

TECHNICAL REPORT STANDARD TITLE PAGE

| | | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|-----------|
| 1. Report No. UMTA/TX-90/2007-1F | | 2. Government Accession No. | | 3. Recipient's Catalog No. | |
| 4. Title and Subtitle Roles for Transit in Texas | | | | 5. Report Date November 1990 | |
| | | | | 6. Performing Organization Code | |
| 7. Author(s) R.W. Stokes and E.J. Washington | | | | 8. Performing Organization Report No. Technical Report 2007-1F | |
| 9. Performing Organization Name and Address Texas Transportation Institute Texas A&M University System College Station, Texas 77843-3135 | | | | 10. Work Unit No. | |
| | | | | 11. Contract or Grant No. Study No. 2-11-90-2007 | |
| 12. Sponsoring Agency Name and Address Texas State Department of Highways and Public Transportation Public Transportation Division 11th and Brazos Austin, Texas 78701 | | | | 13. Type of Report and Period Covered Final: September 1989 September 1990 | |
| | | | | 14. Sponsoring Agency Code | |
| 15. Supplementary Notes Research performed in cooperation with TX, UMTA. Research Study Title: Roles/Justification for Transit in Texas. | | | | | |
| 16. Abstract <p>This report describes three roles for transit in Texas. These roles are public transportation (services designed to serve transportation disadvantaged individuals), mass transportation (services for the rapid movement of large volumes of persons between fixed points of concentrated activity along high-density urban corridors), and internal circulation (services within large downtown areas, universities, airports, and major activity centers). This report also identifies some of the basic challenges facing the state's and nation's transit service providers. These include the need for increased efficiency through improved internal management practices, and greater cooperation and coordination between public transit and highway agencies and the private sector. Funding and cost control measures are clearly concerns shared by the state's and the nation's transit operators. The development of a broader conception of transit that permits more effective pursuit of diverse market opportunities also appears to be a vital concern of the entire transit industry. General topical areas where the Public Transportation Division may wish to clarify and refine its roles and functions are also outlined. These areas include transit funding, the administration of federal and state transit programs, technical assistance and training programs, transit planning, and improved communication and coordination between local, state, and federal transit agencies.</p> | | | | | |
| 17. Key Words Public Transportation, Mass Transportation, Internal Circulation, Transit, Transit Planning, Transit Trends, Transit Policy, Transit Issues | | | 18. Distribution Statement No restrictions. This document is available to the public through the National Technical Information Service 5285 Port Royal Road Springfield, Virginia 22161 | | |
| 19. Security Classif. (of this report) Unclassified | | 20. Security Classif. (of this page) Unclassified | | 21. No. of Pages 51 | 22. Price |

ROLES FOR TRANSIT IN TEXAS

by

Robert W. Stokes

Associate Research Planner

and

Earl J. Washington

Assistant Research Planner

Technical Report 2007-1F

Study Number 2-11-90-2007

Roles/Justification for Transit in Texas

Sponsored by

Texas State Department of Highways and Public Transportation

in cooperation with

U.S. Department of Transportation

Urban Mass Transportation Administration

Texas Transportation Institute

The Texas A&M University System

College Station, Texas 77843

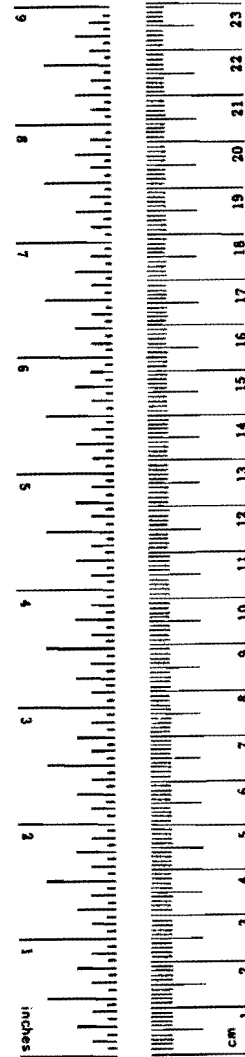
November 1990

This study was financed in part through a grant from the Urban Mass Transportation Administration, United States Department of Transportation Urban Mass Transportation Act of 1964, as amended.

METRIC (SI*) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

| Symbol | When You Know | Multiply By | To Find | Symbol |
|---------------|---------------|-------------|-------------|--------|
| LENGTH | | | | |
| in | inches | 2.54 | centimetres | cm |
| ft | feet | 0.3048 | metres | m |
| yd | yards | 0.914 | metres | m |
| mi | miles | 1.61 | kilometres | km |



| AREA | | | | |
|-----------------|---------------|--------|--------------------|-----------------|
| in ² | square inches | 645.2 | centimetressquared | cm ² |
| ft ² | square feet | 0.0929 | metres squared | m ² |
| yd ² | square yards | 0.836 | metres squared | m ² |
| mi ² | square miles | 2.59 | kilometres squared | km ² |
| ac | acres | 0.395 | hectares | ha |

| MASS (weight) | | | | |
|----------------------|----------------------|-------|-----------|----|
| oz | ounces | 28.35 | grams | g |
| lb | pounds | 0.454 | kilograms | kg |
| T | short tons (2000 lb) | 0.907 | megagrams | Mg |

| VOLUME | | | | |
|-----------------|--------------|--------|--------------|----------------|
| fl oz | fluid ounces | 29.57 | millilitres | mL |
| gal | gallons | 3.785 | litres | L |
| ft ³ | cubic feet | 0.0328 | metres cubed | m ³ |
| yd ³ | cubic yards | 0.0765 | metres cubed | m ³ |

NOTE: Volumes greater than 1000 L shall be shown in m³.

TEMPERATURE (exact)

| °F | Fahrenheit temperature | 5/9 (after subtracting 32) | Celsius temperature | °C |
|----|------------------------|----------------------------|---------------------|----|
|----|------------------------|----------------------------|---------------------|----|

APPROXIMATE CONVERSIONS TO SI UNITS

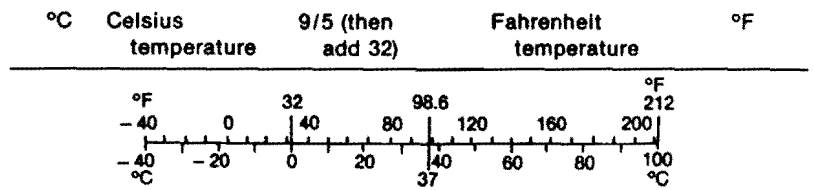
| Symbol | When You Know | Multiply By | To Find | Symbol |
|---------------|---------------|-------------|---------|--------|
| LENGTH | | | | |
| mm | millimetres | 0.039 | inches | in |
| m | metres | 3.28 | feet | ft |
| m | metres | 1.09 | yards | yd |
| km | kilometres | 0.621 | miles | mi |

| AREA | | | | |
|-----------------|-----------------------------------|--------|---------------|-----------------|
| mm ² | millimetres squared | 0.0016 | square inches | in ² |
| m ² | metres squared | 10.764 | square feet | ft ² |
| km ² | kilometres squared | 0.39 | square miles | mi ² |
| ha | hectares (10 000 m ²) | 2.53 | acres | ac |

| MASS (weight) | | | | |
|----------------------|----------------------|--------|------------|----|
| g | grams | 0.0353 | ounces | oz |
| kg | kilograms | 2.205 | pounds | lb |
| Mg | megagrams (1 000 kg) | 1.103 | short tons | T |

| VOLUME | | | | |
|----------------|--------------|--------|--------------|-----------------|
| mL | millilitres | 0.034 | fluid ounces | fl oz |
| L | litres | 0.264 | gallons | gal |
| m ³ | metres cubed | 35.315 | cubic feet | ft ³ |
| m ³ | metres cubed | 1.308 | cubic yards | yd ³ |

TEMPERATURE (exact)



These factors conform to the requirement of FHWA Order 5190.1A.

* SI is the symbol for the International System of Measurements

ABSTRACT

This report describes three roles for transit in Texas. These roles are public transportation (services designed to serve transportation disadvantaged individuals), mass transportation (services for the rapid movement of large volumes of persons between fixed points of concentrated activity along high-density urban corridors), and internal circulation (services within large downtown areas, universities, airports, and major activity centers). This report also identifies some of the basic challenges facing the state's and nation's transit service providers. These include the need for increased efficiency through improved internal management practices, and greater cooperation and coordination between public transit and highway agencies and the private sector. Funding and cost control measures are clearly concerns shared by the state's and the nation's transit operators. The development of a broader conception of transit that permits more effective pursuit of diverse market opportunities also appears to be a vital concern of the entire transit industry. General topical areas where the Public Transportation Division may wish to clarify and refine its roles and functions are also outlined. These areas include transit funding, the administration of federal and state transit programs, technical assistance and training programs, transit planning, and improved communication and coordination between local, state, and federal transit agencies.

Key Words:

Public Transportation, Mass Transportation, Internal Circulation, Transit, Transit Planning, Transit Trends, Transit Policy, Transit Issues.

IMPLEMENTATION STATEMENT

This study is intended to provide the Public Transportation Division (D-11) of the State Department of Highways and Public Transportation (SDHPT) with information concerning the appropriate transit roles for various travel markets, and the operational and economic characteristics of the modes and technologies available to serve those roles. The study also presents general recommendations concerning the role of D-11 in meeting the state's public transportation needs. The information in this report should be useful to state and local transit officials in developing a balanced transportation system that makes the best use of the advantages of all available transportation modes in meeting the state's transportation needs.

DISCLAIMER

The contents of this report reflect the views of the authors who are responsible for the opinions, findings, and conclusions presented herein. The contents do not necessarily reflect the official views or policies of the Texas State Department of Highways and Public Transportation or the Urban Mass Transportation Administration, U.S. Department of Transportation. This report does not constitute a standard, specification or regulation.

TABLE OF CONTENTS

| | <u>Page</u> |
|---------------------------------------------------|-------------|
| ABSTRACT | iii |
| IMPLEMENTATION STATEMENT | v |
| DISCLAIMER | v |
| | |
| I. INTRODUCTION | 1 |
| Background | 1 |
| Study Objectives | 3 |
| | |
| II. TRANSIT IN THE UNITED STATES | 5 |
| Recent Trends in Transit | 5 |
| Challenges Confronting the Transit Industry | 14 |
| Economic, Social, and Demographic Trends | 15 |
| Public Policy and Planning Practices | 17 |
| Management and Operations | 22 |
| | |
| III. TRANSIT IN TEXAS | 25 |
| Roles of Transit in Texas | 25 |
| Current Services | 29 |
| Planning for the Future of Transit in Texas | 36 |
| Current and Emerging Issues | 37 |
| Roles of the Public Transportation Division | 42 |
| | |
| IV. SUMMARY | 46 |
| | |
| REFERENCES | 49 |

CHAPTER I INTRODUCTION

Background

During the 1970's, the migration to the Sunbelt resulted in significant increases in the population of Texas. From 1970 to 1980, the metropolitan areas of Austin, Dallas-Fort Worth, El Paso, Houston, and San Antonio all grew by at least 20 percent, with some growing by nearly 50 percent. It is the expressed desire of the leaders in the state to continue to encourage growth and to realize the economic benefits that can be derived from that growth.

