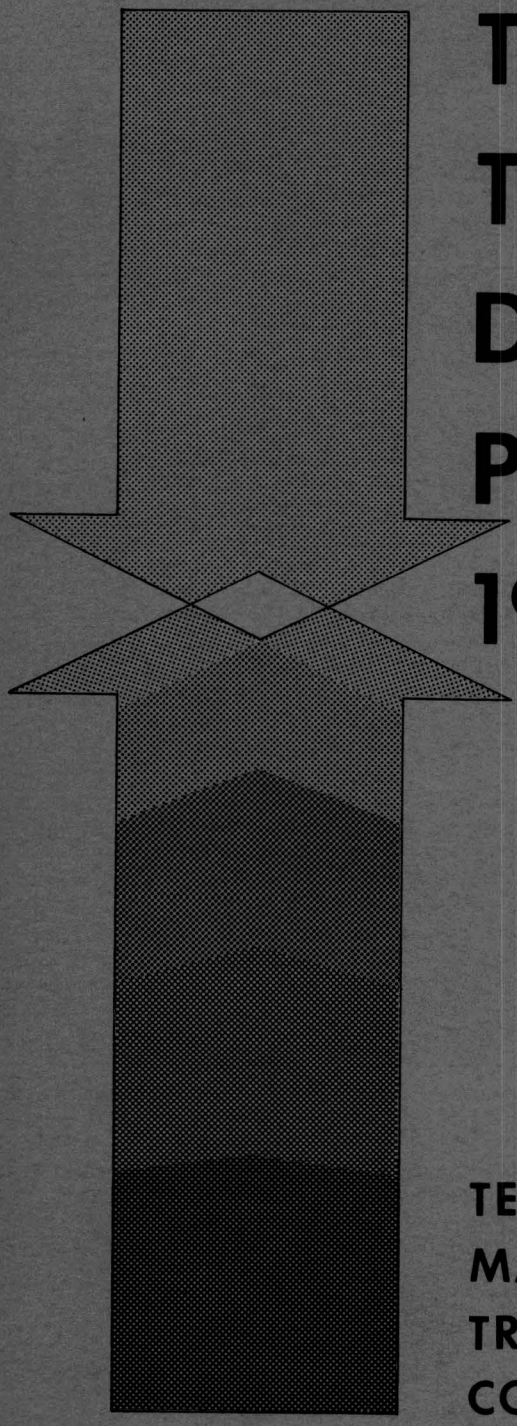
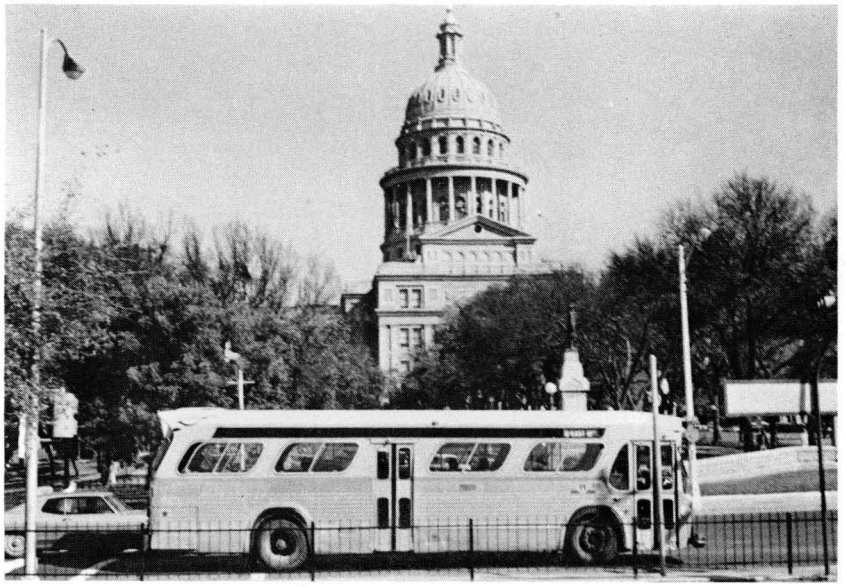


TEXAS TRANSIT DEVELOPMENT PLAN 1975 – 1990

TEXAS
MASS
TRANSPORTATION
COMMISSION

The preparation of this report was financed in part through a grant for technical studies from the United States Department of Transportation under the provision of Section 9 of the Urban Mass Transportation Act of 1964 as amended.

TEXAS TRANSIT DEVELOPMENT PLAN, 1975 - 1990



Prepared By The Texas Mass Transportation Commission

With Assistance From
Texas Transportation Institute
And
Wilbur Smith & Associates, Inc.

In Cooperation With The
Urban Mass Transportation Administration,
Department Of Transportation

December 1974

TEXAS
MASS TRANSPORTATION
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Members of the 64th Legislature

The Texas Mass Transportation Act, Article 4413 (34) V.A.T.S., directs the Texas Mass Transportation Commission to develop and continuously maintain a comprehensive master plan for public mass transportation development in the State of Texas. This report was prepared and is submitted in accordance with that mandate.

In order to maintain a report that accurately reflects the proposed transit developments in Texas, the Texas Transit Development Plan will be reviewed annually to evaluate the current validity of assumptions, projections and recommended transit improvements. A reevaluation of the underlying assumptions and projections will be made as warranted by changing conditions or at five-year intervals.

The information contained within the report reflects the current status of transit and intercity passenger transportation in the State and the transit improvements planned to provide an alternate form of mobility for the citizens of the State.

Sincerely,

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ACKNOWLEDGMENTS

The material presented herein was developed by the Texas Mass Transportation Commission in cooperation with the Urban Mass Transportation Administration, U.S. Department of Transportation and with assistance provided by the Texas Transportation Institute and Wilbur Smith and Associates, Inc.

Special recognition is given to Dr. Ronald W. Holder of the Texas Transportation Institute, Texas A&M University, author of the report entitled "Transit in the U.S. and Texas: Past, Present and Future" which was used as the source document of the historical data and text presented in Chapters 1 and 2 of the report. Dr. Holder is also the author of the report entitled "Rail Passenger Transportation in Texas" which was used as the source document for intercity rail travel and commuter travel in Chapter 8. Several of the photographs used in this report were taken from the slide library on transit prepared for the Texas Highway Department and the Texas Mass Transportation Commission by Dr. Ron Holder. The Commission is grateful to Dr. Holder for his continuing assistance.

The Commission also wishes to express its appreciation to the Texas Highway Department; the Texas Railroad Commission; the Regional Councils of Governments; Cities in Texas especially those over 50,000 population; the transit operators of the state; and to Mr. Charles P. Zlatkovich, Bureau of Business Research, University of Texas at Austin for assistance in gathering information used in the preparation of this report.

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SUMMARY

SUMMARY

Introduction

Under the legislation which created the Texas Mass Transportation Commission (House Bill 738, 61st Legislature), the Commission is directed to "develop and maintain a comprehensive master plan for public mass transportation development in the state". . .and to "correlate the master plan with plans of the Texas Railroad Commission and other agencies or departments concerned with public transportation". [V.A.T.S. 4413(34)]

This Texas Transit Development Plan, 1975-1990, reviews urban transportation development in the United States and the State of Texas, lists goals and objectives adopted by the Texas Mass Transportation Commission as guidelines for implementation of mass transportation development policies established by the Texas Legislature, projects mass transportation requirements in Texas for 1975 to 1980, and from 1975 to 1990, and examines financial implications for meeting these projected mass transportation requirements.

CHAPTER 1

Urban Transportation Development in the United States

Before the development of mechanized modes of transportation, American urban residents depended on walking, or animal power, for all their local trips. This meant that city dwellers had to find housing within short distances of factories and other employment centers.

With the growth of cities in northeastern United States after the start of the industrial revolution around the year 1800, urban areas developed with dense population patterns.

Streetcar Era - In the late 1880s, electric streetcars were introduced, and were an immediate success. Traveling at speeds of 10 to 15 miles per hour, the streetcar permitted the start of the trend toward suburban low-density living.

Bus Transit Systems - The motor bus began to replace streetcars about 1920, and now is the primary mode of urban public transit. Buses provided a flexibility for expanding and changing routes which streetcars did not possess.

Rail-Rapid Transit - Most of today's rail subway or elevated rapid-transit systems developed in the 1890s and early 1990s. Their speed was approximately 25 miles per hour.

Rail-rapid systems were developed in New York City, Boston, Chicago, and Philadelphia. Cleveland opened a short line in 1955 and expanded it to the municipal airport in 1968.

The Bay Area Rapid Transit (BART) System began partial operations in 1972, to serve the San Francisco-Oakland area. Washington, D.C., is constructing a system and Atlanta and Baltimore are finalizing plans for rail-rapid systems.

Trends in Transit Ridership

Transit ridership reached a peak in 1926, declined steadily until 1933, then began an upturn. World War II saw a tremendous increase in transit ridership, due to the interruption of new-car production and nationwide gasoline rationing. Ridership then dropped sharply after 1947, and has continued a downward trend until very recently.

In 1915, three in every four urban trips were made by transit. Today, less than five per cent of urban trips are by transit. One result was a growth in transit operating deficits, which caused many cities to lose transit service. In cities still retaining transit service, the majority of systems now are municipally owned and receive tax revenues to offset operating deficits.

CHAPTER 2

Urban Transit in Texas

Transit development in Texas generally paralleled the national pattern, except that Texas cities did not grow large enough prior to development of mechanized transit to necessitate high-density residential patterns. As a result, rail-rapid transit has not developed in any Texas city.

Service Terminations - In 1954, 37 Texas cities had transit service--all provided by private companies. By 1974, transit operations had ended in 19 of these cities. Of the 18 cities retaining transit service, only four were privately owned operations without local tax support. In the other 14 cities, transit systems are either municipally owned or receive assistance from local governments.

1974 Transit Survey - A survey of the 18 Texas cities with transit service, conducted in March of 1974, shows population densities range from a high of 3,555 persons per square mile in San Antonio to a low of 1,197 persons in Abilene.

Low population densities of this magnitude made provision of public transit service costly per vehicle-mile, due to low ridership generation rates.

A total of 1,624 buses were used by intracity transit systems in 1973, carrying 117,451,000 yearly passengers. Total transit revenues (including charter operations) were $38 million in 1973, while operating costs totaled $39 million.

CHAPTER 3

Transit's Role in Texas

The role of transit service in Texas communities can be discussed under three classifications: Public Transportation, Mass Transportation, and Specialized Transportation Systems.

Public Transportation - This service can be defined as provision of a minimal level of mobility for Texas residents who cannot afford, are unable to operate, or have no desire for, a private form of transportation.

According to the 1970 Census, over 992,000 persons, or nine per cent of Texas residents, are 65 or more years of age, and over 70 per cent live in urbanized areas. The Governor's Committee on Aging reports that surveys in 125 Texas counties show a need for public transportation is exceptionally high among these senior citizens.

Both the U.S. Congress and the Texas Legislature have recently adopted measures to assist senior citizens in meeting their transportation needs.

Over two million Texans or about 19 per cent of the population were at or below the poverty level in 1970; in addition 3/4 million more Texans were very near the poverty level. Many of these persons cannot afford to own an automobile and are dependent on transit.

Based on figures supplied by the Texas Rehabilitation Commission it is estimated that at least 500,000 urban residents in Texas have physical handicaps which prevent them from operating motor vehicles. When low-income and elderly residents are included, and persons who for various reasons are temporarily

without access to automobiles, a substantial portion of the state's population has regular or periodic need for public transit service.

Mass Transportation - This service is defined as the movement of large numbers of people in vechicles with high passenger capacity. The service is most effectively used in major travel corridors connecting high-density residential areas and focal points of concentrated activity--such as the central business districts of larger Texas cities, convention centers, medical complexes, and large shopping centers.

More recently, environmental and energy conservation considerations have given impetus to consideration of mass transportation proposals for even small rural or fringe cities which have well-defined travel corridors to another city or area.

Specialized Systems - The proposed River Taxi system for San Antonio is an example of a specialized transit system. Other specialized approaches include proposed systems for moving large numbers of people in high-activity centers, such as the proposed "people mover" systems for downtown Houston and San Antonio, and the planned El Paso-to-Juarez and Laredo-to-Neuvo Laredo systems.

Even in rural communities and areas, many elderly, poor, or handicapped persons must rely on other persons for personal mobility. One possible approach would be provision, with State or Federal funds, of small vans, or even automobiles, with the community supplying operators, fuel, and vehicle maintenance.

CHAPTER 4

Statement of Transit Goals

The Texas Mass Transportation Commission has adopted the following goals for provision of future transit service in the state:

1. To seek state financial assistance for all urbanized areas of Texas over 50,000 population, and to smaller communities desiring such assistance, in order to provide at least a minimal level of public transportation service.

2. To encourage the larger cities of Texas to develop or improve mass transportation systems in order to support community economic

growth, reduce traffic congestion and air pollution, and provide service to urban commuters making trips to and from work.

3. To develop and continuously maintain a comprehensive master plan for transit development, and to maintain a public information activity to inform the public of statewide transit needs and development.

CHAPTER 5

Future Bus Transit Travel in Texas

There now are 27 urbanized areas in Texas, each containing 50,000 or more persons. These areas had a total population of 7,150,422 in 1970. By 1990, the state is expected to have 32 urbanized areas. They will have a population of 10,205,000, and will contain 71 per cent of the state's 1990 population.

Three alternate projections were made of future bus transit ridership levels. The lowest transit projection was based on an assumption of a stabilized price and adequate supply of gasoline. The highest transit projection was based on an assumption of continuing increases in gasoline prices and periodic supply shortages. The third projection falls between the high and low extremes. This middle projection was adopted as a basis for a transit planning target figure. Local estimates were used where available to arrive at a target figure.

Under this approach, a 1990 bus ridership total of 361 million passengers was projected. This would be a 207 per cent increase over 1973 ridership. However, on a basis of yearly transit ridership per person in transit service areas, it represents only a return to 1960 per capita ridership levels. In view of recent increases in Texas transit ridership, and the planned expansion and improvement of bus transit service, it appears a reasonable estimate.

Future Rail Transit Ridership

The only rail transit service now operating in Texas in a small system linking downtown Fort Worth with a nearby parking lot. Projection of future rail transit ridership is based on planning work accomplished to date in several large cities.

