
Lubbock	·Roadway congestion	·Nonmotorized supporting infrastructure ·Roadway expansion, construction, preservation, and maintenance
Midland-Odessa	*Plan unavailable at time of publication*	
San Angelo	·Roadway congestion ·Population and employment growth in excess of transportation system capacity	·Roadway construction, expansion, preservation, and maintenance (widenings, bridge repairs, right of way acquisition, realignments, new construction) ·Nonmotorized supporting infrastructure
San Antonio	·Right of way preservation ·Roadway congestion ·Tourism	·Roadway construction, expansion, preservation, and maintenance ·Transportation System Management (park and ride lots) ·Transportation Demand Management (tourist shuttle)
Sherman-Denison	·Roadway congestion	·Roadway construction, expansion, preservation, and maintenance

SUMMARY OF TEXAS METROPOLITAN PLANNING ORGANIZATION DRAFT PLANS
Major Issues and Initiatives

Metropolitan Planning Organization	Major Issues	Key Initiatives
Texarkana	·Roadway congestion	·Nonmotorized supporting infrastructure (construct bikeway) ·Transportation system management (signalization) ·Roadway construction, expansion, preservation, and maintenance (over 50 miles of rehabilitation, safety projects, new construction, bridge replacements) ·Transportation demand management
Tyler	·Roadway congestion ·Roadway conditions	·Transportation System Management ·Roadway preservation, maintenance, construction, and expansion
Victoria	·Roadway congestion ·Air quality nonattainment	·Roadway preservation, maintenance, construction, and expansion (route upgrades and extensions, bridge and roadway rehabilitation) ·Transportation System Management (signal and interchange improvements)
Waco	·Roadway congestion	·Roadway capacity expansion ·Transportation System Management (signalization, turn lanes, intersection improvements)
Wichita Falls	·Roadway congestion ·Right of way preservation ·Roadway safety	·Preservation, maintenance, expansion, and construction ·Roadway construction, expansion, preservation, and maintenance

SUMMARY OF TEXAS METROPOLITAN PLANNING ORGANIZATION DRAFT PLANS

Major Issues and Initiatives

Metropolitan Planning Organization	Major Issues	Key Initiatives
		·Transportation System Management (turn lanes, signal and intersection improvements) ·Installation of safety equipment (break-away poles and sign posts) ·Nonmotorized supporting infrastructure (construct/stripe bike lanes)

Notes: · *Plan unavailable at time of publication* as of 11/4/94.
· Above documentation reflects content of draft plans that are subject to policy and program revisions.

Other issues noted in the majority or all plans
· Overwhelming tendency to drive alone and related single occupant vehicle issues
· Historic and anticipated future demand for low density land use (transit unfriendly)
· Inadequate finances to meet transportation needs