Texas now has three of the 10 largest cities in the United States, and those urban areas continue to gain population. The resulting demands on the transportation systems in these cities have become excessive. In these large urban areas, it is becoming apparent that, where people live, where they work, and what activities they choose to participate in are being influenced by the transportation system. News media reports tell of companies choosing not to locate or expand in Texas and citing traffic congestion as a major concern. And, while Houston is often singled out since it is the most congested of the Texas cities, the other cities are not far behind Houston in terms of congestion.

While the transportation problems of the state's major urban areas are well known, the transportation needs of rural and small urban areas have been receiving increased attention in recent years. State and local governments, human services agencies, and concerned citizens have implemented programs to address the mobility problems of the residents of rural and small urban areas. Many of these residents may be denied access to many essential services and activities as a result of the lack of adequate transportation services.

It is becoming increasingly evident that the economic and social vitality of the state will be closely tied to the quality of its transportation systems. The problems being faced today, however, cannot be solved simply by more streets and highways, nor can those problems be solved by only developing transit. The best use must be made of the advantages of all available transportation modes.

In order to take full advantage of transit in serving the state's transportation needs, it will be necessary to develop a better understanding of the different roles transit can serve. For example, the following have been suggested as the principal roles of transit:

- o Public Transportation - This form of transit primarily provides some level of mobility to persons who have no other means of transportation. Public transportation helps these persons reach important community destinations, such as employment, shopping, and medical facilities. As such, public transportation fulfills a social-welfare need.
- o Mass Transportation - The primary objective of mass transportation is to provide for the rapid movement of large volumes of persons to major activity centers (such as CBDs) in order to help service peak travel requirements within travel corridors. Mass transportation serves an economic need rather than the social need served by public transportation.
- o Internal Circulation - Within major activity centers where parking is often scarce or restricted, travel distances can become too lengthy to be served only by walking. Some form of transit service is necessary to serve an internal circulation function within these areas.

The combined effects of recent shifts from federal support of transit to greater local self-sufficiency, a deteriorating transportation infrastructure, increasing operating cost, and the need to expand transit services in growth areas have presented transit planners, managers, and operators with an enormous challenge. These transportation officials are

faced with the challenge of deciding which, and/or how much of each, role of transit should be developed, and in deciding the appropriate role(s) of state and local agencies in providing these services.

This study is intended to assist state and local decision-makers by providing them with information concerning the appropriate transit role(s) for various travel markets, and the operational and economic characteristics of the modes and technologies available to serve those roles.

Study Objectives

The primary objectives of this study are:

- 1) Identify and classify current roles of transit in Texas;
- 2) Identify the operational and economic characteristics of these roles; and
- 3) Document the results of the study in a format that will be useful to decision-makers in identifying effective transit services for the different travel markets within their communities.

Based on discussions with SDHPT personnel, these basic objectives were expanded to include an overview of the nation's and the state's public transportation systems, the identification of issues, barriers and opportunities facing these systems, and a preliminary identification of those topical areas where the Public Transportation Division (D-11) could play a role in meeting the state's public transportation needs.

CHAPTER II

TRANSIT IN THE UNITED STATES

Recent Trends in Transit

Transit encompasses an array of vehicle types and services, typically including bus, rail, or other conveyance, either publicly or privately owned, which provides to the public general or special service on a regular and continuing basis. Less formal arrangements defined as ridesharing include buspools, vanpools, carpools, jitneys, and shared-ride taxis. These can be used to serve a variety of markets, trip types, and purposes.

Motor bus service is by far the most widespread mode. Buses account for 97 percent of the route miles, 67 percent of passenger boardings. Rapid rail, conversely, with only 0.5 percent of route miles, is responsible for 29 percent of passenger boardings. This is an indication of the high service intensity provided by rail in certain settings, particularly Chicago, Boston, and New York. As shown in Table 1, approximately 25 cities operate at least one rail or fixed guideway mode. Multimodal rail services have traditionally played major roles in the larger, older, densely northeast, and midwest cities. In the 1960's San Francisco and Washington began construction of the first of a new generation of rapid rail systems which, though still expanding, operate as mature systems today. Other new rapid rail systems followed in Atlanta, Miami, and Baltimore, with a system under construction in Los Angeles. Dallas and Houston are two Texas cities which are constructing or planning fixed guideway transit systems.

Funding for publicly operated transportation comes from three sources; transit system operating revenues, other revenues, and local, state, and federal capital and operating assistance. Operating revenues are those that the transit operating agency or company generates from fares and other transportation operations, such as advertising. In real terms, operating revenues declined continually from the 1950's to 1980, when the trend of falling

Table 1.
U.S. Fixed-Guideway Transit Systems

| City/Metropolitan Area | Rapid Rail | Commuter Rail | Light Rail | Other* |
|------------------------|------------|---------------|------------|--------|
| New York | X | X | | |
| Chicago | X | X | | |
| Boston | X | X | X | |
| Philadelphia | X | X | X | |
| San Francisco | X | X | X | X |
| Washington | X | X | | |
| Miami | X | X | | X |
| Atlanta | X | | | |
| Baltimore | X | | UC | |
| Los Angeles | UC | X | UC | UC |
| Cleveland | X | | X | |
| Pittsburgh | X | X | | |
| Detroit | | | X | X |
| Newark | | | X | |
| New Orleans | | | X | |
| Portland (OR) | | | X | |
| Sacramento | | | X | |
| San Diego | | | X | |
| San Jose | | | X | |
| Seattle | | | X | X |
| Buffalo | | | X | |
| Tampa | | | | X |
| Jacksonville | | | | X |
| Las Colinas (TX) | | | | X |
| Morgantown (WV) | | | | X |
| Las Vegas | | | | UC |
| Dallas | | | X | |
| Houston | | | X | |

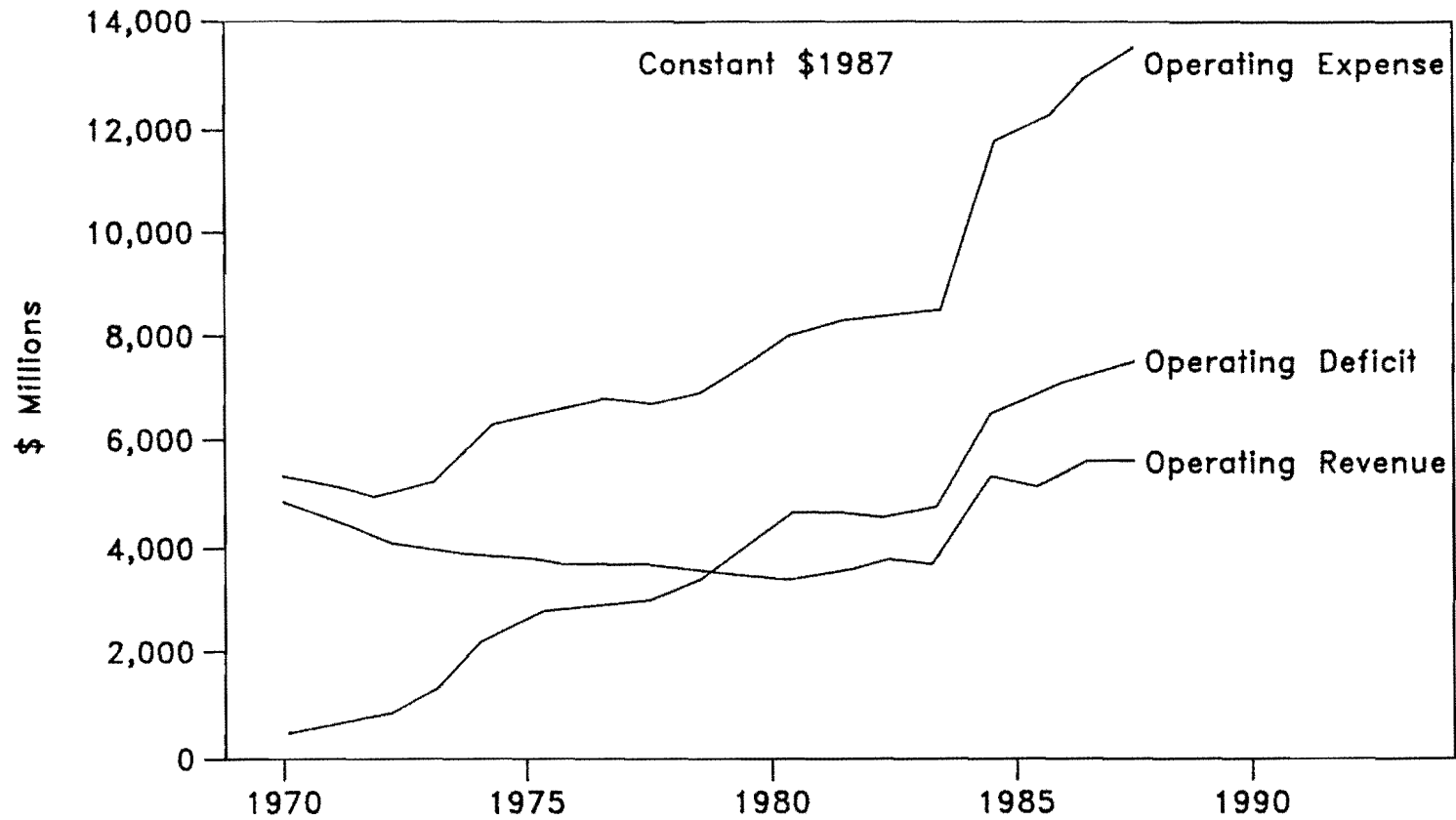
*Includes automated guideway, monorail, and cable car.

UC = Under construction.

Source: (1).

fare revenues was reversed. Revenues have been on the upswing since then. Nevertheless, operating revenues are still insufficient to cover operating expenses. Trends in transit industry operating revenues, expenses, and deficits are shown in Figure 1. In the late 1970's, double digit inflation, high interest rates, and rapidly increasing labor and fuel cost sent transit cost soaring. This heightened the need for increased operating subsidies (1).