The 1990 rail transit ridership estimate totals 67 million, of which 30 million riders would be on a planned Houston system, 34 million on a Dallas-Fort Worth system, and three million in El Paso--where local streetcar service is expected to resume in coming years.

1990 Ridership on Specialized Transit Systems

As many as five specialized transit systems may be operational in Texas by 1990. These include downtown "people-mover" systems in Houston and San Antonio, a river taxi service in San Antonio, and "people-mover" systems from El Paso-to-Juarez and from Laredo-to-Neuvo Laredo.

Summary of 1990 Ridership Estimates

Total Texas transit ridership in 1990 thus is projected at nearly 456 million. This would be 3.74 times the 1973 total transit ridership. Bus systems would account for approximately 79 per cent of the total; rail systems, nearly 15 per cent; and specialized systems, six per cent.

Each of these estimates will require periodic reevaluation in the light of new developments which will affect the underlying assumptions.

CHAPTER 6

Transit Capital Costs Up to 1980

Total cost of transit improvements up to 1980 is estimated at $1,367 million. This is made up of $801 million for bus systems, and $566 million for rail systems. No capital costs for specialized systems is anticipated by 1980. Thus, rail systems account for approximately 41 per cent of the projected capital costs up to 1980.

Spread over the five-year period of 1975 through 1979, this represents an average yearly expenditure of $273.4 million.

1980 Transit Operating Costs

For the five years from 1975 through 1979, transit operating deficits are estimated at $81 million, for a yearly average of $16.2 million.

As in the case of capital costs, Texas cities with tax-supported transit systems currently meet operating deficits through local general taxes. Recently passed legislation by the U.S. Congress provides Federal assistance to cities in meeting transit operating deficits.

With a 50 per cent matching ratio for operating assistance, an annual average of $8 million in local funds would be required to meet projected transit operating deficits over the next five years.

1990 Transit Operating Costs

By 1990, accrued transit operating deficits for Texas systems are projected at $266 million. This represents a yearly operating deficit of $16 million for 1975 through 1980, and $19 million yearly for 1980 to 1990.

However, as mentioned earlier, Federal legislation has recently been enacted that will assist local governments in meeting transit operating costs.

CHAPTER 7

Federal Capital Grants

Current guidelines in the 1974 National Transportation Study issued by the U.S. Department of Transportation would limit transit capital grants to Texas to $105.8 million yearly up to 1980.

State Transit Funding Proposals

It appears likely that some level of State transit capital improvement funding will be established in 1975. Levels being discussed range from $5 million up to $50 million yearly.

Under a maximum of $105.8 million in UMTA capital grants and $50 million in State capital grants, local governments would still need to supply $79.8 million yearly in 1975 dollars.

Currently, all such local funds for transit support comes from general tax revenues. It therefore appears clear that if the total 1980 transit capital improvement program is to be implemented, new financial resources will need to be made available to both the State and local governments.

Transit Capital Costs to 1990

Capital costs for all transit systems projected to be in operation by 1990 total $4.378 billion. For bus-related systems, this cost is projected at $1.8 billion; for rail systems, $2.3 billion; for specialized systems, $228 million.

This statewide total represents a yearly capital expenditure of $273.4 million for 1975 through 1980, and $301.4 million yearly for 1980 through 1989.

Even with Federal capital improvement funds totaling $105.8 million annually and assuming State-local funding will be provided to match this amount, an additional $167.6 million will be required to implement 1980 transit improvement needs.

A substantial increase of $28 million annually from Federal funding and State-local matching funds would be required in order to successfully implement the 1990 plan.

CHAPTER 8

Intercity Passenger Transportation by Bus

The only available regularly scheduled intercity passenger transportation in more than 1,000 communities in Texas is provided by bus lines. Seventeen intercity bus lines operated scheduled service between Texas cities, four others provided service into Texas cities from points in adjacent states or Mexico, and a number of other bus lines provided local or charter service in 1973.

The state's intercity bus systems are very important to Texas and are becoming more important each year. The lower cost of intercity bus service makes it the choice for many people who do not own automobiles and cannot afford air travel. However, bus travel is a relatively slower means of intercity travel. Special nonstop bus service between major cities can provide a competitive alternative to short-haul air service.

Problems With Intercity Bus Travel

A large problem in Texas is the lack of service to many of the state's smaller cities. There are 64 cities in Texas ranging in population from 1,000 to 5,000 which are without intercity bus service. In many places where bus service is available, connections are bad and passengers may travel many miles out of their way to reach their destination.

The lack of adequate terminal facilities and the need for newer buses in some areas are additional problems of intercity bus service in Texas.

Intercity Passenger Transportation by Rail

The recent energy shortage, reduction of speed limits, the curtailment of construction of new highway facilities, and increasing air transportation travel times due to congestion around older airports and remote locations of newer airports have resulted in increased interest in intercity rail passenger service.

The U.S. Government responded to this increased interest by enacting the Rail Passenger Service Act of 1970 which provided for the establishment of a non-governmental, for profit corporation (AMTRAK) that would operate a national system of rail passenger service.

At present all rail passenger service in Texas is operated by AMTRAK. The three existing rail passenger routes in the Texas study triangle (Dallas-Fort Worth, Houston, and San Antonio) are segments of national AMTRAK routes.

Service between Dallas and San Antonio is provided three days per week with a scheduled trip time of 8.5 hours. Houston to Fort Worth trip time is 6.5 hours and is provided daily. Taxi or bus trip time of one hour must be added to the Houston to Fort Worth trip time to obtain Houston to Dallas trip time. Service between Houston and San Antonio is provided three times per week with a scheduled trip time of 4.5 hours. Due to scheduling arrangements in New Orleans and Los Angeles, trains leave Houston at 9:50 pm in the evening and arrive at San Antonio at 2:15 am in the morning.

Problems With Intercity Rail Travel

Nationally AMTRAK is beset by numerous problems including inadequate and inefficient scheduling, inadequate staffing and lack of support from the railroads. In Texas, problems with the rail system are similar to national problems-i.e., more railroad cars are needed and improvements in train scheduling, connections and expansion of rail service are required. Also there are miles of railroad track and right-of-way under-utilized. Passenger train delays are caused in many cases by interference with freight trains and track conditions throughout the state cause AMTRAK operating speeds to range from 30 to 80 miles per hour. Passenger trains

encounter numerous grade-level street and highway crossings, and their speed is restricted to local slow orders in many communities.

Only one percent of intercity travel in Texas is by train due to the limited and slow service provided.

Estimated Intercity Passenger Demand

Total intercity travel will increase by between 400 and 500 per cent by the year 2000. The implications of this magnitude of increase are severe; the future demand for intercity travel will greatly exceed the existing capacity to serve travel. Assuming the per cent of bus passenger demand remains stable and assuming an intercity travel growth rate of 5.5 per cent occurs, bus passengers will increase 356 per cent by the year 2000. Rail passengers are projected to increase 76.2 per cent between 1980 and the year 2000 using the low estimate of rail passenger demand and the low growth rate in intercity travel of three per cent. From the preceding figures we can see that significant improvements are needed to all modes of travel.

It is recommended that the State of Texas take actions to assure that intercity travel can be accommodated. To do this the state needs to develop comprehensive intercity transportation plans for major intercity travel corridors with emphasis on rail travel in the "Great Triangle" of Texas and an in-depth study and recommendations for statewide bus travel.

Daily Commuter Travel

From the suburbs of the state's urbanized areas and the smaller cities located within 50 miles of these areas, a number of citizens commute daily to the central city to work. In Texas, commuting is accomplished by private automobiles, singularly or in car pools, for the most part. Several other means of commuting have been examined for applicability in Texas.

Some limited commuting takes place on conventional fixed schedule transit routes. In many areas, the "park and ride" concept of commuting is in operation. This is where passengers are picked up at peripheral locations and taken by express bus to the central business district.

Subscription bus service is an operation where a group of commuters charter a bus(es) from a private operator on a regular basis or purchase their own bus for commuting purposes to their place of employment. This type of service has recently been initiated between Conroe and Houston.

The greatest advantage of bus service over fixed guideway service is flexibility. However, unless preferential treatment is given to the bus, riders will suffer the same congestion delays as the people in private autos.

Commuter rail provides a daily passenger service, transporting persons from cities and towns outside of the metropolitan area to points within the metropolitan area. The average trip length nationwide for communter rail is approximately 22 miles.

Rail service generally serves very high ridership corridors, much higher than those that exist in Texas. Therefore, if rail service were provided in Texas, it appears that a light rail transit operation would have the greatest applicability for Texas commuter needs.

Railroad tracks presently exist that could accommodate commuter service in Houston, Dallas, Fort Worth, or San Antonio. However, commuter operation on these tracks would need to be coordinated with other trains and many of the tracks would require upgrading to serve passenger trains. Also some stations would need to be constructed and others renovated.

Potential Commuter Ridership

Preliminary estimates of potential commuter ridership in San Antonio, Dallas and Houston indicated enough demand for a more in-depth study to evaluate the potential of some form of commuter service for several Texas corridors. It is recommended that the State of Texas conduct further research and study in the area of commuter travel.

History of Urban Transportation Development

CHAPTER 1

Chapter 1

HISTORY OF URBAN TRANSPORTATION DEVELOPMENT

American urban residents originally depended on walking, or animal power, to make all their local trips. The average speed was about 4 miles per hour. This did not pose a problem, because cities were small enough in area for this means of transportation to be adequate.

With the beginning of the industrial revolution around the year 1800, particularly in northeastern United States, people began to move from rural areas to the cities, where better job opportunities were available and a higher standard of living could be obtained.

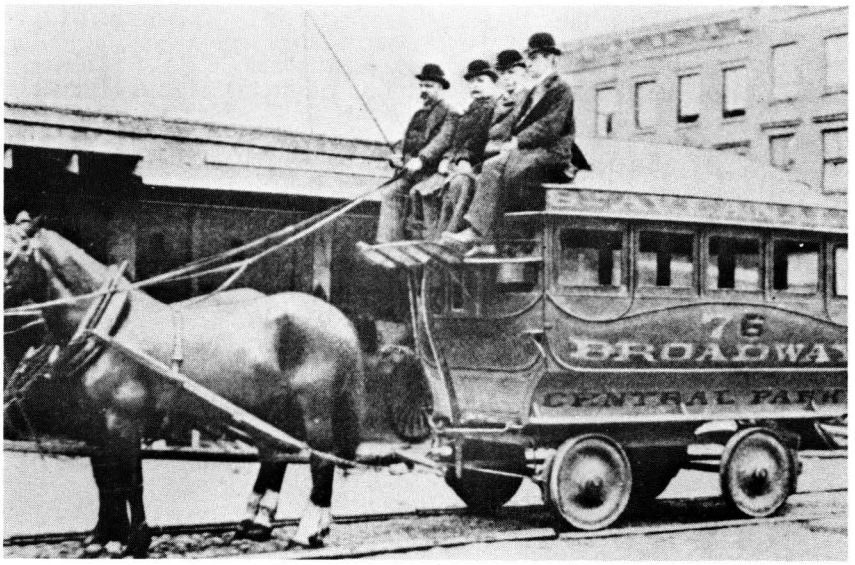
Early Urban Growth Patterns

Since no mechanized mode of transportation had been invented, the new city dwellers had to find housing within short distances of factories and other employment centers. This resulted in development of densely populated urban areas in the northeastern region of the United States.

Most of these cities did not have paved streets, and travel was difficult during inclement weather. For-hire transportation was offered in horse-drawn cabs and omnibuses--which were wagons fitted with seats.

Four-horse brake in U.S. - circa 1880.

In order to improve the quality of ride and to make travel easier in wet weather, many companies built railways in the streets, over which they operated horse-drawn steel-wheeled wagons called trams. These tramways provided a smoother ride, required fewer horses to pull the vehicles, and made movement in wet weather easier.



Horse drawn tram in New York City - circa 1850.

Development of Cable Cars

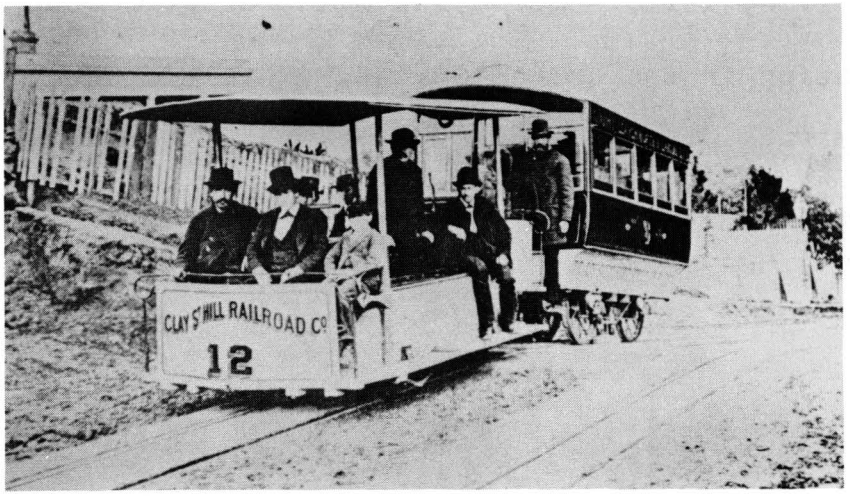
The general state of transportation development did not improve until the year 1873, when Alexander Hallidie developed the cable-car. This means of transportation replaced the horses used to power vehicles.

A large steam-operated machine pulled the vehicles by means of cables laid between the railway tracks. The cables were attached to each vehicle and pulled the vehicle over a loop track system. The limitations associated with cable-car operations were:

1. The maximum speed of operation that could be achieved was not much faster than a horse-drawn vehicle.

2. The number and locations of routes was limited, due to equipment requirements.

The primary advantage of the cable-car was the elimination of the large number of horses used to pull the vehicles, and related problems resulting from maintaining the horses within the city.



First cable car - San Francisco, 1873.

San Francisco, California was the original user of the cable-car, and today this usage continues--primarily as a tourist attraction.

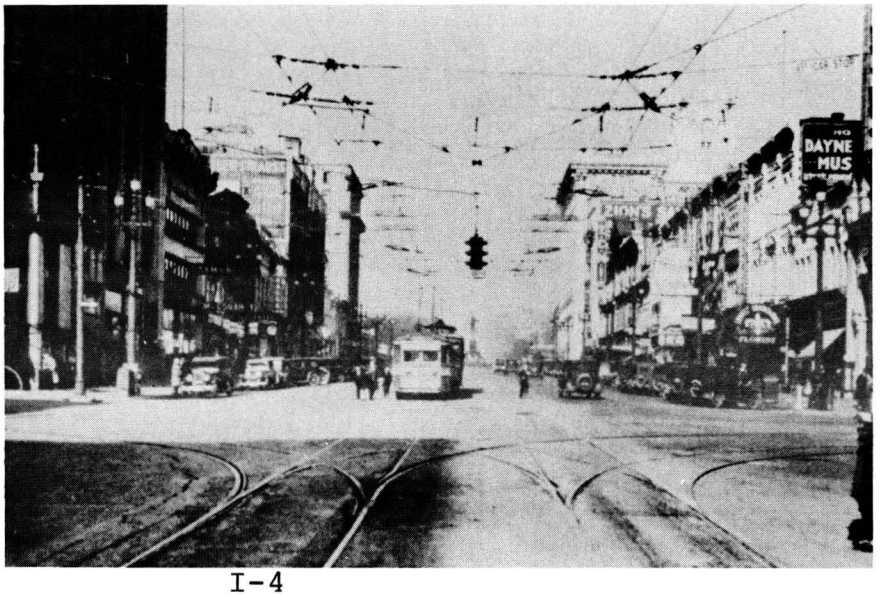
Streetcar Era

In the late 1880s, the first electric streetcar was used to transport passengers. It greatly increased the mobility of the urban resident and permitted cities to expand outward adjacent to the new streetcar routes.

This new form of urban transportation rapidly became the primary form of urban transportation. By 1890, the technology of streetcar operation had been developed to the extent that even many smaller cities and towns had streetcar systems in operation.

The streetcar was an immediate success. It provided a level of transportation service not previously equalled, with its speeds ranging from 10 to 15 miles per hour. Traveling at this increased speed, people could live greater distances from their employment and still get to and from work in the same amount of time. The streetcar permitted the beginning of the trend toward suburban low-density living.

By 1917, some 30,000 miles of streetcar lines were in operation in the United States. This was equivalent to approximately one mile of streetcar line for every 1,500 urban citizens.



Overhead lines and tracks required for streetcar in Salt Lake City in 1920s.

Bus Transit Systems

The motor bus began to replace streetcars in the United States about 1920, and today is the primary mode of public transit. Motor buses were popular in England for about 20 years prior to their introduction in the United States, and even steam-powered buses were operated in London for a time.

Transit companies began using buses to replace their streetcar lines because buses were more compatible with the flow of traffic on the streets. Motor buses also provided a flexibility for expanding or changing routes, which fixed-route streetcars did not possess.

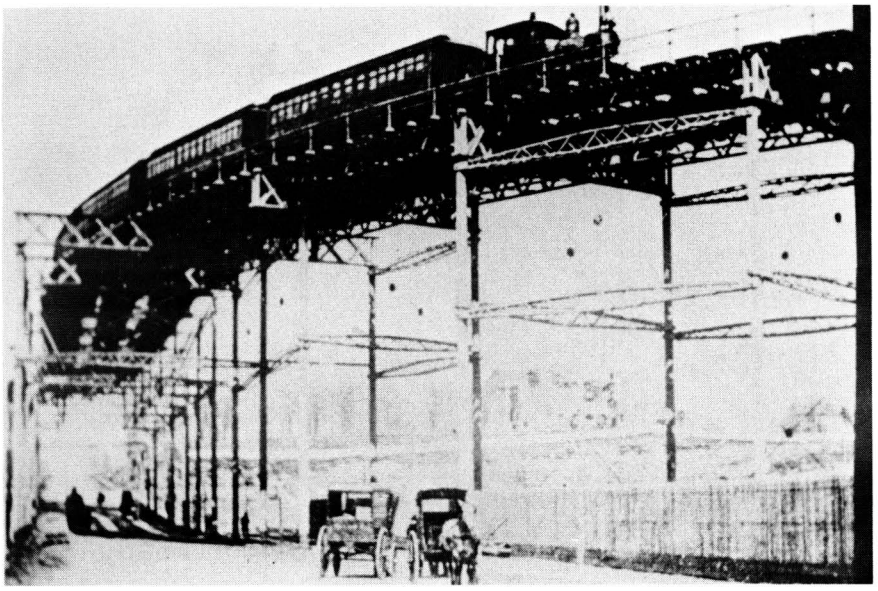
Double-decker bus used in New York - circa 1915.

Rail-Rapid Transit Systems

In the 1890s and early 1900s, a few cities were already so densely populated that their downtown streets could not adequately accommodate pedestrians, wagons, and streetcars. Therefore, it was necessary to provide separated rights-of-ways for streetcars, in subways or on elevated structures.

Most of today's subway or elevated transit systems were initiated in this period. The use of exclusive rights-of-way resulted in an increase in speed over that of the common streetcar, to a maximum of approximately 25 miles per hour. This new development in transportation was called "rail-rapid transit"--and it was rapid, compared to the alternatives available.

New York City Systems - Several elevated transit lines were in operation in New York City in the 1890s. The first subway in New York City was opened in 1904. Two additional subways were added in the 1920s. In 1940, all of these transit systems were purchased by New York City. They continue to be operated as part of the present-day system.



Elevated railroad with passenger cars pulled by steam engine - New York City, Nineth Avenue, 1875.

Boston Subway - Boston began the first subway operation in America in 1897. An extension of this system was made in the 1920s and again in the 1960s.

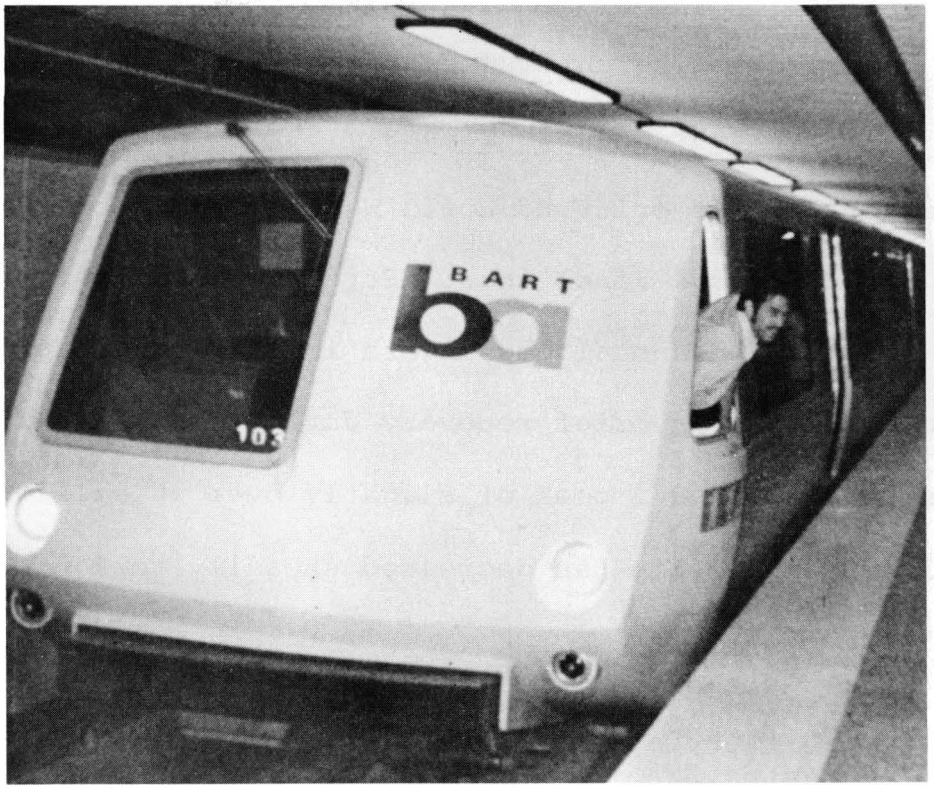
Chicago Elevated System - Chicago's rail-rapid transit system opened in 1897 and was an all-elevated system until 1943, when the first subway was opened.

Philadelphia System - Philadelphia started its first line in 1908, with subsequent additions in 1922, 1928, and 1936.

Some additions were made to these systems in the 1920s and 1930s, but there were no significant changes in the systems until after World War II.

Cleveland Route - Cleveland opened a short line in 1955 and extended it to the municipal airport in 1968.

Post-World War II Systems - The only completely new system constructed since World War II is the Bay Area Rapid Transit (BART) System, partially opened in 1972 to serve the San Francisco-Oakland Area. Washington, D. C. is currently constructing a RRT



BART train in subway station, 1973.

system and Atlanta and Baltimore are finalizing designs for rail-rapid transit.

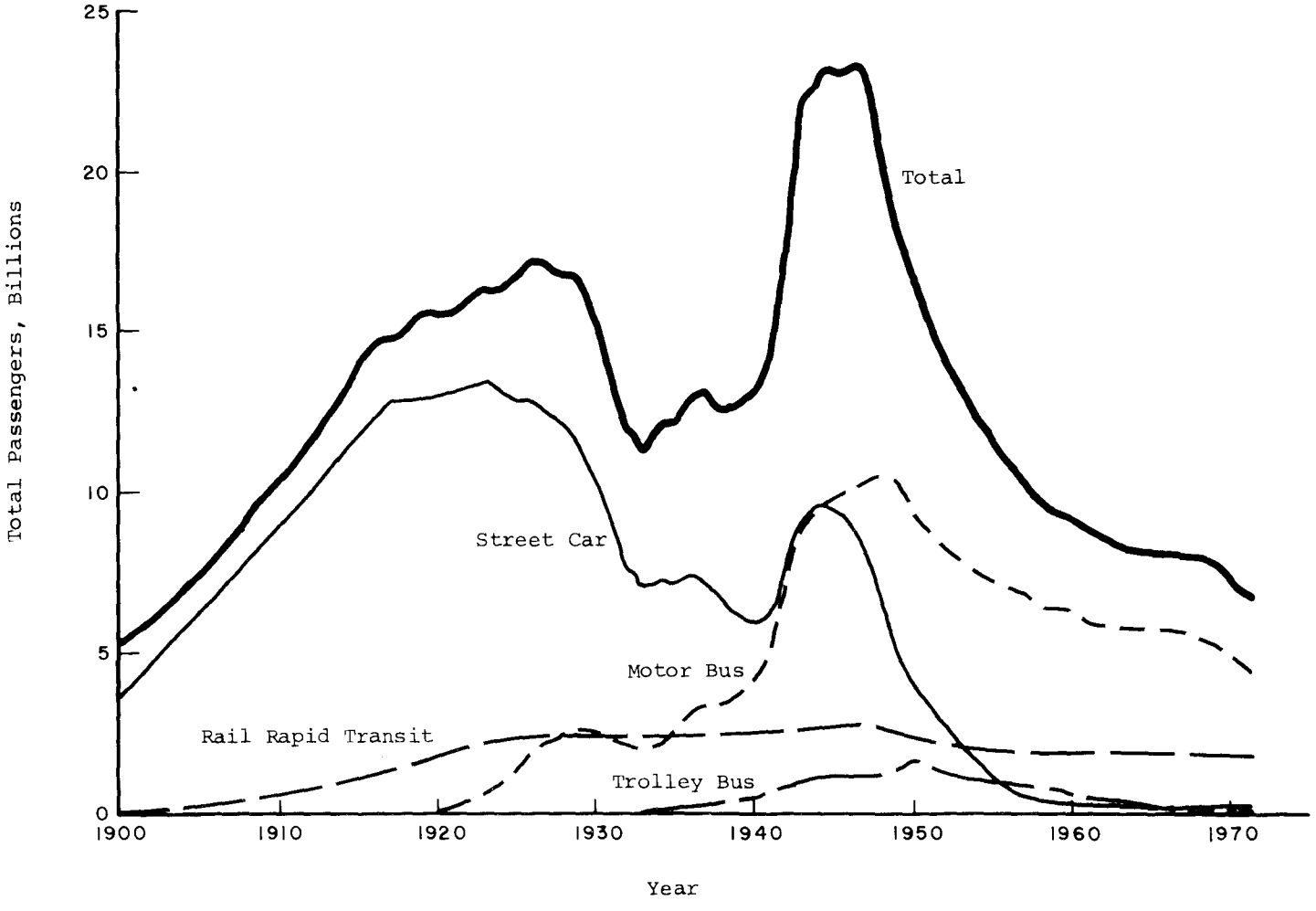
Trends in Transit Ridership

Changes in the usage of various modes of transit during the last fifty years are indicated by the data presented in Figures 1.1, 1.2, and 1.3. As shown in Figure 1.1, transit ridership reached a peak in 1926 and then began a decline for the next seven years. It reached a temporary low in 1933 and then increased slowly until the start of World War II.

With the beginning of World War II, a tremendous increase in transit usage was realized, due to stoppage of new-car production and nationwide gasoline rationing. Ridership dropped very sharply after 1947, leveled out some during the mid-1960s and has been decreasing until very recently.

Streetcar and Bus Trends - Streetcars were the primary modes of transit prior to World War II, and motor buses have been the dominant mode since then. Streetcar ridership reached a peak of 13.5 billion annual passengers in 1923, and has declined since then except for a brief recovery during World War II. Motor bus ridership reached a peak of slightly over 10 billion passengers in 1949. Ridership has decreased steadily to 4.5 billion passengers in 1972.

FIGURE 1.1
TRANSIT RIDERSHIP TRENDS IN THE U.S.A.