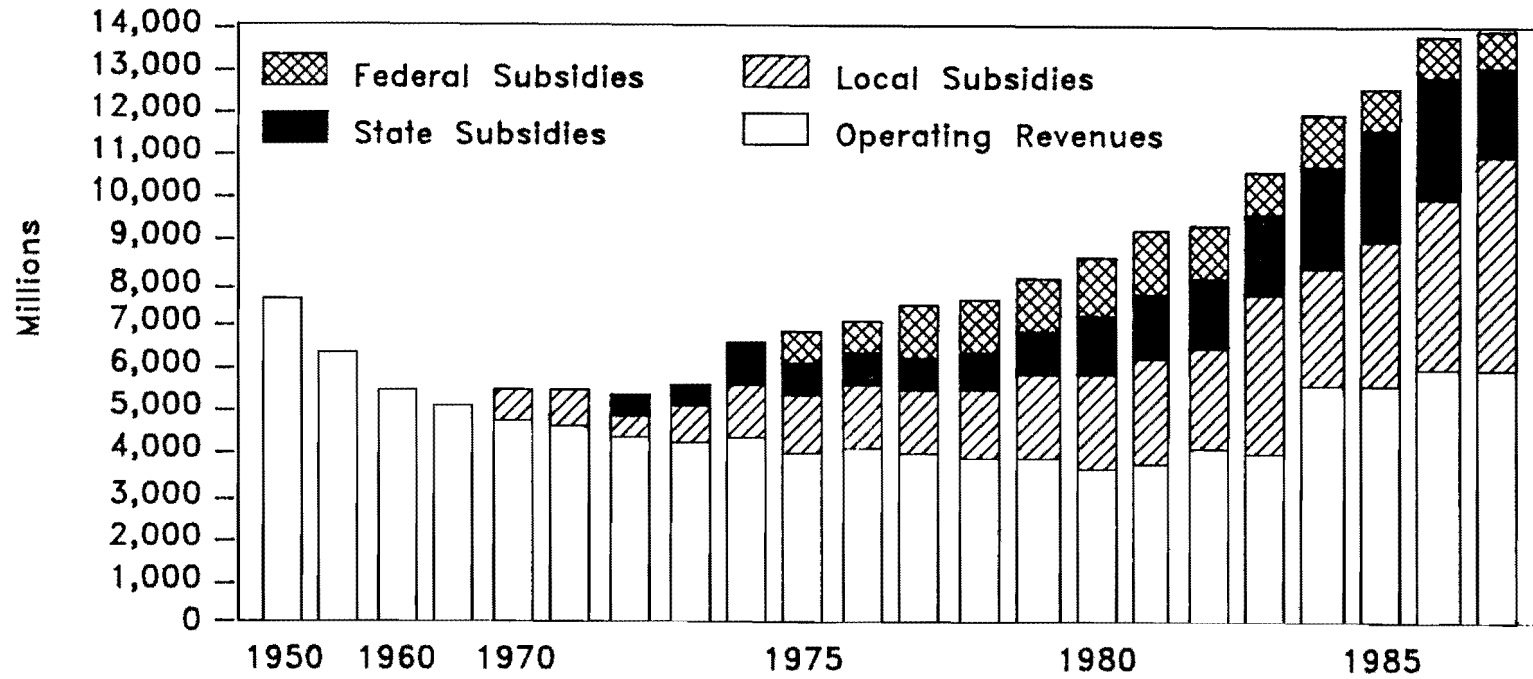
As Figure 2 shows, until 1965 the industry as a whole covered expenses from earned revenues. However, transit systems generally spent little money on capital improvements since operating revenue could not cover amortization of these costs. Transit systems also tended to defer all but essential maintenance. When transit expenses began to exceed transit operating revenues, local subsidies, followed by state, and finally Federal subsidies



Source: (1).

Note: The large increase in operating expense between 1983 and 1984 is because of the expansion of the UMTA Section 15 reporting base to include the major commuter rail systems and additional small, primarily demand-responsive operators. This expansion was due to funding incentives in the Section 9 Grant Program, which encouraged participation in the Section 15 system. Since the new reporting operators tended to run high deficits, the increase in operating revenue was not comparable.

Figure 1. Trends in Transit Industry Operating Finances, 1970 to 1987



Source: (1).

Figure 2. Transit Operating Revenues by Source

were provided. The sum of all operating subsidies has risen quite rapidly since 1970, with subsidies now greatly in excess of earned revenues. Subsidies are also provided for the replacement of deteriorating transit equipment. Initially, Federal mass transit assistance was available only for such capital improvements (1).

The number of transit systems operating in the United States and reporting under Section 15 has grown from 446 in 1978 to 689 in 1986. In 1986, all urbanized areas of 200,000 or more population had one or more transit systems. Over 80 percent had two transit modes available, and nearly 25 percent had three or more modes. For urbanized areas of less than 200,000 population, fewer had transit available. For areas with populations of 100,000 to 200,000 people, 84 percent had transit. For areas of less than 100,000 people, 58 percent had transit.

Most new transit systems established between 1979 and 1986 are relatively small and operate primarily motor bus and demand-responsive services (Table 2). For example, 90 percent of the new motor bus transit systems formed between 1978 and 1985 own fewer than 25 buses. Similarly, 75 percent of the 162 new demand-responsive systems own fewer than 25 vehicles. Fleet size and location in small urban areas indicate that these new systems carry relatively few riders.

Table 2.
Number of Transit Systems Operating in All Urbanized Areas

| Mode | 1978/1979 | 1983 | 1986 |
|-------------------|-----------|------|------|
| Motor Bus | 311 | 364 | 375 |
| Rapid Rail | 9 | 10 | 12 |
| Light Rail | 7 | 9 | 10 |
| Trolley Bus | 4 | 5 | 5 |
| Demand Responsive | 86 | 234 | 248 |
| Other | 29 | 34 | 39 |
| Total | 446 | 656 | 689 |

Source: (1).

While transit service is widespread across the country, most services are concentrated in the largest urbanized areas. The six largest urbanized areas (3 million or more

population) account for 52 percent of nationwide vehicle miles traveled (VMT). The New York City metropolitan area alone accounts for almost 30 percent of all VMT, or about five times the vehicle miles of service operated in any other area. The 256 urbanized areas of less than one million people that have transit receive 20 percent of all service (1).

Excluding commuter rail and demand-responsive services, which were not included in the data before 1975, vehicle miles of service operating in 1987 were about the same as VMT in 1955. Service levels dropped to a low of 1,755.6 million VMT in 1972, but since 1973, they have increased an average five percent in every year but one.

Although the total vehicle miles may be approximately the same as three decades ago, there have been major declines in both light rail and trolley bus VMT. These dropped from a combined level of 669 million vehicle miles in 1950, to 355 million in 1955, and to 32 million in 1986. The drop in light rail VMT reflects the decline of the electric street railways which were prevalent in the early 1950's. The effort and expense of maintaining the rails, electrical transformer and transmission facilities, and aging vehicles compared to lower fixed capital and operating costs for new buses were undoubtedly significant factors in the acute contraction of this mode. Trolley bus service declined for similar reasons. However, while still constituting a small share of total transit VMT, light rail VMT has increased by about 20 percent since reaching its historic low in the early 1980's. This is primarily due to new or expanded services in west coast cities. A major attraction of these services is the ability to operate in mixed traffic in comparison to rapid rail systems that require exclusive guideways. The only mode to show a gain in VMT over 1950 is rapid rail. This is because none of the older rapid rail systems has been abandoned, several have been expanded, and several new rapid rail systems have been built.

Transit ridership grew steadily through the first three decades of the century, and stabilized during the Great Depression. Transit ridership surged during World War II when gasoline and rubber tires were rationed and automobile supply was limited due to the diversion of manufacturing capacity to the wartime effort. Following the war, a variety of factors contributed to the decline of transit ridership. Federal policies such as low-cost, tax-

deductible mortgages and construction of the interstate highway program promoted suburban growth. This growth contributed to meeting the postwar housing crisis caused by the return of veterans to civilian life and the rapid expansion of facilities. It also responded to an apparent consumer preference for a less congested environment. The location of the new housing gradually led to the decentralization of employment, shopping, and recreation as well. This decentralization and the rise in automobile ownership that occurred at the same time were primary factors in the decline of transit ridership.

As ridership declined, a cycle of disinvestment was accelerated. When the automobile became a viable alternative for a majority of commuters after the war, these commuters naturally abandoned the transit systems. Left with a shrinking base of riders dominated by those least able to afford alternatives, transit operators had no way of raising the capital needed to reinvigorate their systems.

The passage of the Urban Mass Transportation Act (UMTA), which provided Federal grants for transit capital expenditures for the first time in 1964, did little initially to alter the transit ridership trend. Ridership reached a low point of about seven billion trips in 1973.

Transit ridership began to rise again in 1974. The increasing cost and shortage of gasoline for the automobile caused by the Organization of Petroleum Exporting Countries' oil production cutback combined with a continued increase in traffic congestion helped greatly to reverse the trend in transit ridership. The added stimulus given transit by the UMTA grant program, which in 1974 permitted a portion of the grant funds to be used for operating subsidies for the first time, also played a part by fostering increased service and lower fares. Ridership rose until 1980, at which point a plateau seems to have been reached. Ridership has been fluctuating above and below the 1980 level since that time. The American Public Transit Association (APTA) calculated 1988 unlinked passenger trips at 8.8 billion, or less than three percent higher than the 1980 figure of 8.57 billion.

Even though transit trips are currently higher than the 1973 low point, transit's share of all trips taken by individuals continues to decline (Table 3).

Table 3.
Transit's Share of Person Travel

| | 1969 | 1977 | 1983 |
|---------------------------------------------------|-------|-------|-------|
| Annual total person Trips on all modes (billions) | 145.1 | 211.8 | 224.4 |
| Public transportation Share of person trips | 2.9% | 2.4% | 2.2% |

Source: (1).

In spite of these downward trends, mass transportation continues to play an important role in certain market segments. Much of the nation's transit ridership is concentrated in areas around the largest cities. For example, transit systems operating in the six largest areas carry over 63 percent of all passenger boardings. Over 37 percent are carried in the New York City area. Conversely, the 256 areas of less than one million people represent only 12 percent of total ridership.

Table 4 shows the mass transportation share of work trips in the ten largest consolidated metropolitan statistical areas (CMSA's). CMSA's include central cities and surrounding suburban counties. As shown, in six of the ten areas, transit service carries more than ten percent of all work trips.

Table 4.
Transit Share of Work Trips: 10 Largest CMSAs

| Rank | Area | Transit Share of Work Trips (%) |
|------|-------------------|---------------------------------|
| 1 | New York | 28.2 |
| 2 | Los Angeles | 5.1 |
| 3 | Chicago | 16.5 |
| 4 | Philadelphia | 12.5 |
| 5 | San Francisco | 11.2 |
| 6 | Detroit | 3.6 |
| 7 | Boston | 12.6 |
| 8 | Houston | 3.0 |
| 9 | Washington, D.C. | 14.8 |
| 10 | Dallas-Fort Worth | 3.5 |

Source: (1).

The role of transit can be seen even more clearly by focusing on the core city or county within CMSA's. Using this definition, transit carries more than 10 percent of work trips in 19 urban areas and exceeds 20 percent in five areas; these cities are shown in Table 5. While 44 percent of the U.S. population lives in suburban areas, 32 percent still live in central cities. Slightly more than one-half of suburban workers still commute to central city jobs. In the downtown cores of some of these cities, transit carries a majority of peak-hour commuter trips.

Table 5.
Transit Share of Work Trips: Most Transit-Oriented Primary Metropolitan Statistical Areas

| Area | Transit Share of Work Trips |
|----------------------|-----------------------------|
| New York | 49.3% |
| Washington, D.C. | 38.0% |
| Boston | 32.4% |
| San Francisco | 22.1% |
| Chicago | 20.4% |
| St. Louis | 18.6% |
| Atlanta | 17.4% |
| Philadelphia | 14.0% |
| Portland (OR) | 13.2% |
| Pittsburgh | 11.7% |
| Seattle | 11.0% |
| Minneapolis/St. Paul | 11.0% |
| New Orleans | 10.4% |
| Middlesex Co. (MA) | 10.4% |
| Cleveland | 10.6% |
| Denver | 10.2% |
| Milwaukee | 10.2% |
| Baltimore | 10.2% |
| Honolulu | 10.0% |

Source: (1).

The trend in ridership during the past two decades varies considerably by mode. Ridership on surface routes (primarily bus) in large urbanized areas (more than 500,000 people) experienced the greatest increase during the 1970's, but has essentially leveled off in the 1980's. Ridership on rapid transit systems remained stable until 1975 but has increased nine percent from 1980. This shows that transit continues to grow in some cities, particularly in the Northeast, which experienced an economic expansion in the 1980's. At the other end of the spectrum, transit ridership in the 1980's increased 26 percent in urban areas with fewer than 100,000 people and 55 percent in demand-responsive services. These services are primarily oriented to the other key component of transit ridership, the captive

market. It is in the midrange of services - bus routes in urban areas of 100,000 to 500,000 people - that transit ridership declined during the 1980's by 25 percent, continuing a trend that began during the 1960's. These systems experienced a brief upturn during the late 1970's due to increases in the price of gasoline, transit fare subsidies, and upgraded service. As gasoline prices declined and fares increased, these systems lost their competitive appeal for discretionary riders, and they have shrunk to below their 1975 levels.

A variety of demographic factors contribute to capping the transit share of the discretionary commuter market. Most significant is the growth of suburban employment markets. The share of total office floor space outside the central cities increased at more than twice the rate of suburban-to-central city work trips in the 1970's. Suburban trips are inherently more difficult for transit to serve because of the dispersion of origins and destinations. Transit has experienced a slight loss of market share but increased the number of trips in its traditional suburb-to-central city market, but it has lost both market share and total riders in the other three markets. While all suburban work trips (both central city to suburb and suburb to suburb) have increased from 17.2 million in 1970 to 24.4 million in 1980, transit's share of these trips declined from approximately 950,000 to 650,000 (1).

Challenges Confronting the Transit Industry

After over twenty years of experience with transit owned, operated, and financed by the public sector, many transit critics have argued that transit policies, programs, and services frequently fall short of their objectives, and are in need of revision. In the coming years, the transit industry must develop responses to a number of challenges if it is to continue to play a role in meeting the nation's transportation needs. Financing must be found for both capital and operating expenses, costs must be controlled, efficiency must be improved, and effective ways to serve emerging markets must be devised.

Although transit continues to be a major component of transportation policies, many observers suggest that the transit industry must respond to the following three general problem areas to secure its future:

- 1) Economic and sociodemographic conditions and trends;
- 2) Local, state and federal transportation policies and planning practices; and
- 3) Management and operations issues in the transit industry.

Specific issues within each of these three categories are enumerated in the following sections of this report. The following discussion provides useful background and a point of departure for subsequent discussions concerning issues confronting transit in Texas and the role SDHPT can play in addressing these issues.

Economic, Social, and Demographic Trends

Among the factors which will have significant bearing on transit markets are changes in national and regional economies, as well as trends in social organization and demographics. The service sectors of the economy will continue to grow, but manufacturing will remain a critical source of jobs in many areas. Ongoing suburbanization of both population and employment, as well as rapid growth in small urban areas, seem likely; but development and revitalization of older urban cores will continue as well. Increases in urban and metropolitan populations; the general aging of the population; higher rates of labor force participation, especially among women; growth in real incomes; increased auto ownership per capita; and growing amounts of leisure activity are other factors that are likely to be strong determinants of the demand for transportation (2).

The suburbanization of both population and employment, as well as rapid growth in small metropolitan areas and towns beyond the metropolitan fringe perhaps best illustrate the combined effects of these trends.

While development and revitalization of older urban cores have continued in many areas, a stronger trend has been toward suburban and exurban growth. Development of housing, industrial parks, and office complexes in these outlying areas have shifted both commute patterns and the origins and destinations of other trips. Today, over 40 percent of metropolitan work trips occur entirely in the suburbs. In addition, increasing numbers of commuters live beyond the traditional metropolitan boundaries and work in suburban job centers, and some have left the major metropolitan areas altogether for jobs and housing in rural or semi-rural areas. In many cases, these shifts are putting a strain on street and freeway systems designed for much lower levels of activity, and creating demand for major infrastructure additions or expansions and for public commute modes (2).

The trends toward increased suburban and exurban growth, and the pressures for congestion relief and traffic mitigation which have accompanied that growth, present risks and opportunities for transit. The risks stem from the possibility that transit agencies will be pressured to expand services without being provided either sufficient funds to cover costs or the flexibility to match service designs to markets. Suburban and exurban development tends to be low density and scattered, and as such is hard to serve with conventional transit. The deployment of conventional bus or rail transit in areas where demand does not justify such options could lead to worsening deficits and management problems which transit agencies can ill afford. For that matter, additional peak-only services in either suburbs or core areas could be a financial drain if provided in conventional ways (2).

On the other hand, opportunities also may result from these same land development patterns and concerns over congestion. Transit agencies may find the occasion to introduce a broader range of public transportation services, with quality and costs matched to market segments and user characteristics; to tie transit provision to land development commitments that help create or strengthen markets; to participate in the coordination of land development, transit provision, and other transportation policies (HOV lanes, parking policies); and to involve the private sector and/or local governments in public transportation provision and finance.

Suburban and exurban development tends to be low density and scattered, and, as noted above, is hard to serve with conventional transit. While many transit operators are implementing services to serve these demands, a broader conception of public transportation, incorporating such services as subscription bus, dial-a-ride and other demand-responsive services, and possibly carpools and vanpools, will be needed to serve the thin markets being created in these areas. At the same time, land use strategies that result in more clearly defined (and denser) development corridors and activity nodes and produce clustered development more easily served by the family of shared ride services may help build markets for public transportation. Coordination of these development patterns with priority treatment for high occupancy vehicles and with more economical provision of parking also offers possibilities for increased public transportation use (2).

Public Policy and Planning Practices

Local, state, and federal transportation policies also will have a strong effect on the demand for public transportation and the nature of transit agencies' options for action. Not only will policy concerning federal, state, and local transit finance be critical; the outcome of current debates over future highway finance will affect the configuration and service quality of transit's chief competing mode for years to come. Responses to continuing air pollution problems in metropolitan areas, and to possible increases in fuel prices, also will shape public transport services and influence their markets. Finally, citizen pressures for solutions to growing congestion problems both in central cities and in the suburbs, and for developer mitigation of transportation impacts, may favor public transportation (2).

Another area which can have significant, positive effects on transit's ability to serve a larger portion of the travel market is an increased emphasis on coordinated land use and transportation planning to foster development patterns which are conducive to efficient transit operations. A variety of policies are being utilized, including growth management options (i.e., restricting uses which generate large numbers of peak-period auto trips, and/or reducing the total amount of development that will be permitted); planning and zoning that

focus development in those areas where transportation capacity is available; and site design requirements aimed at creating an environment that makes good transit service feasible.

While these efforts to improve the coordination of land use and transportation planning offer the potential to improve the efficiency of transit services, there remains considerable disagreement about what strategies should be pursued and who should assume the responsibility for implementing these strategies. Political acceptability is perhaps the most important issue concerning coordinated land use/transportation planning. Hence, in the coming years the transit industry needs to assume a more active role in promoting coordinated land use/transportation planning as a means to increase the efficiency of transit services. In this regard, improvements and innovations in the following general aspects of coordinated land use/transportation planning could do much to increase the use and efficiency of transit services.

1) Improved coordination between local transit service providers and local state highway agencies to insure that planned roadway improvements consider the physical and operating characteristics of transit vehicles and services. In those areas where transit services are available, or are likely to become available in the future, guidelines for planning, designing, and operating street improvements need to be modified to incorporate transit-related considerations.

2) Increased emphasis on land use and site design considerations as viable solutions to the "transportation problem." This includes policies which encourage development and/or redevelopment in areas already served by transit services, site design and building orientations which favor transit, and provision of sidewalks, street lights and other "transit-friendly" amenities.

3) Renewed emphasis on comprehensive, multimodal transportation planning. The transportation problems facing Texas cannot be solved by simply building more highways. Likewise, transit is not the solution to all of the state's transportation problems. A balanced, multimodal transportation system that makes the best use of the advantages of

all transportation modes will be needed to serve the state's transportation needs. This will require increased levels of coordination between transit service providers (public and private; urban, rural and intercity) and local and state highway agencies, private developers, and the citizens of Texas.

A number of policies that could significantly alter the amounts, sources, and rules on the use of funds to finance transit capital and operating costs are currently being debated. Probably the most critical issue here is the direction of federal transit policy. Proposed federal transportation policies which could have significant impacts on transit include the following (3).

Encourage effective management and use of transportation assets by requiring Federal aid recipients in Department programs to evaluate alternative options and management techniques that enhance performance and capacity (e.g., high-occupancy vehicle lanes and traffic control improvements).

Explore incentives in Federal-aid programs for cost-effective use of transportation assets, such as higher matching ratios in the highway program for projects that make better use of existing facilities.

Encourage peak-period or congestion pricing to ensure the most effective use of transportation facilities.

Bring the principles of market competition to bear in public transportation and enlist the private sector in solving urban transportation problems.

Apply cost-effectiveness standards to federally assisted transit investment.

Eliminate disincentives to maintenance of transit equipment and facilities in federally assisted programs.

Reduce operating assistance for urban transit.

Adjust requirements in Federal assistance programs for public transit, to be more sensitive to the scale and nature of the services and communities involved.

Coordinate the transportation programs of the different Federal agencies (Departments of Transportation, Health and Human Services, Agriculture, and Housing and Urban Development) to eliminate duplication, inconsistency, and conflict among programs and improve their effectiveness.

Promote greater access by working with transportation providers and representatives of disabled individuals and other transportation disadvantaged citizens to identify transportation facilities where access improvements are necessary, and assist in developing effective designs and implementation schedules for meeting those needs.

Assist public transportation agencies in preparing plans and standards of requiring vehicles accessible to disabled passengers, to meet requirements in a timely and cost-effective manner.

Develop criteria and review procedures for enforcing conformance with Federal accessibility requirements.

These policies will radically change the context in which transit operates. Unless alternative (i.e., local) funding sources are developed, the ability of public agencies to expand transit service into new markets, and even to maintain existing service levels, will probably be sharply restricted. Even planning procedures would likely change, since today much activity is oriented toward compliance with federal rules and successful competition according to federal investment criteria. Yet a number of interest groups advocating continued federal involvement in transit recognize the desirability of restructuring the federal role. Some have proposed a rethinking of formulas, capital grant procedures, and matching funds requirements, others have suggested limiting the federal role to capital investments only, and still others have proposed a unitary urban transportation fund for which transit and highway projects both would be eligible. The outcome of these debates could define the range of possibilities for urban transportation for years to come.