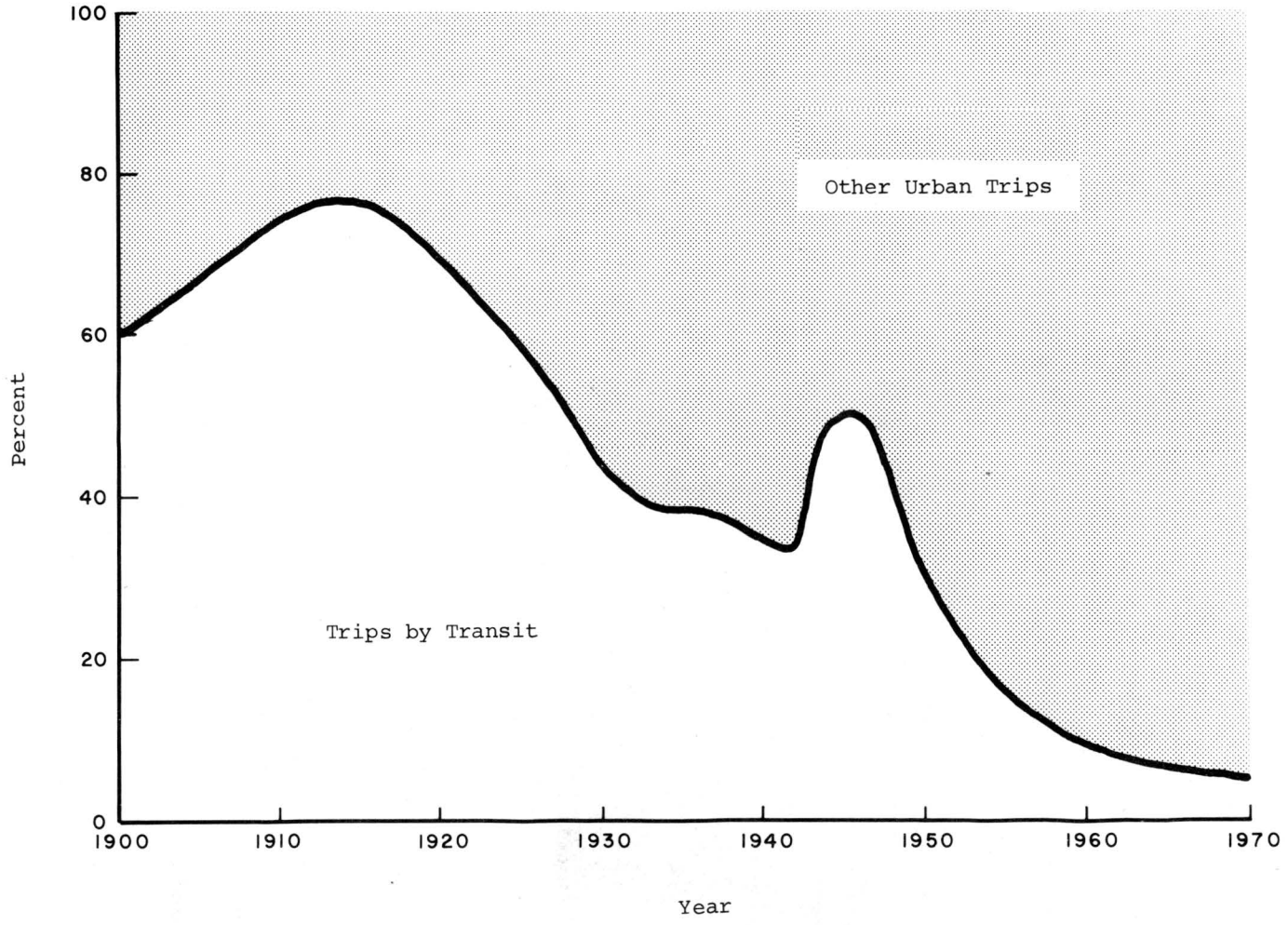


Sources: Street Railway Journal (1900-1908) Dewees, Decline of American Street Railways (1922-1950)
Electric Railway Journal (1908-1930) ATA, Transit Fact Book (1935-1970)
Census of Transportation (1902-1927)

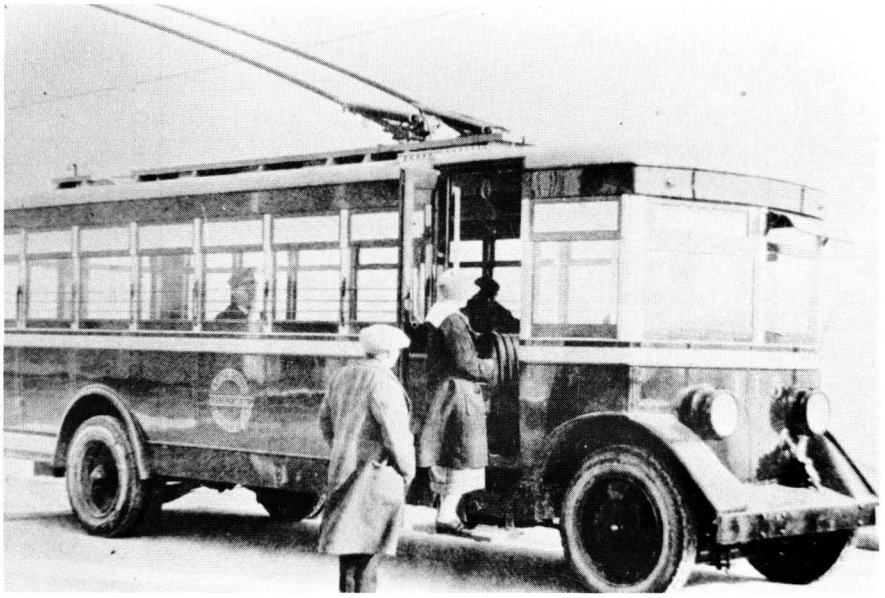
FIGURE 1.2
TRENDS IN THE AVERAGE NUMBER OF TRANSIT TRIPS
MADE BY URBAN RESIDENTS EACH YEAR

Sources: Transit Ridership - Same as for Figure 1
Urban Population - Bureau of Census

FIGURE 1.3
TRANSIT TRIPS AS A PERCENTAGE
OF ESTIMATED TOTAL URBAN TRIPS



Trolley Buses - Trolley buses (electrically-powered, rubber-tired vehicles) were used to replace streetcars on some lines after 1935. However, trolley buses never became very popular and now are virtually extinct.



Trolley bus in New York about 1920.

Rail-Rapid Transit - Rail-rapid transit ridership has remained relatively constant over the last 50 years. However, due to the decline of ridership on other modes, the per cent of total transit ridership carried by rail-rapid transit has increased from 12.5 per cent in 1922 to 29 per cent in 1972.

Transit Trips Per Urban Resident - Total transit ridership over the past fifty years, as shown in Figure 1.1, is not a true reflection of the changes in transit usage. During this period, urban population increased from about 50 million to 150 million.

While total ridership reached a peak during World War II, the average number of transit trips made by urban residents each year was about the same during World War II as it was during the 1920s, as illustrated in Figure 1.2.

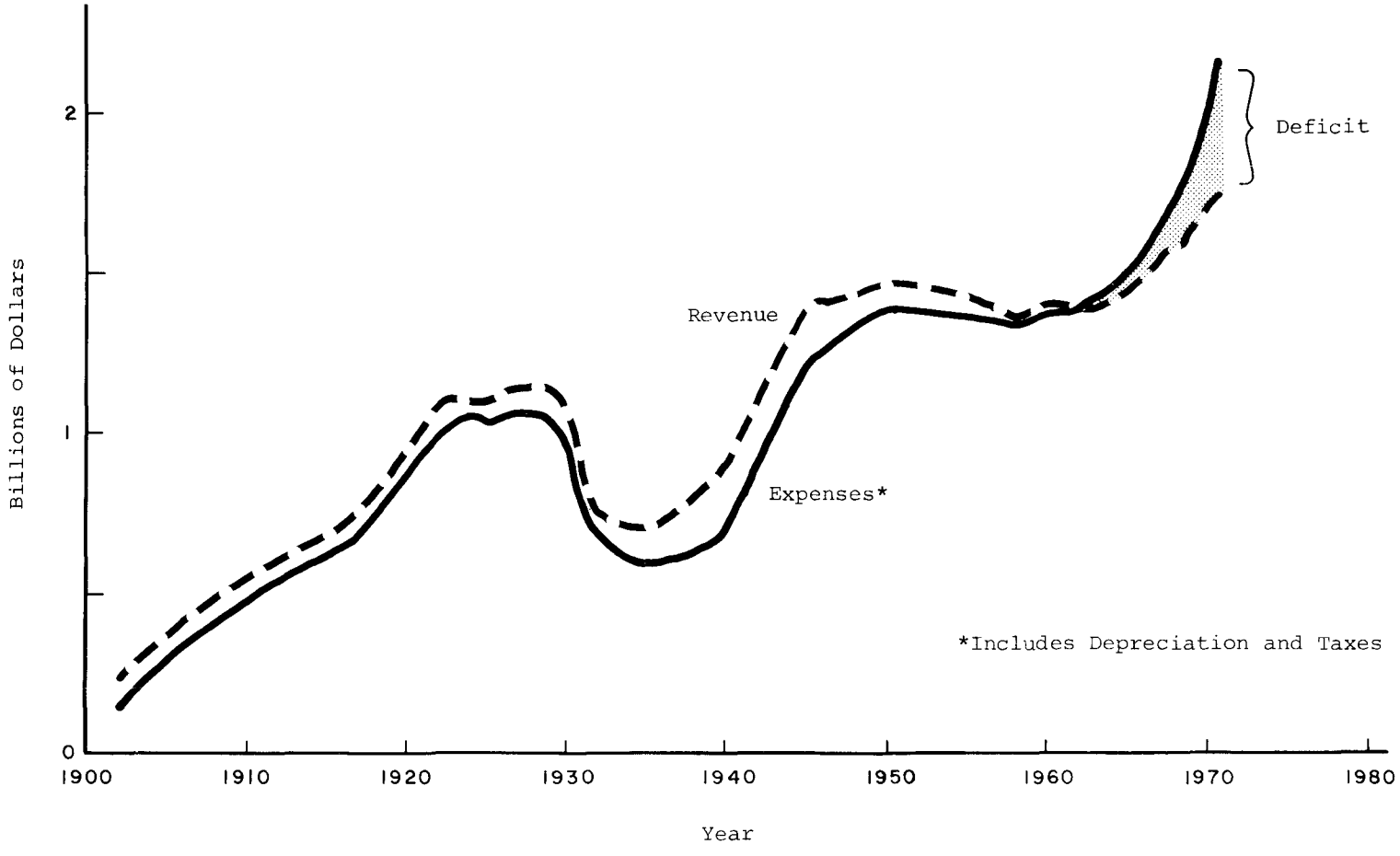
Transit's Changing Role

Urban transportation studies conducted since World War II have shown that the total number of daily trips made by an average resident has been increasing rapidly. However, the reliance upon transit by urban residents has sharply decreased over the past 50 years, except for a slight increase during World War II, as shown in Figure 1.3.

In 1915, approximately three out of every four urban trips were made by transit. Today, fewer than five per cent of urban trips are served by transit. Obviously, the role of transit has changed from being the primary form of urban transportation to one of serving limited and specialized needs.

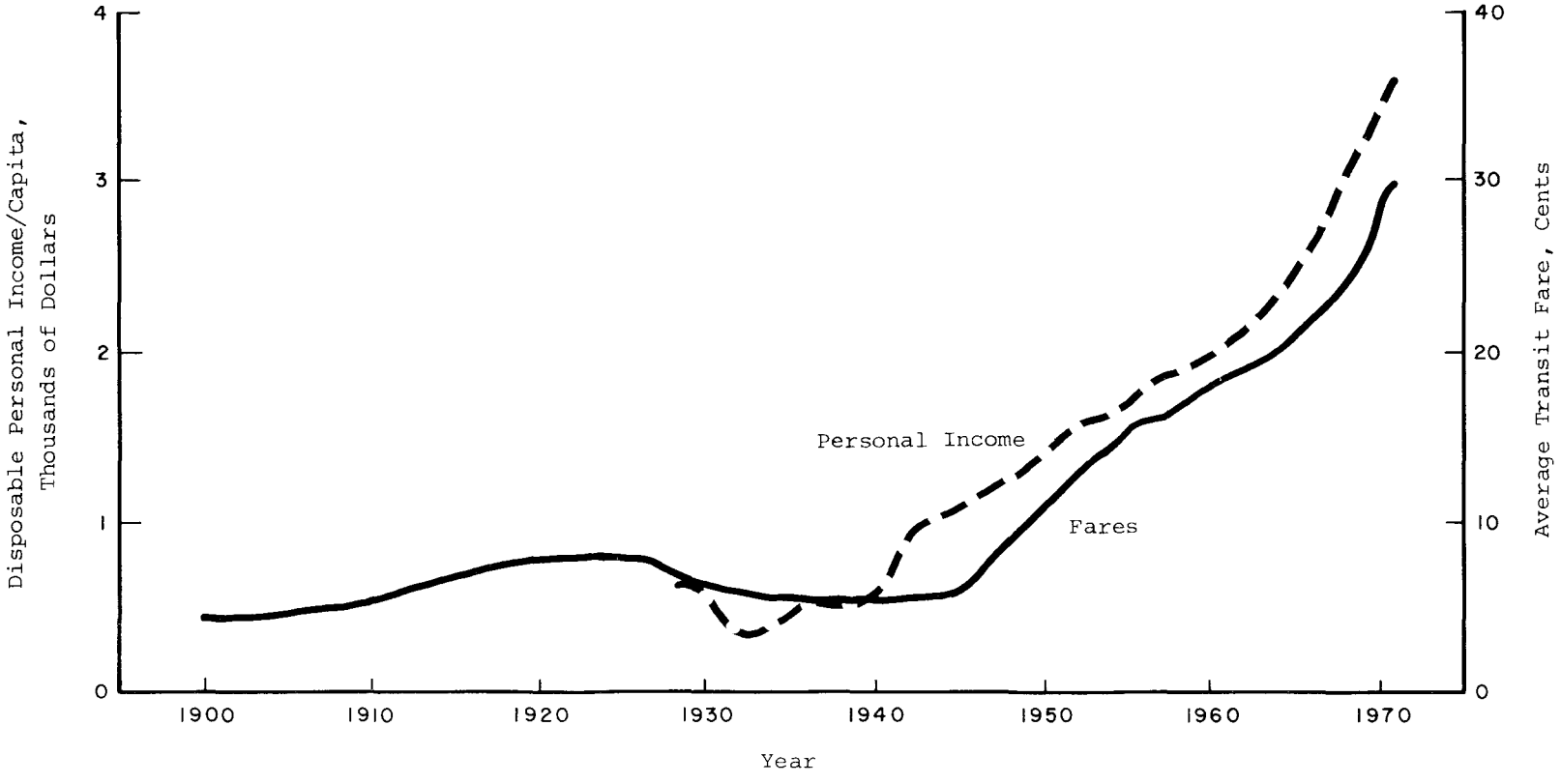
Deficit Operations - This decreased dependence upon transit by urban residents has generated problems for the transit industry. Despite frequent fare increases, revenue has not increased as rapidly as operating expenses, as indicated in Figure 1.4. Consequently, the transit industry has sustained increasing deficits in recent years.