Some of the impacts of the proposed federal policy, however, could result in an increased role for transit in meeting the nation's travel demands. For example, those policies which encourage the consideration of a wider range of alternatives to meet travel demands (e.g., management techniques that enhance performance and capacity by making better use of existing facilities) could lead to a more comprehensive, multimodal approach to transportation system planning.

A variety of Federal, State, and local programs affect rural public transportation, and they incorporate numerous and inconsistent standards and requirements that often do not

meet the particular circumstances of an individual community. Through a coordinated effort by transit planners and operators, private businesses, and community groups, transit service to rural areas can become more efficient and more effective in meeting community needs. The Federal policy directed at the coordination of different federal transportation agencies and programs is intended to accomplish this.

The Federal policy to encourage peak-period or congestion pricing to ensure the most effective use of transportation facilities, while probably infeasible for political reasons at this time, could result in substantial shifts away from the single occupant auto mode to more efficient, high-occupancy travel modes. Congestion pricing entails charging relatively higher prices for travel during periods of peak demand and lower prices in off-peak periods. While peak period or congestion pricing is not a substitute for necessary capacity increases, it is one way to encourage the most effective use of existing facilities by shifting demand that would otherwise require additional capacity to other time periods or modes where facilities are underutilized. Peak period pricing is common in the private sector - in restaurants, theaters, resorts, as well as telephone service, and rail and air fares. The same pricing principles offer significant potential for transportation facilities and services provided by the public sector to achieve efficient use of resources and ensure that public funds are well spent.

The basic rationale behind congestion pricing is that transportation facilities should be financed from direct user charges that reflect both the demand for travel and the costs of usage. It has been suggested that one of the fundamental problems encountered in improving the highway traffic situation is the subsidization of autos that use the road. There is broad agreement that automobile use is generally subsidized and highly subsidized in urban areas. Some estimates hold that total [auto] subsidies amounted to \$300 billion in 1987 alone, and another estimate puts the subsidy at \$2400 per passenger car for that year (8). The basic argument for the removal or reduction of these auto subsidies is that measures which make the price of auto travel more representative of its actual cost can increase the use of transit more than an equivalent reduction in transit price.

The role of the states in public transportation, a mixed situation at present, with widely varying levels of activity and interest is also an issue. While some states undoubtedly will continue to develop their own policies and programs concerning transit even if there is no substantial redirection of federal policy, state involvement in transit finance almost certainly will be influenced by federal policy decisions. Should federal withdrawal occur, for example, one question will be whether states will step in to preserve transit services or even to maintain a "safety net" for transit dependents (2).

Local transit finance policy is a third area that will influence future options. Currently a wide array of financing mechanisms are utilized by local transit agencies to supplement farebox revenues. These range from property tax levies to bonds to earmarked sales taxes. While resistance to increased taxes and fees is prevalent in many localities, some areas are showing an increased willingness to finance clearly defined transit projects and programs, and additional attempts to obtain such funds seem likely. In addition, public-private partnerships for transit finance appear to be another possible area of increased activity in coming years (2).

The preceding discussion suggests that recent policy and planning issue debates pose significant uncertainties that could drastically reduce transit's role in achieving national goals in environmental and energy matters, congestion relief, urban development, and improved mobility. Alternatively, these public policy debates could create possibilities for more flexible, responsive planning, management, and service delivery. It is this latter challenge - improving the efficiency of current transit management and operations practices - which is the subject of the closing section of this Chapter.

Management and Operations

A recent Transportation Research Board (TRB) study (4) reported that the greatest challenge facing local transit operators is developing innovative solutions to the problems they experience in managing today's services. According to the TRB study (4), the following

list of seven broad topics is representative of the kind of concerns uppermost in the mind's of transit managers.

1) Human resources management. The challenge here is in identifying key factors in the transit work environment that affect employee performance, controlling absenteeism, assessing the productivity implications of alternative work rules and use of part-time labor, and introducing incentive programs and restructuring jobs to motivate improved performance.

2) Service configuration and marketing. These concerns include developing service strategies, like timed-transfer, to accommodate decentralized development, improving existing routes, and scheduling and using marketing techniques to increase ridership.

3) Service delivery models. Common problems encountered in this area include methods for improving service coordination in a multiprovider environment, identifying types of services or functions most amenable to privatization, and reducing the barriers to contracting with private providers.

4) Internal efficiencies. The primary concerns here include developing energy management programs, identifying effective insurance strategies, improving fare structures and collection equipment, and getting the most out of automation.

5) Maintenance. Recruiting and training maintenance personnel, developing effective supervisory programs, using computerized maintenance management information systems, and developing simplified vehicle subsystems and diagnostic equipment are problems frequently cited by transit managers.

6) Equipment. Concerns expressed by transit managers in this area include introducing automated equipment, improving component reliability and life, increasing energy efficiency, responding to environmental regulations, developing better vehicle inspection techniques, and improving procurement practices and policies.

7) Innovative financing. In the area of financing, the challenges include analyzing the benefits of innovative financing techniques such as joint development, identifying the factors necessary to their successful introduction, assessing the impact of tax reform on innovative financing for mass transit, and defining appropriate roles for the private sectors in public-private partnerships.

CHAPTER III

TRANSIT IN TEXAS

Roles of Transit in Texas

During the 1970's, the migration to the Sunbelt resulted in significant increases in the population of Texas. From 1970 to 1980, the metropolitan areas of Austin, Dallas-Fort Worth, El Paso, Houston, and San Antonio all grew by at least 20 percent, with some growing by nearly 50 percent. And it is the expressed desire of the leaders in the state to continue to encourage growth and to realize the economic benefits that can be derived from that growth.

In the larger cities, it is becoming evident that it is necessary to develop effective mass transportation systems. As mentioned previously, the problems being faced today cannot be solved simply by building more streets and highways, nor can those problems be solved by only developing transit. The best use must be made of the advantages of all available transportation modes.

To better understand this contention, it is necessary to appreciate the roles served by public transportation. Primarily, three *complementary* passenger transport roles are served. These roles can be referred to as public transportation, mass transportation, and internal circulation. In addition to these passenger transport roles, transit can be an efficient mode for intercity goods movement.

In the following descriptions of the potential roles of transit, it is important that those not be viewed as all-inclusive, nor mutually exclusive roles. In fact, *a balanced, integrated transit system will typically include a hierarchy of services designed to serve all of these roles.* Moreover, while the following definitions of the roles of transit tend to emphasize the economic characteristics of the target populations of the respective roles, it must be stressed

that the use of transit is increasingly becoming a matter of choice rather than economic necessity.

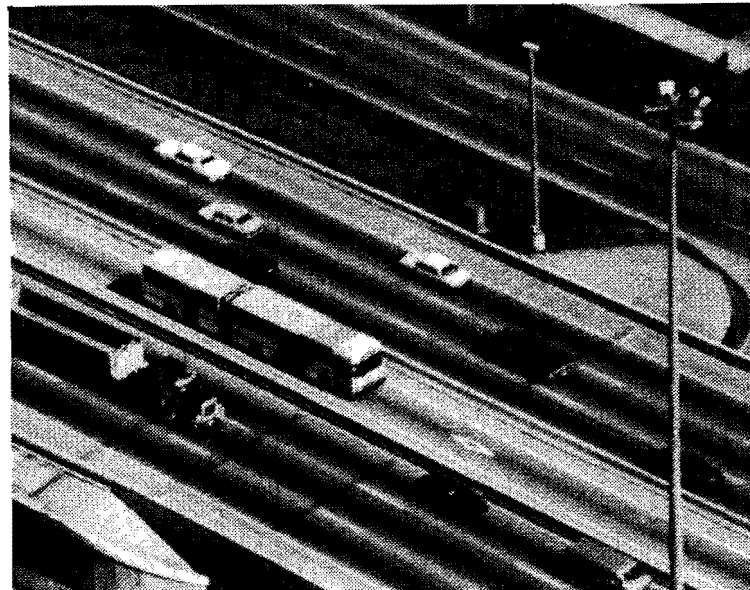
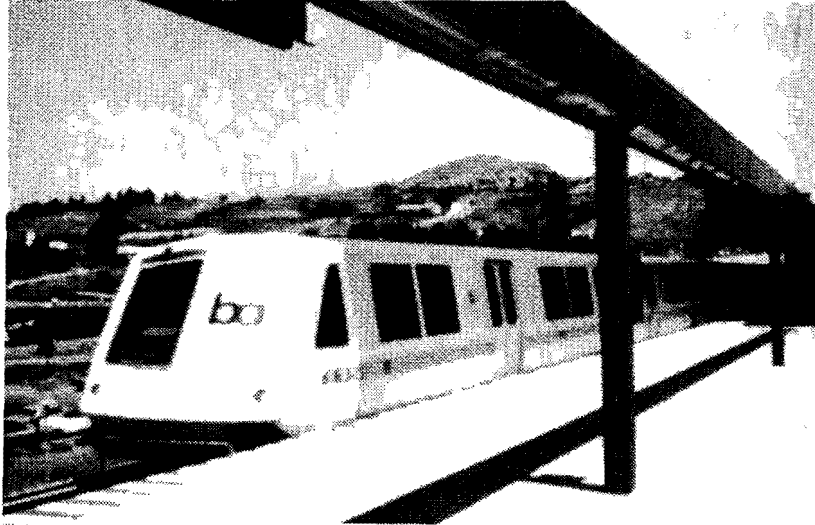
The public transportation role, as defined herein, is the role that has historically been served by transit in Texas. The public transportation role offers some level of mobility to those who otherwise would not be able to travel. A social-welfare need is served by providing transportation to the elderly, the young, the handicapped, and those who do not have access to a private automobile. Without transit, these segments of the population may be denied access to employment, shopping, recreation, medical facilities, and the like. This is an important role that transit may always be called upon to serve. It is a difficult role; by serving a social-welfare function, it requires that hard decisions be made at the local level concerning how much money should be spent to meet this need. And this decision is made more difficult since farebox revenues cover only a fraction of the operating costs required to provide this service. As would be expected in such a policy issue, the decisions that have been reached vary considerable between cities within the state.

Public transportation service may be implemented in a number of ways depending on the needs of the area being served. Examples include regularly scheduled bus service, demand-responsive or "dial-a-ride" transportation service, and subsidized taxi operations. The public transportation role, as defined here, is the role that has historically been served by transit in Texas. To many Texans, when transit is mentioned, this is the role that comes to mind.

A role for mass transportation is only recently beginning to emerge in the larger Texas cities. Mass transportation serves an economic need; it is primarily intended to move large volumes of workers to major employment centers during peak commuting periods. Without effectively developing this transit role, major Texas cities cannot be expected to either continue to grow or to offer a high quality of life to the urban residents. The mass transportation role impacts a significant portion of the state's population. In 1980, the six largest metropolitan areas, the areas most affected by the need for mass transit, contained over 55 percent of the state's population. The mass transportation role has not previously



Due to age, income or physical limitations, many urban and rural residents do not have regular access to private means of transportation. Transit services implemented to serve these transportation disadvantaged individuals are referred to in this report as PUBLIC TRANSPORTATION. Public transportation is provided as a public service to the nondriving segment of the community and, as such, functions to fulfill a social need. Although public transportation systems can never match the flexibility, convenience, availability or speed of private transportation, they can nevertheless provide transit dependent persons with at least some service to most areas within the community at an affordable cost to the patron. Public transportation service may be implemented in a number of ways depending upon the needs of the area being served. Examples include regularly scheduled bus service, demand-responsive or "dial-a-ride" transportation service, and subsidized taxi operations. The public transportation role, as defined here, is the role that has historically been served by transit in Texas. To many Texans, when transit is mentioned, this is the role that comes to mind.