FIGURE 1.4
OPERATING CONDITIONS OF U. S. TRANSIT INDUSTRY



Sources: Street Railway Journal (1900-1908)
Electric Railway Journal (1909-1930)
Census of Transportation (1902-1927)
ATA, Transit Fact Book (1935-1970)

FIGURE 1.5
TRENDS IN PERSONAL INCOME AND TRANSIT FARES



Sources: Transit Fares - Street Railway Journal (1900-1908)
Electric Railway Journal (1908-1930)
Census of Transportation (1902-1927)
ATA, Transit Fact Book (1935-1970)

Personal Income - Economic Report of the President, 1972

The total industry-wide deficit for 1973 is estimated to be $630 million. Approximately 25 per cent of this deficit is attributable to rapid-rail transit operations, which carry approximately 29 per cent of total transit passengers.

In 1920, almost every transit system in the nation was owned and operated by private enterprise. Due to increasing financial troubles, many of these privately owned systems either ceased operations entirely or have been taken over by public agencies.

Factors in Transit Decline

A logical and reasonable explanation for the rapid decline of transit in America is necessary to understanding the current situation of the transit industry. The following factors are most frequently cited as the major contributors to this decline:

1) Increasing fares,
2) Deteriorating service,
3) Increasing family incomes,
4) Increasing automobile ownership, and
5) Decreasing urban population densities.

Statistical information relative to these factors is presented in Figures 1.5, 1.6, 1.7, and 1.8.

Fare Increases - Transit fares have increased steadily since 1945--the period of most rapid decline in ridership as shown in Figure 1.5. However, disposable personal income per capita in the nation has increased even faster than transit fares.

Even with the higher fares of today, the cost to make an urban trip via transit usually is less than the cost of driving an automobile. Increased fares were the result of declining transit usage, rather than the cause of the decline.

However, increased fares may have contributed to a more rapid decline in usage. Figure 1.6 illustrates the historical trends for the average transit fare and total revenue passengers in the nation.

Transit Service Levels - Trends for two of the primary measures of the "level-of-service" provided by the transit industry--the age of transit vehicles being used, and the number of vehicle-miles of service provided--are presented in Figures 1.7 and 1.8.

These curves show that shortly after World War II, while ridership was declining most rapidly, transit vehicles in the fleet were newer than at any time since the turn of the century.

Also, the rate of decrease in vehicle-miles of transit service has been much slower than the decline in ridership, which indicates a reluctance of transit operators to curtail service.

Thus, it again appears that any deterioration in transit service has been more a result of declining ridership rather than a causative factor.

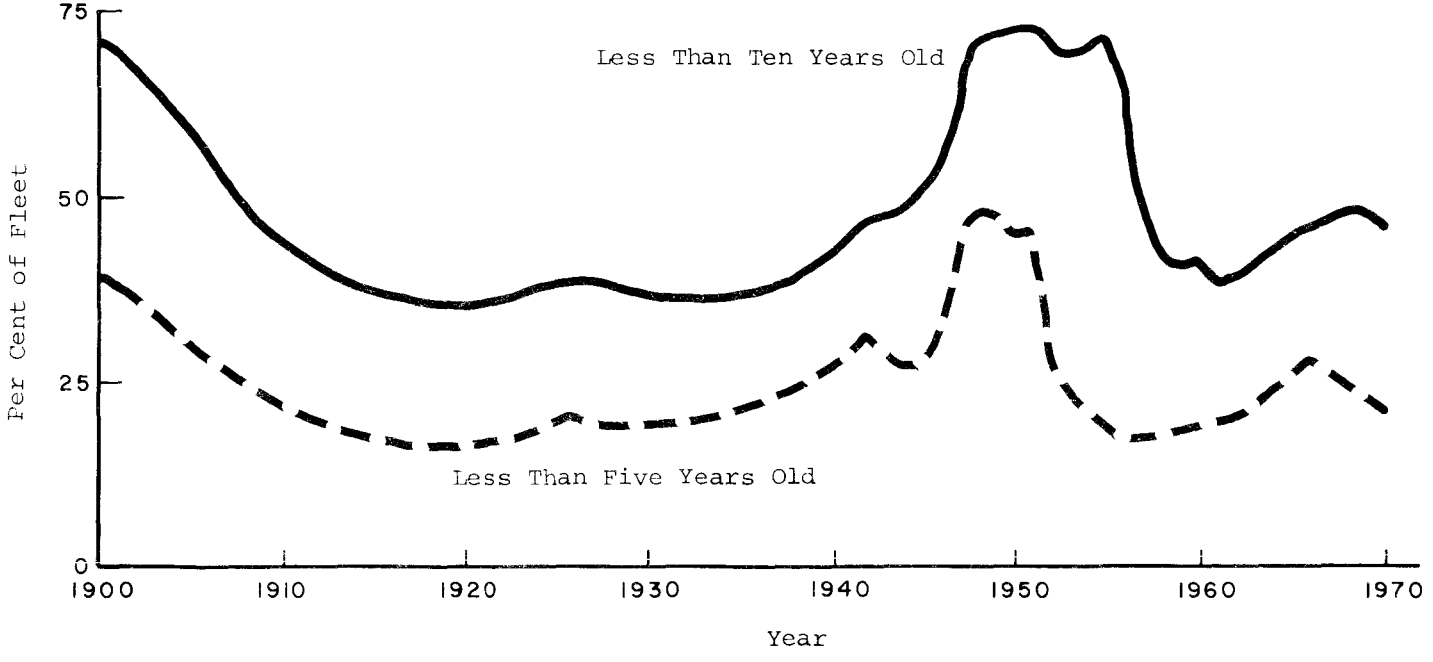
Growth in Auto Ownership - As personal incomes increased, Americans began satisfying their mobility needs with private transportation--the automobile.

Peak hour congestion on downtown street - Dallas, 1973.

Automobile ownership increased from one car for every 13 persons in 1920 to one auto for every 2.3 persons in 1970. In the last quarter-century, auto ownership has increased parallel to the growth in U.S. population, as illustrated in Figure 1.9. This increased availability of automobiles has been the chief factor in the decline in transit use in the U.S.

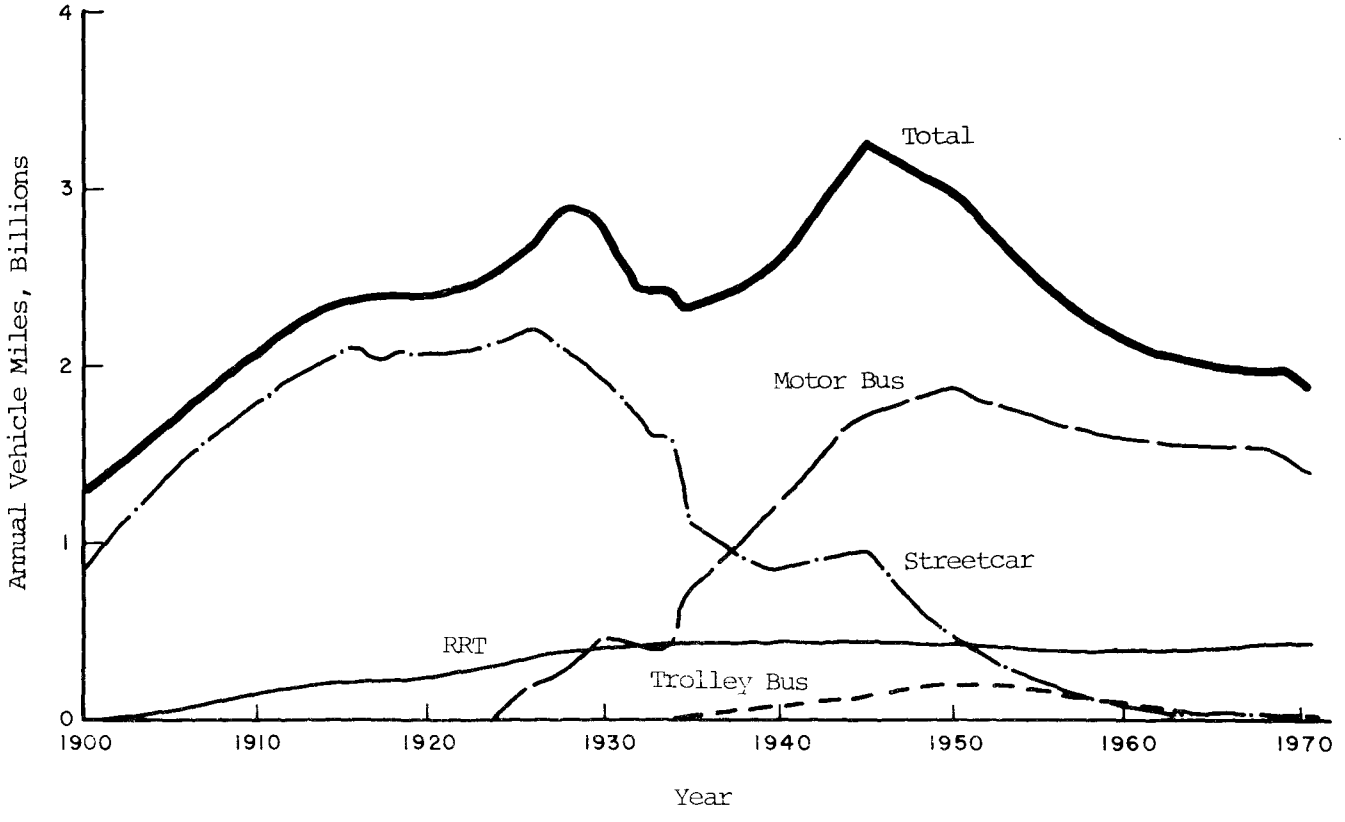
FIGURE 1.6
AVERAGE FARE/REVENUE PASSENGER
1940-1970

FIGURE 1.7
AGE OF VEHICLES IN FLEET



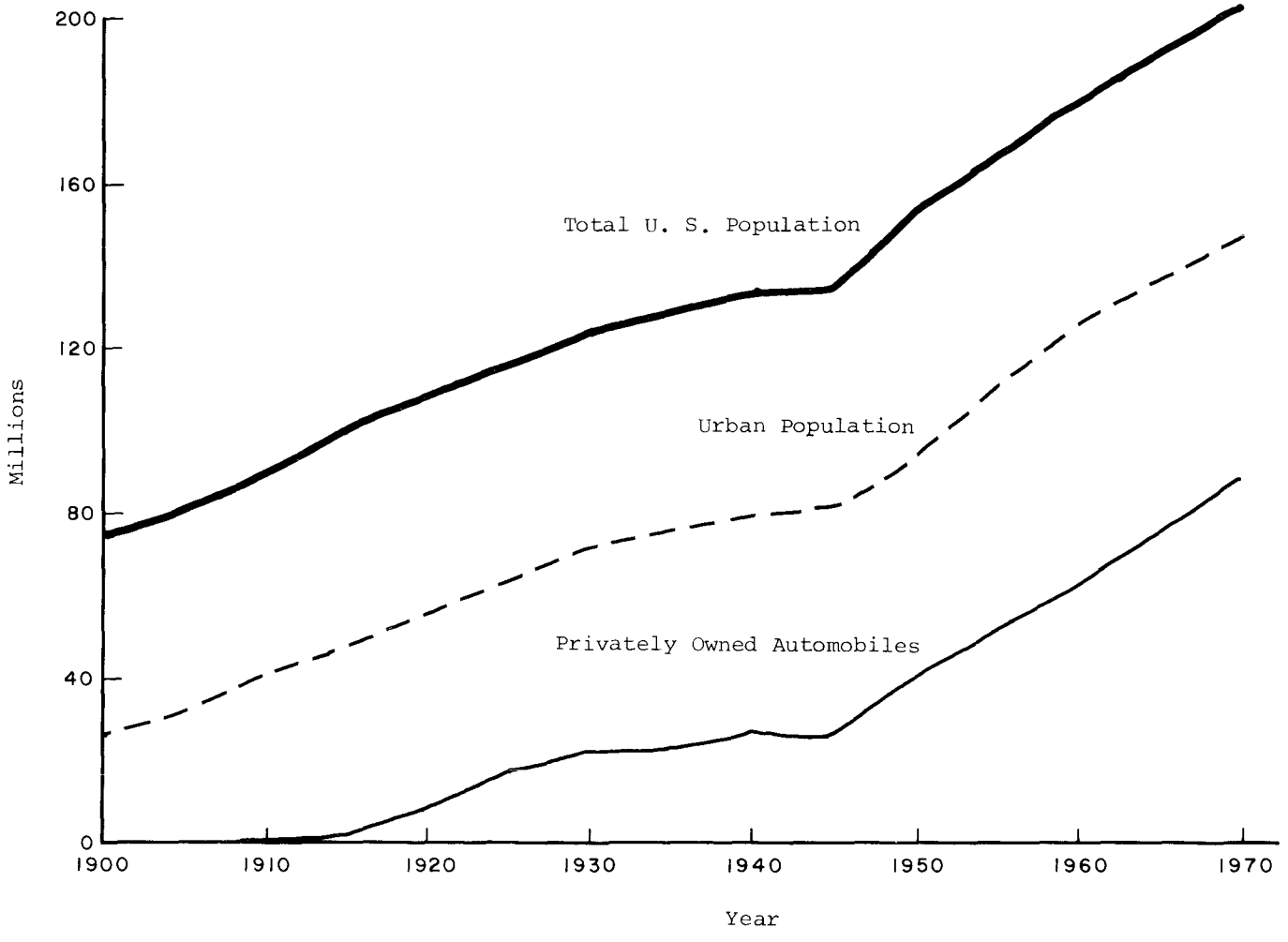
Sources: Street Railway Journal (1900-1908)
Electric Railway Journal (1909-1930)
Census of Transportation (1902-1927)
ATA, Transit Fact Book (1935-1970)

FIGURE 1.8
ANNUAL VEHICLE-MILES OF SERVICE



Sources: Street Railway Journal (1900-1908)
Electric Railway Journal (1909-1930)
Census of Transportation (1902-1927)
ATA, Transit Fact Book (1935-1970)

FIGURE 1.9
TRENDS IN POPULATION AND AUTOMOBILE OWNERSHIP
IN THE U.S.A.