Another way in which transit may function is in the role of MASS TRANSPORTATION. The primary objective of mass transportation is to provide for the rapid movement of large volumes of persons to major activity centers in order to serve peak travel requirements within major travel corridors. Mass transportation serves an economic need rather than the social need served by public transportation. Because mass transportation is designed to serve "choice" riders rather than "captive" riders, a level-of-service must be provided which is consistent with user needs and at a fare competitive with the cost of available transportation alternatives. Mass transportation systems typically take the form of rail rapid, light rail, or express motor bus (transitways and park-and-ride) service; these systems are most effective when used to serve high-volume movements between fixed points of concentrated activity along high-density corridors. This role of transit is a relatively new role for transit in Texas that is being used effectively in several of the state's large urban areas.

existed to a meaningful extent in Texas. For example, during a period when cities such as Los Angeles and Chicago were operating 2000 buses, the large Texas transit properties typically operated fewer than 450 vehicles.

Mass transportation systems typically take the form of rail rapid, light rail, or express motor bus (transitways and park-and-ride) service; these systems are most effective when used to serve high-volume movements between fixed points of concentrated activity along high-density corridors. This role of transit is a relatively new role for transit in Texas that is being used effectively in several of the state's large urban areas.

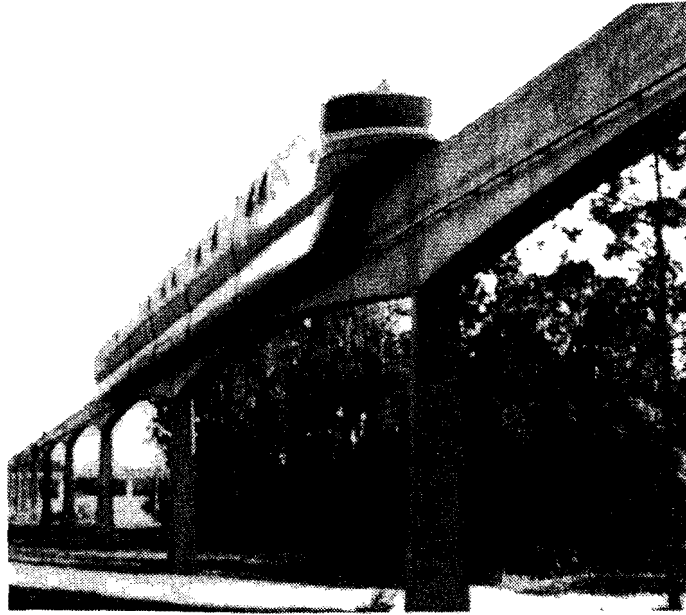
In order for mass transportation to serve its mass movement function, it must be complemented with an efficient "public" transportation network. Mass transportation simply cannot function without efficient collector/feeder services, such as provided by regularly scheduled local public transportation.

Within major activity centers (e.g. large downtown areas, airports, universities, amusement parks, etc.), travel distances can become too long to be served only by walking. Some form of mechanized transport may be needed to meet the travel demands that exist within these activity centers. Various types of transit technology, often referred to as people movers or automated guideway transit (AGT), are used to serve this transit role, which is referred to in this report as internal circulation. In some instances, the mass transportation system ties directly into the internal circulation system.

In this role, a number of different types of transit systems have been used effectively, including shuttle-type bus service, trolleys, streetcars and more recently, automated guideway transit (people movers and intermediate capacity transit systems).

Current Services

Public transportation service in Texas is provided through one of three entities. Urban areas of the state are served by Metropolitan Transit Authorities, commonly referred



Within major activity centers where parking is often scarce or restricted (such as large downtown areas, universities, airports, and amusement parks), travel distances can become too lengthy to be served only by walking. Some form of transit service is necessary to serve an INTERNAL CIRCULATION function within these areas. In this role, a number of different types of transit systems have been used effectively, including shuttle-type bus service, trolleys, streetcars and more recently, automated guideway transit (people movers and intermediate capacity transit systems).

to as MTAs. The MTAs are created to provide public transportation services in special geographical areas and must be approved by a majority vote of the populace in the area. The voters also can approve financing of the MTA through levy of a sales tax. This sales tax can be one-fourth, one-half, three-fourths or one percent on the dollar. Since 1979, six urban areas have approved creations of MTAs which are governed by directors who are appointed by elected city and count government officials (Table 6). Table 7 shows general information on the state's six existing MTAs.

Table 6.
Texas Metropolitan Transit Authorities

| Metropolitan Transit Authority | Election Date | Operational Date |
|-----------------------------------------------------------|---------------|------------------|
| Via Metropolitan Transit (San Antonio) | November 1977 | March 1978 |
| Metropolitan Transit Authority of Harris County (Houston) | August 1978 | January 1979 |
| Dallas Area Rapid Transit | August 1983 | January 1984 |
| Fort Worth Transportation Authority | November 1983 | April 1984 |
| Capital Metropolitan Transit Authority (Austin) | January 1985 | July 1985 |
| Corpus Christi Regional Transit Authority | August 1985 | January 1986 |

Source: (5).

In November 1977 the voters of Bexar County created the San Antonio Metropolitan Transit Authority by voting in favor of the transition from the San Antonio Transit System (SATS) to the transit authority, thereby accepting the proposed one-half percent level in city sales tax. In 1978, the first year of operations, approximately 27.8 million passengers were carried over 13.6 million vehicle miles, covering one million vehicle hours. Average number of MTA employees stood at roughly 800. Total operating revenues were \$7.1 million and operating expenses were \$18.7 million, resulting in a net operating deficit of \$11.5 million. The capital deficit was \$9.8 million.

In August 1978, voters of Harris County confirmed a metropolitan transit authority and approved a limited one-cent sales tax to finance it. The MTA was formally implemented in January 1979 and ridership under this entity form nearly tripled to 77.4

Table 7.

Texas Metropolitan Transit Authorities Summary Operating and Financial Statistics, 1978-1987

| Year | Total Passengers | Total Vehicle Miles | Total Vehicle Hours | Average Number Employees | Total Operating Revenue | Total Operating Expense | Net Public Operating Cost | Public Capital Cost |
|-------------------|------------------|---------------------|---------------------|--------------------------|-------------------------|-------------------------|---------------------------|---------------------|
| 1978 ¹ | 27,840,099 | 13,563,609 | 1,002,097 | 788 | \$ 7,106,090 | \$ 18,693,571 | \$ 11,587,481 | \$ 9,834,247 |
| 1979 ² | 77,415,277 | 30,562,687 | 2,495,086 | 2,418 | 20,771,700 | 67,328,270 | 46,556,570 | 4,836,168 |
| 1980 ² | 82,083,340 | 33,138,216 | 2,501,050 | 2,617 | 25,905,288 | 89,380,083 | 63,474,795 | 55,778,929 |
| 1981 ² | 82,637,762 | 37,251,460 | 1,675,362 | 2,744 | 32,563,906 | 116,337,467 | 83,773,561 | 11,883,630 |
| 1982 ² | 86,445,115 | 40,443,528 | 2,779,912 | 2,886 | 35,029,245 | 135,674,103 | 100,644,858 | 20,432,259 |
| 1983 ² | 86,102,405 | 43,521,017 | 2,939,217 | 2,953 | 51,185,234 | 135,176,802 | 83,991,568 | 14,809,415 |
| 1984 ³ | 145,849,142 | 70,816,763 | 4,995,112 | 4,980 | 102,971,709 | 215,981,372 | 113,009,663 | 90,884,214 |
| 1985 ⁴ | 172,445,068 | 77,548,155 | 5,751,092 | 6,120 | 116,842,895 | 267,704,520 | 150,861,625 | 119,114,584 |
| 1986 ⁵ | 168,972,726 | 88,875,169 | 6,176,361 | 6,749 | 124,173,033 | 297,704,520 | 173,531,187 | 92,318,407 |
| 1987 ⁵ | 164,222,080 | 88,492,639 | 6,118,903 | 6,768 | 121,012,150 | 309,727,010 | 188,714,860 | 71,757,208 |

Source: (5).

¹Includes VIA Metropolitan Transit - San Antonio Only²Includes VIA Metropolitan Transit - San Antonio & Metropolitan Transit Authority of Harris County - Houston Only³Includes VIA Metropolitan Transit - San Antonio, Metropolitan Transit Authority of Harris County - Houston, Dallas Area Rapid Transit - Dallas & Fort Worth Transportation Authority Only⁴Includes VIA Metropolitan Transit - San Antonio, Metropolitan Transit Authority of Harris County - Houston, Dallas Area Rapid Transit - Dallas & Fort Worth Transportation Authority & Capital Metropolitan Transit Authority - Austin Only⁵Includes all six MTAs

million passengers. Vehicle miles and hours increased proportionally at 225 percent and 248 percent respectively. Operating revenues jumped to \$20.8 million and operating expenses increased to \$67.3 million, this generated \$46.6 million in operating cost to the public. Capital cost decreased 51 percent to \$4.8 million. During the 1979-1983 period no other MTAs were created, the concept consisted of two systems, VIA Metropolitan Transit - San Antonio and METRO - Houston. During this period (1979-1983) ridership on the two systems increased roughly 11 percent, vehicle miles over 40 percent and vehicle hours about 18 percent. Revenues swelled to \$51 million an increase in excess of 240 percent, concomitant expenses increased to \$135 million resulting in a \$84 million cost to the public.

In 1984, two additional systems (Dallas Area Rapid Transit and Fort Worth Transit Authority) began operations as MTAs, bringing the total to four systems in Texas. As shown in Table 7 all operating and financial statistics nearly doubled from the preceding year. Public capital cost grew six-fold from \$14.8 million in 1983 to \$90.9 million in 1984.

In the 1985 Capital Metropolitan Transportation Authority of Austin was created, bringing the total to five MTAs in Texas. Increases were modest for most categories shown in Table 7, however, the largest increase was shown in operating revenues, which increased about 33 percent from \$103 million in 1984 to \$137 million in 1985. Also, public capital cost grew to \$119 million an increase of over 30 percent.

By 1986 the number of MTAs in Texas expanded to six as the Corpus Christi Regional Transit Authority was created. During 1986 and 1987 little change occurred in the operating and financial statistics as shown in Table 7. In fact, three categories (passengers, operating revenues, and public capital cost) experienced decreases from 1985 levels. Vehicle miles, vehicle hours, and operating expense all exhibited increases in the 9 percent to 15 percent range. Later, a seventh MTA was approved in El Paso.

In summary, the creation of transit authorities in urban areas has gained acceptance as the preferred means of service provision. These six MTAs account for a vast majority of transit services in the state.

Local city governments also have an interest in providing and financing public transportation services for their residents. Prior to the creation of MTAs, city governments provided public transportation services as part of their responsibilities. Currently, 17 city governments provide these services to their residents. Table 8 shows these Texas cities.

Table 8.
City Governments Providing Public Transportation Services

| | | | |
|-------------|-----------|-------------|---------------|
| Abilene | Cleburne | Laredo | Teague |
| Amarillo | Denison | Lubbock | Tyler |
| Arlington | Galveston | Port Arthur | Waco |
| Beaumont | Howe | San Angelo | Wichita Falls |
| Brownsville | | | |

Source: (5).

Between 1978 and 1987 all Texas municipal transit systems operating and financial statistics declined steadily (Table 9). This is due in part to the creation of MTAs which were discussed in the previous paragraphs. During this period, total passengers declined from 101.5 million to roughly 20 million. Vehicle miles were reduced from 38.5 million to about 10 million, a 74 percent drop. Accordingly vehicle hours declined approximately 82 percent. Operating revenues and expenses were down 72 percent and 56 percent respectively. It is noteworthy to observe that public operating cost only decreased by 29 percent during this period.

Public transportation service in non-urbanized and rural areas is provided through the Section 18 program. The Section 18 program was established by the Surface Transportation Assistance Act of 1978 and offers federal financial assistance in rural areas for the purchase of vehicles and other equipment for administrative and operating expenses. State agencies, local public bodies, and non-profit organizations are eligible for assistance. Operators of public transportation services such as intercity bus lines and taxi cab companies may receive funding through an eligible recipient.

The goals of Section 18 program are to enhance the access of people in non-urbanized areas for purposes such as health care, shopping, education, recreation, public services, and employment by encouraging the maintenance, development, improvement, and

Table 9.

Texas Municipal Transit Systems Operating and Financial Statistics Summaries, 1978-1987

| Year | Total Passengers | Total Vehicle Miles | Total Vehicle Hours | Average Number Employees | Total Operating Revenue | Total Operating Expense | Net Public Operating Cost |
|------|---------------------|---------------------------|---------------------------|--------------------------------|-------------------------------|-------------------------------|---------------------------------|
| 1978 | 101,555,729 | 38,567,017 | 3,795,630 | 1,109 | \$ 35,465,209 | \$ 52,888,761 | \$ 17,423,552 |
| 1979 | 69,777,651 | 31,488,444 | 2,442,674 | 2,036 | 28,426,760 | 48,723,193 | 20,296,433 |
| 1980 | 69,732,380 | 31,251,957 | 2,386,396 | 2,089 | 31,374,493 | 57,979,718 | 26,605,225 |
| 1981 | 71,283,107 | 32,165,821 | 2,428,773 | 2,153 | 36,615,592 | 67,516,331 | 30,900,739 |
| 1982 | 69,119,866 | 33,232,370 | 2,537,584 | 2,313 | 40,664,070 | 76,400,784 | 35,736,714 |
| 1983 | 67,943,083 | 33,554,560 | 2,519,522 | 2,375 | 40,556,985 | 80,337,600 | 39,780,615 |
| 1984 | 28,585,148 | 14,925,049 | 1,144,376 | 1,065 | 12,452,820 | 31,314,629 | 18,861,809 |
| 1985 | 23,906,037 | 11,963,983 | 923,491 | 851 | 9,648,306 | 25,922,645 | 16,274,339 |
| 1986 | 21,571,104 | 10,543,942 | 806,239 | 741 | 8,796,412 | 22,406,375 | 13,609,963 |
| 1987 | 20,038,542 | 9,779,207 | 737,903 | 724 | 9,815,921 | 23,261,510 | 12,445,589 |

Source: (5).

use of passenger systems. There are currently thirty-seven Section 18 providers in Texas. Table 10 shows these Texas cities.

Table 10.
Section 18 (Rural) Public Transportation Services

| | | | |
|-----------|------------|-----------------|---------------|
| Alice | Crowell | Lufkin | Terrell |
| Amarillo | Denison | McAllen | The Woodlands |
| Aspermont | Denton | Mineral Wells | Uvalde |
| Austin | Galveston | Rio Grande City | Victoria |
| Beeville | Glen Rose | San Angelo | Waco |
| Bryan | Kingsville | San Antonio | Weatherford |
| Cleburne | Lamesa | San Saba | |
| Columbus | Laredo | Sinton | |
| Crosbyton | Levelland | Sweetwater | |

Source: (5).

Table 11 shows 1989 statistics for Section 18 (rural) transit operators in Texas. It is noteworthy to observe the 1989 totals in comparison to those provided for the Metropolitan Transit Authorities for any time period.

Planning for the Future of Transit in Texas

In the coming years the transit industry in this country will need to respond to a number of challenges if it is to remain a viable component of our nation's transportation system. Financing will be needed for both capital and operating expenses, costs must be controlled, efficiency needs to be improved, and effective ways of serving new and emerging markets should be developed. The nature of these responses will be molded both by external factors such as federal, state, and local policies toward transit and competing modes and by the industry's ability to implement fundamental changes in its management and service delivery philosophies.

As will be seen in the following discussion of the challenges facing the transit industry in Texas, the basic issues confronting transit in Texas do not differ substantially from those experienced by other states and cities in this country. However, it is still useful to briefly review these issues, as the discussion provides the basis for a preliminary enumeration of potential roles for the Public Transportation Division (D-11) in addressing the state's transit needs.

Table 11.
1989 Statistics for Section 18 (Rural) Transit
(000)

| Location | Capital Expense | Operating Expense | Revenue | Passengers Carried | Vehicle Miles |
|-----------------|-----------------|-------------------|--------------|--------------------|-----------------|
| Alice | 81.3 | 303.8 | 8.8 | 63.2 | 317.7 |
| Amarillo | 144.6 | 711.1 | 28.8 | 24.6 | 470.9 |
| Aspermont | 0 | 249.2 | 6.0 | 12.2 | 196.6 |
| Austin | 0 | 1,680.7 | 87.0 | 287.0 | 1,213.9 |
| Beeville | 0 | 399.7 | 11.4 | 75.8 | 186.6 |
| Bryan | 475.0 | 1,429.4 | 5.3 | 189.5 | 691.3 |
| Cleburne | 6.3 | 102.7 | 12.6 | 15.1 | 57.2 |
| Columbus | 36.0 | 193.5 | 13.2 | 23.8 | 160.9 |
| Crosbyton | 100.7 | 594.0 | 6.5 | 65.8 | 408.5 |
| Crowell | 0 | 229.9 | 0 | 54.9 | 100.7 |
| Denison | 49.9 | 456.3 | 22.4 | 71.0 | 321.2 |
| Denton | 52.5 | 327.4 | 32.4 | 47.5 | 264.3 |
| Galveston | 0 | 383.9 | 0 | 79.3 | 299.8 |
| Glen Rose | 76.8 | 250.9 | 19.5 | 23.0 | 199.1 |
| Kingsville | 75.1 | 159.0 | 0.2 | 25.6 | 80.4 |
| Lamesa | 0 | 434.0 | 2.4 | 75.2 | 182.9 |
| Laredo | 128.2 | 261.1 | 3.3 | 65.8 | 218.1 |
| Levelland | 153.5 | 728.5 | 10.1 | 84.4 | 665.3 |
| Lufkin | 0 | 449.8 | 48.2 | 152.1 | 356.1 |
| McAllen | 338.2 | 591.3 | 5.4 | 215.5 | 694.4 |
| Mineral Wells | 20.0 | 179.7 | 24.7 | 42.1 | 172.9 |
| Rio Grande City | 69.3 | 435.9 | 0 | 117.9 | 260.6 |
| San Angelo | 24.6 | 150.0 | 2.3 | 37.8 | 70.5 |
| San Antonio | 0 | 250.7 | 0.6 | 86.8 | 321.7 |
| San Saba | 156.2 | 760.0 | 1.8 | 175.4 | 437.5 |
| Sinton | 56.2 | 356.1 | 1.7 | 48.5 | 192.6 |
| Sweetwater | 115.5 | 297.8 | 4.1 | 62.8 | 162.0 |
| Terrell | 86.5 | 157.6 | 4.2 | 18.8 | 99.0 |
| The Woodlands | 0 | 1,280.1 | 515.9 | 354.6 | 557.0 |
| Uvalde | 71.7 | 314.6 | 9.8 | 43.7 | 307.3 |
| Victoria | 48.0 | 359.6 | 24.7 | 80.9 | 335.3 |
| Waco | 92.5 | 110.2 | 4.4 | 65.4 | 205.3 |
| Weatherford | 21.2 | 321.0 | 43.6 | 34.4 | 294.6 |
| Totals | 2,479.7 | 14,909.6 | 961.5 | 2,820.3 | 10,502.2 |

Source: (6).

Current and Emerging Issues

The results of a 1988 survey (7) of state and local transportation agencies indicate that the most pressing concerns of the transit industry in Texas are in the following general areas: 1) Improving coordination and cooperation between local service providers and state and local transportation agencies; 2) Defining and quantifying the appropriate role (s) of transit in meeting the state's mobility needs; and 3) Developing innovative, broad-based funding strategies for the state's transit systems. The survey respondents also cited the need for the development of training and continuing education programs for transit and

transportation agency personnel, studies concerning the development and testing of technologies to comply with EPA clean air standards, improved human resources management programs, and transit service strategies for serving suburban and low density travel demands.

The key findings of the 1988 survey are summarized in the following pages. However, it must be emphasized that the intent of the 1988 survey (7) was to identify general (topical) areas of concern. Efforts are currently underway to develop a comprehensive transit research agenda for the State of Texas¹. As a result, the following discussion should be viewed as a general framework for the development of a comprehensive and coordinated transit research program for Texas.

The results of the 1988 survey (7) indicate that the lack of coordination between service providers and between local and state transportation agencies is the state's most important transit problem. Those respondents who cited this problem area frequently referred specifically to the need for a clarification of the role of the Public Transportation Division (D-11). Other needs cited by the survey respondents included:

The need for coordinated transportation planning at the state level (including short- and long-range state transportation plans);

The need to consolidate all transportation-related functions (including regulation) under a single state agency (i.e., creation of a state DOT);

The need for improved coordination between local transit agencies and local and state highway agencies in planning highway improvements;

The need for policies/guidelines concerning the development of "transit-friendly" roadways (sidewalks, pedestrian access);

¹A Transit Research Task Force, comprised of representatives from transit agencies, service providers, state, regional, and local governments, and the private sector, has been formed to accomplish this effort.

The need for policies/guidelines concerning use of transit sales tax revenues for street improvements; and

The need to consider transit in land-use policy decisions.

The second most important problem identified from the survey is in the area of quantifying the role(s) of transit in meeting the state's mobility needs. Specific issues cited by survey respondents included the following:

Identification of cost-effective roles for transit;

Costs and benefits of transit;

Identification of appropriate spending levels for transit;

Procedures for comparing, ranking, and selecting transit projects;

Comparative assessments of alternative transit modes;

Development of standard transit system performance measures;

Guidelines for identifying and discontinuing unwarranted transit services; and

Development of a statewide transit system performance database.