Sources: Bureau of Census, Statistical Abstract of the United States 1971
Department of Transportation, Highway Statistics 1970

Basis for Automobile Preferences

Why do Americans so overwhelmingly prefer this more expensive mode of urban transportation? The answer to this question may be more related to desired life-styles than to transportation services per se, although the flexibility and convenience of the automobile has contributed to its popularity.

The electric streetcar was an immediate success in the early 1900s because it offered a more desirable option in living conditions (lower population densities) as well as improved transportation services.

Single-family houses of the type that developed along many streetcar lines in the early 1900s - New Orleans, 1969.

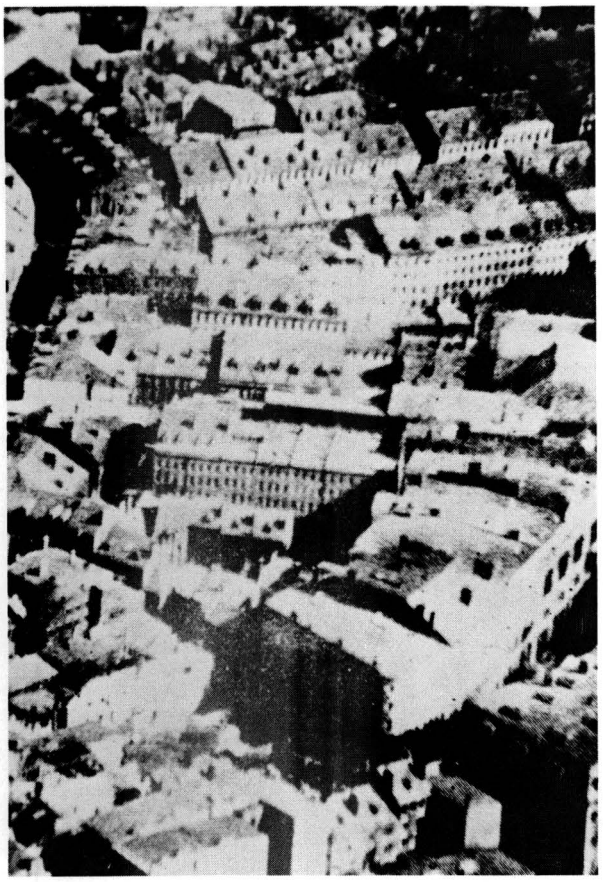
The motor bus replaced the streetcar because it too could serve a more dispersed population. The automobile was accepted readily because it offered an even higher level of transportation service, and it permits the achievement of even lower population densities.

Population Density Trends - Americans have traditionally exhibited a strong desire for low-density housing--primarily single-family dwelling units. They have yielded this preference only when economic forces and current transportation technology dictated otherwise.

During the last 50 years, except for temporary pauses during the depression of the 1930s, and during World War II, urban population densities have been trending downward toward the density corresponding to single-family housing, as indicated in Figure 1.10.

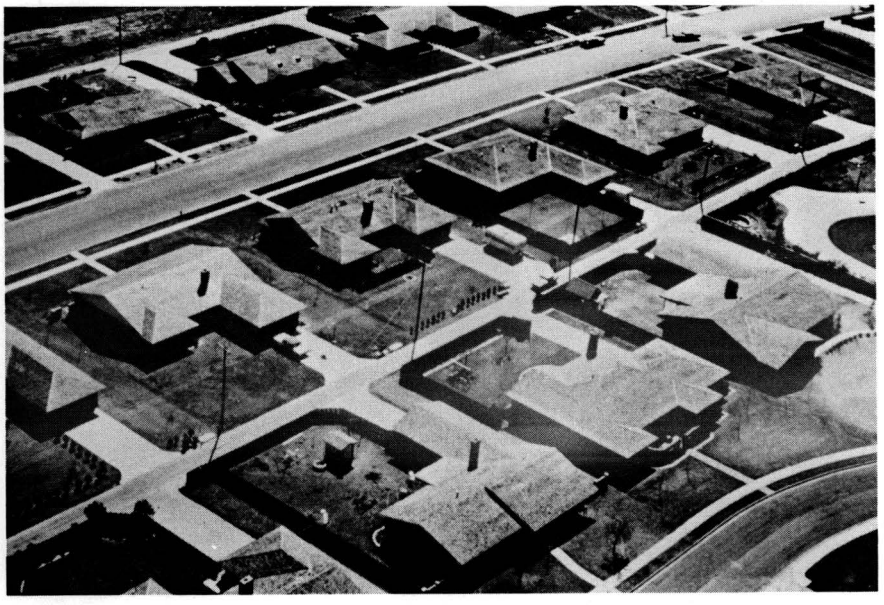
As an example, the residential population density of the Manhattan Island portion of New York City in 1907 was 115,000 persons per square mile. By 1970, it had dropped to 67,000 persons per square mile. The average population density for all U. S. central cities was only 7,800 persons per square mile in 1950, and it had dropped to 5,600 persons per square mile by 1960, and to 4,300 by 1970.

Thus, the flexibility and convenience of the private automobile have made it the most popular means of transportation. Its increased availability, combined with higher personal incomes, have allowed Americans to obtain the low-density housing they desire.



Crowded tenement buildings in Boston in 1870 (approximately 50,000 persons/square mile).

These factors have combined to create a life-style in which transit is no longer the primary mode of urban transportation. There is, however, still demonstrable need for transit to serve the specialized transportation needs of urban America today.



Single-family dwelling units on medium sized lots in Texas in 1970 (approximately 3,000 persons/square mile).

FIGURE 1.10

EXAMPLES OF RESIDENTIAL POPULATION DENSITIES

Characteristic Housing Type	Population Density, Persons/Sq. Mile	Example City
		Manhattan Island-1910
	100,000	
		Manhattan Island-1950
Crowded Tenement Buildings		Manhattan Island-1970
	50,000	
		Brooklyn-1940
Modern High-Rise Apartment Buildings		New York City-1970 (5 Boroughs)
	20,000	Boston-1950
Row-Houses	15,000	San Francisco, Chicago, Philadelphia } 1970
		Boston-1970
Garden Apartments	10,000	Miami-1970
		Cleveland-1970
		Los Angeles-1970
Duplexes Single-Family Houses on Small Lots	5,000	Oakland-1970
		San Antonio-1970
	3,000	Dallas & Houston-1970
Single-Family Houses on Large Lots	2,000	Ft. Worth-1970
	1,000	

Sources: Bureau of Census, Statistical Abstract of the United States 1972, and Electric Railway Journal, Vol. XXXV, No. 23, p. 982.

Urban Transportation Development in Texas

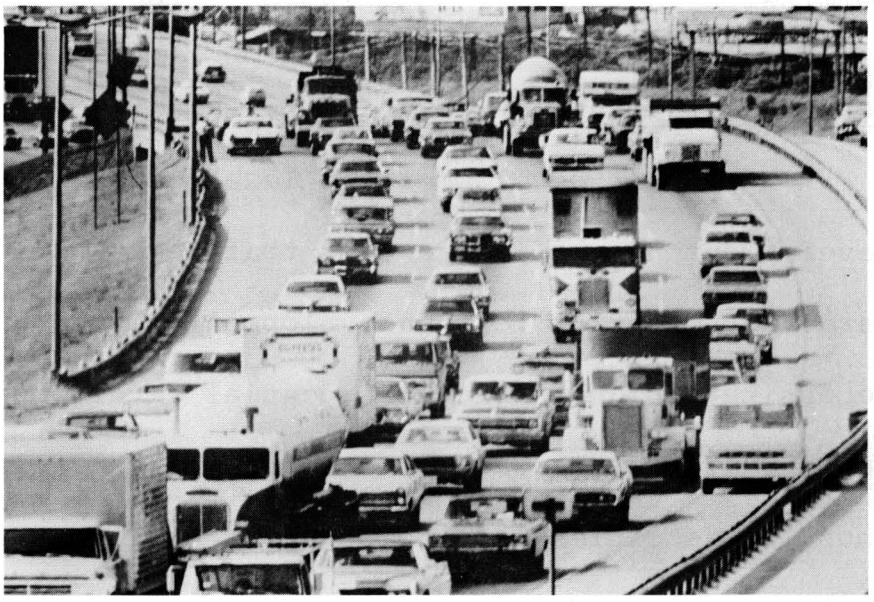
CHAPTER 2

Chapter 2

URBAN TRANSPORTATION DEVELOPMENT IN TEXAS

Personal transportation in Texas today has reached the point where the mobility of the majority of individuals far exceeds that in any previous era. Texans can drive an automobile from point to point almost anywhere in the State on the most modern highways in the world.

Within the cities of the State, this same degree of mobility generally exists. The principal restraints on personal mobility are traffic congestion and the lack of access to an automobile on the part of particular residents.



Peak-hour congestion on freeway - Dallas, 1973.

Restraints on Mobility

High volumes of traffic concentrated on major urban streets and freeways in the morning and evening hours of peak commuter traffic to or from work result in vehicular congestion and delays of 30 minutes or more in the larger cities of the State. A minority of citizens--elderly, handicapped, or financially impoverished--are unable to provide their own transportation and thus also are restricted in personal mobility.

Elected, administrative, and transportation officials at all levels of government are searching for efficient and economical solutions to these pressing problems.

Assisting in development of public mass transportation is the principal mandate given the Texas Mass Transportation Commission in the 1969 legislation which created the Commission.

Early Transit Systems in Texas

Transit development in Texas generally paralleled the development nationwide, except that Texas cities did not grow large enough prior to the development of mechanized transit to necessitate high-density residential development. As a result, rapid-rail transit was not developed in any city of the State. Thus, Texas cities were helped by transit service to retain, rather than to obtain, low-density housing.

Horse-drawn trams appeared in Dallas in 1871, when the city's population was less than 4,000 persons; and electric

streetcars in 1891, when the population was less than 40,000. San Antonio, the largest city in Texas at the time, began mule-drawn tram service in 1874, when the city's population was 15,000; and began streetcar service in 1890, with a population of less than 40,000.

Streetcar service was as popular in Texas as in any other part of the country in the early 1900s. At one time, virtually every city in Texas with a population of 5,000 persons or more had streetcar service.

However, the motor bus rapidly replaced the streetcar in most Texas cities during the 1920s and early 1930s. Dallas continued to operate some streetcars until 1956, and El Paso's transit service still included some streetcar service in 1973.

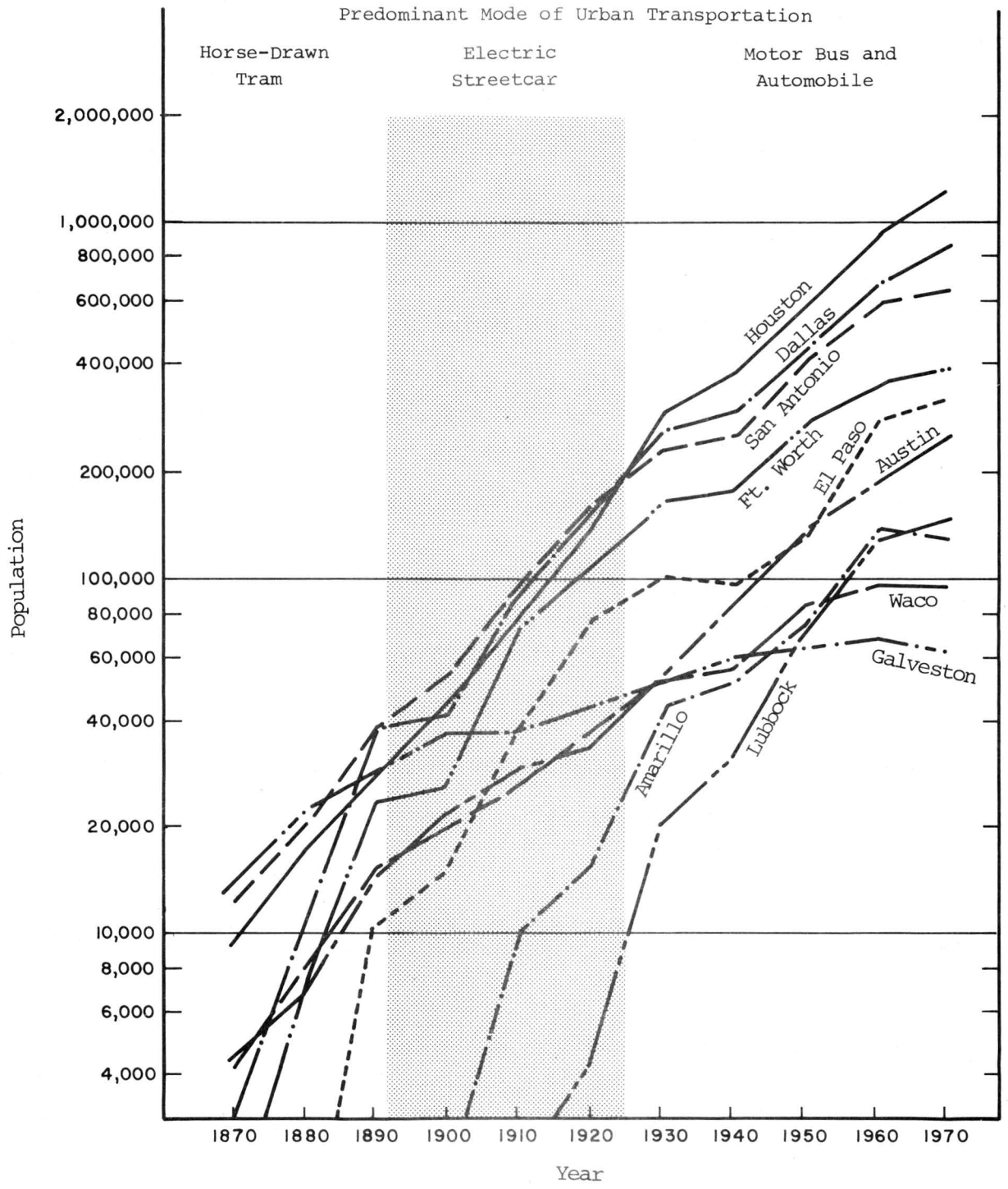
Urban Population Densities

Urban population growth of major cities in Texas during the last 100 years (1870-1970) is shown in Figure 2.1. The primary mode of urban transportation during each time period also is noted on the figure.

During this 100-year period, the average population density of Texas cities has remained in the 2,000-5,000 persons-per-square-mile range--a density commensurate with single-family houses.

New transportation technology (streetcar, motorbus, and automobile) became available at a time when Texas cities were

FIGURE 2.1
POPULATION GROWTH OF TEXAS CITIES



Source: Texas Almanac

relatively small and had low population densities. This permitted Texas cities to continue to grow without sacrificing single-family housing. It also facilitated the transition to automobiles as the primary mode of urban transportation.

Transit Ridership Trends

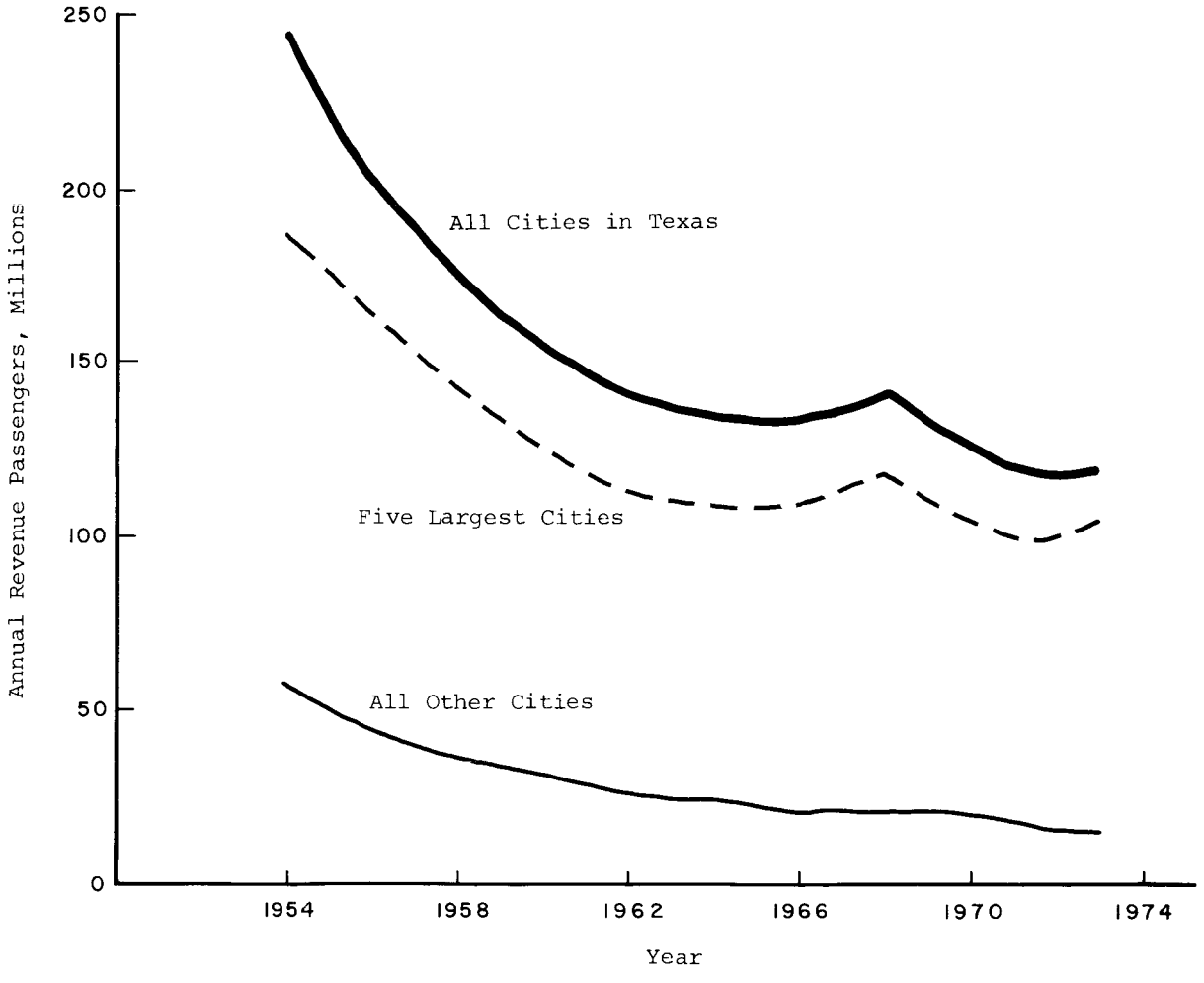
Transit ridership in Texas has declined at about the same rate as the national average. Recent ridership trends for those cities which still have transit service are shown in Figure 2.2. When ridership figures for those cities which have ceased transit operations are included, total ridership for the State has declined even faster than indicated by Figure 2.2.

The five largest Texas cities managed to reverse the ridership trend temporarily during the mid-1960s but ridership began dropping once again in the late-1960s and now appears to be stabilizing.

Service Terminations

In 1954, all 37 Texas cities with transit service had privately owned systems. By 1974, transit operations had ended in 19 cities. Of the 18 cities with transit service in 1974, only four were in private operation with no local tax support. In the other 14 cities, transit systems were either municipally owned or received local public tax support.

FIGURE 2.2
TRANSIT RIDERSHIP TRENDS IN TEXAS CITIES



Source: Texas Highway Department and American Transit Association

Figure 2.3 indicates the 37 cities which had private transit systems in 1954, and shows the type of transit operation in 1974 in the 18 cities still having transit service.

This trend of increasing public ownership and reduction in number of transit systems was a result of privately owned systems incurring financial losses. The city then is left with the possible alternatives of not having transit service or purchasing and operating the system.

Most of the larger cities where private transit services have been terminated have realized the need for a continuing transit operation and have purchased the private system. Currently, two other private operators in the State are negotiating with city officials about the possibility of the city buying their systems.

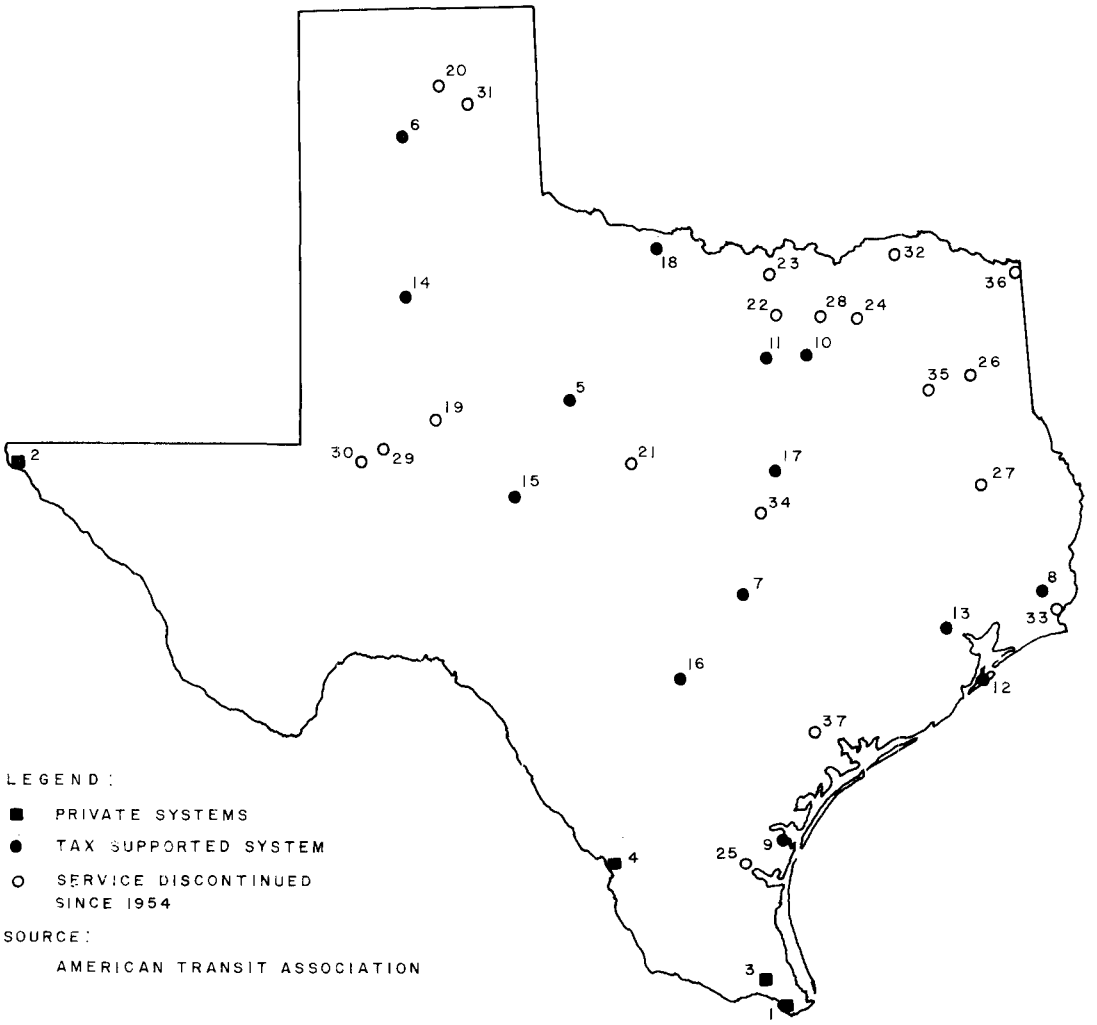
Remaining Transit Systems

The 18 cities with transit systems at present operate under city regulations. The extent of regulation varies from city to city. The four cities with privately owned systems require that the systems operate under a franchise from the city.

All of the transit systems in Texas currently are providing at least a minimal level of mobility to urban residents who utilize their services.

FIGURE 2.3

CITIES WITH CURRENT OR RECENT TRANSIT SERVICE



PRIVATE
1. Brownsville
2. El Paso
3. Harlingen
4. Laredo

TAX SUPPORTED
5. Abilene
6. Amarillo
7. Austin
8. Beaumont
9. Corpus Christi
10. Dallas
11. Ft. Worth
12. Galveston
13. Houston
14. Lubbock
15. San Angelo
16. San Antonio
17. Waco
18. Wichita Falls

SERVICE DISCONTINUED
19. Big Spring
20. Borger
21. Brownwood
22. Denton
23. Gainesville
24. Greenville
25. Kingsville
26. Longview
27. Lufkin
28. McKinney
29. Midland
30. Odessa
31. Pampa
32. Paris
33. Pt. Arthur
34. Temple
35. Tyler
36. Texarkana
37. Victoria

The systems in Houston, Dallas, Fort Worth, El Paso, and Austin are serving, at least to a limited degree, as commuter systems. These systems are carrying an appreciable number of daily patrons to and from congested areas within these cities.

Approximately 20 per cent of the daily commuters into the central business district in Houston, Dallas and San Antonio are delivered by buses, whereas less than 5 per cent of the total urban trips are served by bus.

1974 Transit Survey

A transit survey of the 18 cities in the State with current transit operations was conducted in March of 1974 by the Texas Mass Transportation Commission. Table 2.1 provides some general characteristics of the cities surveyed, by four population groups.

As indicated in Table 2.1, population densities of these cities in 1970 range from a high of 3,555 persons per square mile in San Antonio to a low of approximately 1,197 persons per square mile in Abilene.

Low population densities of this magnitude make the provision of public transportation costly per vehicle-mile of operation, due to the low generation rates of passengers using transit. Recognition of this fact is important to future transit planning in the State.

Table 2.1

POPULATION DENSITIES OF TEXAS CITIES WITH TRANSIT SERVICE

CITY POPULATION	1970 POPULATION (Thousands)	SQUARE MILES OF INCORPORATED AREA	PERSONS PER SQUARE MILE
Over 500,000			
Houston	1,232.8	433.9	2,841
Dallas	844.4	265.6	3,179
San Antonio	654.2	184.0	3,555
200,000-500,000			
Fort Worth	393.5	205.0	1,919
El Paso	322.3	118.3	2,724
Austin	251.8	72.1	3,492
Corpus Christi	204.5	100.6	2,033
100,000-200,000			
Lubbock	149.1	75.7	1,970
Amarillo	127.0	60.7	2,092
Beaumont	115.9	71.6	1,619
40,000-100,000			
Wichita Falls	97.6	42.2	2,312
Waco	95.3	58.7	1,624
Abilene	89.7	74.9	1,197
Laredo	69.0	20.5	3,367
San Angelo	63.9	33.7	1,896
Galveston	61.8	21.0	2,943
Brownsville	52.5	15.2	3,455
Harlingen	33.5	22.5	1,489

SOURCE: 1970 Census of Population

Table 2.2

TRANSIT SERVICE IN TEXAS BY POPULATION GROUPS - 1973

CITY POPULATION	TOTAL BUSES	AGE DISTRIBUTION OF BUS FLEETS					ANNUAL PASSENGERS	ANNUAL BUS MILES (Thousands)
		0-4	5-10	11-15	16-20	21+		
Over 500,000								
Houston	376	44	107	225	-	-	36,500,000	15,402
Dallas	419	50	369	-	-	-	25,696,374	13,650
San Antonio	263	77	140	46	-	-	23,967,551	8,091
200,000-500,000								
Fort Worth	110	83	14	13	-	-	5,701,297	4,200
El Paso	144	-	-	107	-	37	10,922,316	3,960
Austin	50	40	3	7	-	-	4,240,606	2,417
Corpus Christi	49	-	29	7	13	-	2,000,133	1,274
100,000-200,000								
Lubbock	17	-	-	15	-	2	451,000	532
Amarillo	27	16	11	-	-	-	1,200,000	875
Beaumont	21	-	-	1	8	12	1,048,134	588
400,000-100,000								
Wichita Falls	13	-	-	13	-	-	405,063	273
Waco	20	12	4	4	-	-	797,492	648
Abilene	12	6	6	-	-	-	156,000	288
Laredo	24	10	10	4	-	-	2,500,000	672
San Angelo	10	2	-	8	-	-	186,910	400
Galveston	15	-	-	6	5	4	1,179,725	630
Brownsville	12	1	11	-	-	-	498,678	525
Harlingen	42 (1)	n/a	n/a	n/a	n/a	n/a	2,750,000	n/a
	1,624	341	704	456	26	55	117,451,279	54,425

(1) Intercity bus service for a number of cities in the Valley.