The third most important problem identified in survey was the need to develop innovative, broad-based financial strategies for transit. In addition, several of the state's rural and small city transit service providers raised questions concerning the equity of current procedures for allocating state funds to transit systems in Texas. The following needs in the area of transit funding are representative of those cited by the respondents:

Need to conduct a comprehensive evaluation of alternative funding sources (public and private) and assess the applicability of these sources to Texas;

Evaluate alternatives to using state general revenues to fund transit; and

Evaluate current approaches for allocating transit funds (state and federal allocation procedures).

The concerns expressed in the area of training focused on the need to develop and implement ongoing programs to provide information and training on the state-of-the-art in planning, operating, and managing public transportation systems. Many of the respondents stressed the need to develop training programs that would be of interest to all state and local transportation agencies (i.e., training programs should not be tailored solely or specifically for transit agency personnel). The following general topic areas for training programs were suggested:

Roles of public transportation;

Relationships between transit and highway improvements;

Local, state, and federal regulations and funding sources;

Transit technologies;

Transit planning methods;

Grant application procedures;

Computer software for transit planning, operations, and management; and

Vehicle specifications, quality control, and procurement practices.

The U.S. Environmental Protection Agency (EPA) has established strict emission standards for transit buses. These standards are scheduled to take effect in 1991. Currently, a proven technology for meeting the EPA standards does not exist. As a result, there is a need for studies concerning the use of alternative fuels and/or technologies in meeting EPA's clean air standards.

The survey respondents recommended several study topics concerning appropriate strategies for making more effective use of human resources. General topics cited by the respondents included the following:

Identification of organizational structures that foster successful staff/board of directors relationships;

Methods for attracting and keeping good managers;

Improving labor-management relationships;

Incentive programs for increasing labor productivity; and

Creating and maintaining a drug-free work environment.

Since the early 1970s, population and employment have shifted to the suburbs of many of our larger cities, and traditional fixed-route, radial transit systems have not efficiently served the resulting dispersed suburban trip patterns. The survey results indicate there is a need to 1) quantify the nature and magnitude of suburban travel demands, 2) identify and evaluate alternative transit service strategies for meeting these demands, and 3) identify and evaluate funding arrangements for providing these services.

The results of the survey indicate that the state should explore the development and application of computer and automation technologies to improve the efficiency of transit system planning, management, and operations. Typical needs suggested by the survey respondents include:

Development and testing of automated fare collection systems (to eliminate cash fare system and provide for implementation of distance-based fares);

Development and testing of automated passenger counting systems;

Use of electronic information display systems to aid the public in using transit systems;

Use of computerized maintenance information systems; and

Electronic surveillance systems for bus stops to reduce crime and vandalism.

The preceding review of the issues facing transit in Texas indicates, as noted earlier, that they are not necessarily unique to this state. Several common themes can be seen in the state's and nation's transit needs and problems. The need for increased efficiency through improved internal management practices, and greater cooperation and coordination between public transit and highway agencies and the private sector appear to be critical

factors in transit's survival. Funding and cost control measures are clearly concerns shared by the state's and the nation's transit operators. The development of a broader conception of transit that permits more effective pursuit of diverse market opportunities also appears to be a vital concern of the entire transit industry.

Roles of the Public Transportation Division

Current state legislation authorizes the Department to assume an active role in public transportation issues in Texas. Article 6663b of Title 116 of the Texas State Statutes states that the State Department of Highways and Public Transportation (Vernon's State Statutes, Vol. 19a, p. 22):

1) shall encourage, foster, and assist in the development of public and mass transportation, both intracity and intercity, in this state;

2) shall assist any political subdivision of the state in procuring aid offered by the federal government for the purpose of establishing or maintaining public and mass transportation systems;

3) shall conduct hearings and make investigations it considers necessary to determine the location, type of construction, and cost to the state or its political subdivisions of mass transportation systems owned, operated, or directly financed in whole or in part by the state; and

4) may recommend necessary legislation to advance the interests of the state in public and mass transportation.

While it appears that the Department has general authorization to pursue a wide range of transit-related issues, the following discussion of potential roles of the Public Transportation Division *will need to be evaluated not only in terms of current state enabling*

legislation, but in terms of the Divisions's current policies, priorities, programs, and staffing and funding levels as well.

The areas of concern presented in the preceding discussion, and the general solutions suggested within each of these problem areas, provide a very useful outline for identifying, in at least a preliminary way, those areas where the state could assume an active role in seeking and implementing more specific solutions. These general areas, along with the basic questions which need to be answered to define D-11's roles and responsibilities in each of these areas, are summarized below. Like the previous discussion concerning the issues and challenges confronting the state's transit systems, the following should be viewed as only a preliminary identification of the issues which need to be examined in much greater detail.

1) State Roles in Transit Funding. The basic issues which need to be resolved in defining D-11's roles in financing transit services in Texas include the following.

What are the financial resources (capital and operating) needed to support transit in Texas?

What are the potential funding sources, including innovative approaches?

What should the share be between different funding sources?

What level of local funding should be required?

What should the level of state funding be and what are potential sources?

What should the role of the department be in promoting the need for financial assistance for transit?

2) State Roles in the Administration of Transit Programs. To define its role and function in this area, the Department needs to address the following basic issues.

What reporting requirements should the Department require of providers?

What performance standards should the Department use to monitor providers?

Should performance standards be tied to funding?

What should the Department's role be in the administration of federal and state transit funds?

What standards should the Department use to evaluate new service requests and changes in service?

3) State Roles in Technical Assistance and Training. The basic questions concerning this area are the following.

What types and levels of technical assistance and training should the Department provide to transit agencies, service providers, local governments, and others?

What topics and areas should the Department focus its technical assistance and training activities on?

4) State Roles in Transit Planning. The following questions provide a preliminary identification of the planning issues which need to be examined in defining D-11's roles in transit planning.

What should the Department's role be in the various planning efforts occurring in the state? (These include the planning for different types of transit services, such as fixed route, demand-responsive, ridesharing, travel demand management (TDM), high-occupancy vehicle (HOV) facilities, high-speed rail, and other activities).

How should the Department interact with transit agencies, service providers, local governments, Metropolitan Planning Organizations (MPO's), and others on these planning issues?

5) State Roles in Communication and Coordination. To define its roles in this area, D-11 needs to develop and evaluate strategies directed at resolving the following.

What mechanisms should the Department use (newsletters, conferences, etc.) to ensure that ongoing communication and coordination exists between the federal, state, and local levels, service providers, MPO's, other SDHPT department's, and other groups?

The Public Transportation Division (D-11) has already made substantial progress in addressing many of these issues. The division has also indicated a desire to further refine its roles and functions. The material in this Chapter, along with the current efforts of the state's Transit Research Task Force, should provide the division with the basis for developing a comprehensive and coordinated transit program, and for clarifying the roles the division can play in implementing that program to meet the state's transit needs.

CHAPTER IV

SUMMARY

Transit systems in Texas currently provide services to the state's urban and rural residents who, due to age, income or physical limitations, do not have regular access to private means of transportation. Transit services designed to serve these transportation disadvantaged individuals are referred to in this report as "public transportation." This is the role that has historically been served by transit in Texas. To many Texans, when transit is mentioned, this is the role that comes to mind. This is an important role and one that transit is likely to continue to serve in Texas.

In recent years, several of the state's large urban areas have implemented transit services primarily intended to move large volumes of workers to and from major employment centers during peak commuting periods. These services meet an economic need rather than the social need served by public transportation, and are referred to in this report as "mass transportation." Express bus, and transitway and park-and-ride services are examples of mass transportation systems currently in operation in Texas. These services are most effective when used to serve high-volume movements between fixed points of concentrated activity along high-density corridors. This is a relatively new role for transit in Texas but it is being used effectively in several of the state's large urban areas.

Within many major activity centers, where parking is often scarce or restricted, travel distances can be come too lengthy to be served only by walking. In these situations, some form of transit is often necessary to serve an "internal circulation" function. A number of different types of services such as shuttle buses, trolleys, and people movers have been used to provide internal circulation. As the state's urban activity centers continue to grow, the provision of transit services to meet internal circulation needs will become increasingly important.

While the preceding description of the potential roles of transit is useful in categorizing transit services, it is important these not be viewed as all-inclusive, nor mutually exclusive roles. In fact, *a balanced, integrated transit system will typically include a hierarchy of services designed to serve all of these roles.* Moreover, while the following definitions of the roles of transit tend to emphasize the economic characteristics of the target populations of the respective roles, it must be stressed that *the use of transit is increasingly becoming a matter of choice rather than economic necessity.*

In order to take full advantage of the roles transit can serve in meeting the state's transportation needs, the transit industry will need to develop innovative responses to a number of current and emerging challenges. The basic challenges facing the transit industry in Texas are not unique to this state. Several common themes can be seen in the state's and nation's transit needs and problems. The need for increased efficiency through improved internal management practices, and greater cooperation and coordination between public transit and highway agencies and the private sector appear to be critical factors in transit's survival. Funding and cost control measures are clearly concerns shared by the state's and the nation's transit operators. The development of a broader conception of transit that permits more effective pursuit of diverse market opportunities also appears to be a vital concern of the entire transit industry. The nature of the transit industry's response to these challenges will be molded both by external factors such as federal, state, and local policies toward transit and competing modes and by the industry's ability to implement fundamental changes in its management and service delivery philosophies.

The challenges facing the transit industry in Texas provide a general indication of areas where the state may wish to assume a role in seeking and implementing appropriate responses. General topical areas where the state should clarify and refine its roles and functions include transit funding, the administration of federal and state transit programs, technical assistance and training programs, transit planning, and improved communication and coordination between local, state, and federal transit agencies.

The state has already made substantial progress in addressing many of these issues. The recent creation of a state Transit Research Task Force clearly demonstrates the desire to further refine the state's roles and responsibilities in meeting transit needs in Texas.

REFERENCES

1. U.S. Department of Transportation. National Transportation Strategic Planning Study. Washington, DC, March 1990.
2. American Public Transit Association. Background Papers for the APTA Transit 2000 Task Force. Washington, DC, January 1988.
3. U.S. Department of Transportation. Moving America: New Directions, New Opportunities. A Statement of National Transportation Policy: Strategies for Action. Washington, DC, February 1990.
4. Transportation Research Board. "Research for Public Transit: New Directions." TRB Special Report 213. Washington, DC, 1987.
5. Texas State Department of Highways and Public Transportation. Plans for Public Transportation in Texas. Public Transportation Division, Austin, TX, October 1988.
6. Texas State Department of Highways and Public Transportation. Preliminary 1989 Statistics for Section 18 (Rural) Transit. Public Transportation Division, Austin, TX, May 1990.
7. Stokes, R.W. Transit Study Needs in Texas. Technical Report 2004-1F. Texas Transportation Institute, College Station, TX, September 1989.
8. Smerk, G.M. The Federal Role in Urban Mass Transportation. Indiana University Press, Bloomington, IN, 1991, p. 292.