A summarization of transit systems in these 18 cities is contained in Table 2.2. Results of the survey are discussed in the following paragraphs.

A total of 1,582 buses were in use by intracity transit systems in 1973.[1] Of this total, approximately 80 per cent are used daily to serve transit trips. The remaining buses were used either for charter operations or backup vehicles, or were receiving regularly scheduled maintenance.

Age Distribution of Buses - Of this total number of buses, 22 per cent were less than 5 years old; 44 per cent were 5 to 10 years old; 29 per cent were 10 to 15 years old; and 5 per cent were older than 15 years.

The three largest cities had 171 buses that were less than 5 years old, or 16 per cent. Seventy-four per cent of the bus fleet in these three cities was less than 10 years old.

When all buses in cities over 200,000 are considered, 21 per cent were less than 5 years old and 68 per cent were less than 10 years old.

In the smaller cities, under 200,000 population, 27 per cent of buses were less than 5 years old and 52 per cent were less than 10 years old.

(1) The total of 1,624 buses shown in Table 2.2 includes 42 buses operated by Valley Transit Company of Harlingen, which conducts an intercity bus service for a group of adjacent cities in the Valley. In this process, Valley Transit provides local transit service, particularly for Harlingen and McAllen.

Yearly Bus-Miles - Approximately 54.5 million bus-miles of service were provided by the transit systems in 1973. The cities of Houston, Dallas, and San Antonio accounted for 37.7 million bus-miles--approximately 69 per cent of the statewide total. When the service in the cities of Fort Worth, El Paso, Austin and Corpus Christi are added to the service provided by the three largest cities, the combined total represents 49.6 million bus-miles of service, or 91 per cent of the statewide total.

Yearly Ridership - During 1973, total statewide transit ridership was 117,451,279 passengers. In Houston, Dallas and San Antonio, a total of 86,163,925 annual passengers were carried, or 73 per cent of the statewide total. In the seven cities over 200,000 population, the bus systems carried 109,028,277 passengers annually, or 93 per cent of the statewide total.

Fare Structures - The adult base fare in Texas ranges from 45 cents in Houston to 15 cents in Laredo. Special fare rates are granted to the elderly and young in many of the cities. Zone charges and transfer charges vary. Some cities have no zone charges, while others add a 5-cent charge for each added zone.

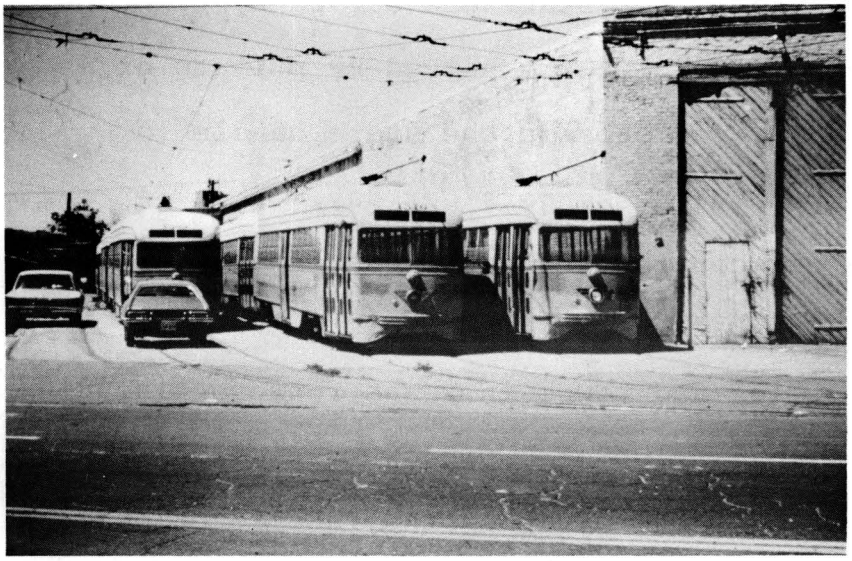
Transfers in some cities are issued free of charge for a specific time period after purchase. Other cities charge a fare for transfers. The maximum transfer charge in the State is 10 cents.

Revenues and Operating Costs - Total transit revenues in 1973, including charter operations, were $38 million, while total operating costs were approximately $39 million. However, these figures do not include the costs for debt service or replacement cost for equipment. In Texas, the average revenue per bus-mile was 70 cents and the average cost per bus-mile was 72 cents.

Rail Systems - At the end of 1973, one small rail system was in operation in Texas. This system operates in the City of Fort Worth from a parking lot on the fringe of the central business district to a downtown department store. The system is operated as a customer service by the department store and collects no fares. Annual cost of the system has been estimated to be $250,000.

During 1973, another small rail service, in El Paso, ceased operation. This was a limited international trolley system which operated on a route from downtown El Paso across the border to downtown Juarez, Mexico. The average fare for the system was 15 cents. Annual ridership on the system was approximately 1.8 million passengers.

An operating deficit of $200,000 was reported for 1972. The system operated under an international treaty which specified that surplus revenues from tolls collected at two bridge crossings were to be used to help keep the trolley fares low and to pay any deficit of the trolley system.



Fleet of PCC cars in yards for repair in El Paso about 1970. The PCC car (President's Conference Committee car) first built in 1933 is still the newest streetcar design available in U.S.

The City of El Paso has purchased the trolley cars, and the facilities located on the United States side of the border. Negotiations are underway with Mexican officials in Juarez and in Mexico City to initiate an expanded service for both cities.

Taxicab Industry - The Texas Taxicab Owners Association, Inc., representing approximately 80 per cent of all taxicabs operated in the state, furnished the following information about the Texas taxicab industry. These units provided transportation to 20,285,550 passengers and travelled 120,851,370 miles in 1973. In addition, to the service provided more than 50,000 people in Texas receive their livelyhood directly from the taxicab industry.

From the above statistics it is evident that the taxicab industry is very important to the State of Texas. Not only does it provide jobs for many but it serves an important need in our transportation system.

All urbanized areas in the state are served by taxicabs compared to 18 of these areas which are served by private or public transit operations. Taxicabs in the state handle in excess of an average of 60,000 passengers per day. This represents approximately 15 per cent of the total passengers carried by all modes of transit operations.

There are 140 cities and towns in Texas representing 81 per cent of the state's population of 7,000 or more which are served by taxicabs, most of which have no other choice of public transportation.

Further, surveys made by the Department of Transportation revealed that approximately 60 per cent of all taxicab trips are by students, housewives, elderly, handicapped and unemployed persons so the service is not as often thought only for the rich. Taxicab companies have been able to provide personalized attention to the many handicapped and elderly persons who use their service.

The industry has faced substantial increases in the cost of doing business over the past year. The basic price of gasoline has increased drastically over the last year for the taxicab industry. The cost of a taxicab also has increased approximately 10 per cent in 1974. Operating costs are increasing at the rate of 13 per cent annually and yet the industry's fare increases average approximately 7 per cent per year for the 185 communities out of the 920 reporting who have been granted fare increases in 1974.

Taxicabs are controlled by local ordinance, state agencies and federal regulatory agencies on (1) fare structure, (2) service levels, (3) safety requirements, and (4) chaffeurs licenses and training. Taxicabs have provided local urban passenger transportation for years without subsidy.

Table 2.3

TAXICABS IN SERVICE IN URBANIZED AREAS
50,000 & OVER POPULATION

Urbanized Area	Number of Taxicabs
Abilene	10
Amarillo	22
Austin	95
Beaumont-Port Arthur-Orange	92
Brownsville	19
Bryan-College Station	15
Corpus Christi	54
Dallas	730
Denton	17
El Paso	150
Fort Worth	150
Galveston-Texas City	61
Harlingen-San Benito	18
Houston	775
Killeen-Harker Heights	50
Laredo	22
Longview	15
Lubbock	25
McAllen-Pharr	28
Midland	19
Odessa	21
San Angelo	8
San Antonio	188
Sherman-Denison	19
Temple-Belton	14
Texarkana	30
Tyler	15
Victoria	13
Waco	20
Wichita Falls	50
TOTAL	2,745

Source: Texas Taxicab Owners Association, Inc.
November 11, 1974

Summary

Transit systems in most Texas cities are serving primarily as public transportation system. A modest level of mobility is being provided for a relatively small segment of the population--primarily persons who do not have access to private transportation. Thus, a very important social need is being served.

In the larger cities, bus systems are also providing a limited amount of mass transportation service. Peak-hour transit service for the work trip, as an alternative to private transportation, serves an economic need. The fuel shortage provides an additional incentive for urban citizens to consider the use of transit for the home-to-work trip.

The role of transit in Texas is defined in detail in Chapter 3.

The Role of Transit in Texas

CHAPTER 3

Chapter 3

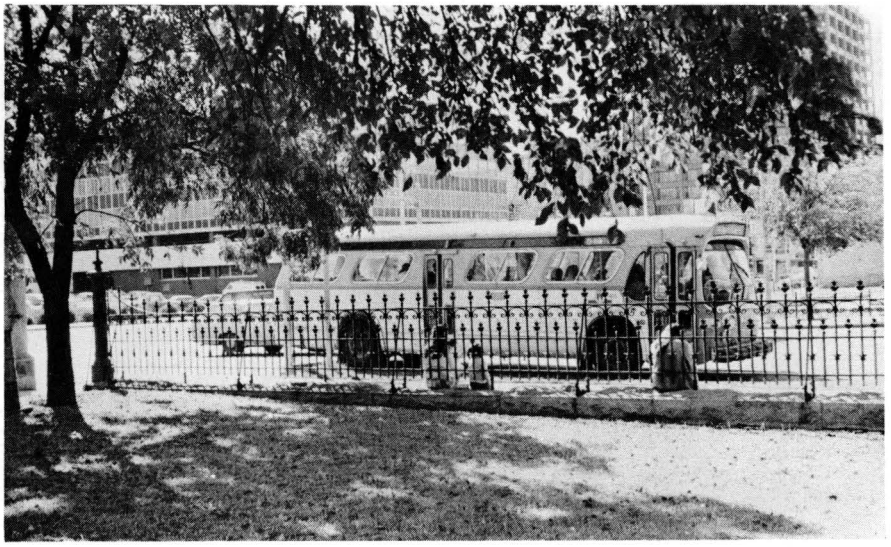
THE ROLE OF TRANSIT IN TEXAS

Urban transit is an efficient and economical means of transportation when large numbers of people wish to make trips at the same time, within the same general travel corridor.

Specific roles of transit in Texas are defined in the following pages. Transit systems are classified as Public Transportation, Mass Transportation, and Specialized Transportation Systems.

1. Public Transportation

Public Transportation can be defined as the provision of a minimal or basic level of mobility for those members of society who cannot afford, are unable to operate, or who have no desire for, a private form of transportation. Included in this category are the elderly, the poor, persons temporarily without other travel means, the permanently handicapped, and persons under legal driving age.



City bus systems are an example of public transportation as it exists in Texas today - Austin, 1974.

a. Senior Citizens - According to 1970 Census figures, there are over 992,000 persons, or 9 per cent of residents in the State of Texas, who are 65 or more years of age. Of this number, over 70 per cent live in urbanized areas, over one-quarter live alone, and 35 per cent are living below the poverty level.

The Governor's Committee on Aging has compiled and analyzed the needs of senior citizens in Texas as they were stated through direct participation by more than 26,000 Texas senior citizens in a program of 680 local Older American White House Forums in 125 counties. Texas senior citizens expressed their needs, which are noted in a report on the forums held in this state.(1) Among other areas of concern, the report emphasized the transportation needs of the senior populace in Texas:

> "Accessible and adequate transportation, particularly public transportation, also ranks as a high priority need. About 30 per cent of all persons completing questionnaires mentioned some type of transportation problem. Over 19 per cent do not own or do not drive a car; over 18 per cent respond that public transportation is not accessible; about 15 per cent find it physically tiring to travel; 13 per cent do not have money to pay bus fares and would like reduced rates; 11.6 per cent find it difficult to get on and off buses; and 7 per cent indicated some other type of transportation problem."

(1) A Report on Needs Defined by Older Texans. The Governor's Committee on Aging, February, 1971.

Clearly, then, the role of public transportation should encompass providing a basic form of mobility to the community's senior citizens who do not have their own transportation and require an alternative means of travel.

This public transportation role should emphasize the special needs of senior citizens, including transit fare adjustments to take into account the reduced incomes and earning capabilities of elderly residents.

State and Federal Legislation - Both the U.S. Congress and the Texas Legislature have recently adopted measures to assist senior citizens in meeting their transportation needs.

House Bill 59 of the 63rd Legislature authorized Texas transit companies to set reduced fares for persons 60 or more years of age, or blind or disabled persons.

In the 1973 Federal-Aid Highway Act, Section 16(b), the Congress authorized the Secretary of Transportation to make capital grants and loans:

> (1) To states and local public bodies and agencies thereof for the specific purpose of assisting them in providing mass transportation services which are planned, designed, and carried out so as to meet the special needs of elderly and handicapped persons, with such grants and loans being subject to all of the terms, conditions, requirements, and provisions applicable to grants and loans made under section 3(a) and being considered for the purposes of all other laws to have been made under such sections; and,
>
> (2) To private nonprofit corporations and associations for the specific purpose of assisting them in providing transportation services meeting the special needs of

elderly and handicapped persons for whom mass transportation services planned, designed and carried out under paragraph (1) are unavailable, insufficient, or inappropriate, with such grants and loans being subject to such terms, conditions, requirements, and provisions, similar insofar as may be appropriate to those applicable to grants and loans under paragraph (1), as the Secretary may determine to be necessary or appropriate for purposes of this paragraph."

b. Low-Income Residents - To those who are unable to afford some form of private transportation (in most cases, an automobile), public transportation provides their only link to employment opportunities.

If public transportation were not available and an individual was beyond walking range of potential jobs and could not obtain "a ride" with another person, he would be unable to obtain gainful employment as a direct result of inadequate transportation. Over 2 million Texans or about 19% of our population was at the poverty level in 1970; in addition 3/4 million more Texans were very near the poverty level. Some of these people may be able and willing to work but are unable to because of their lack of transportation to job locations.

c. Temporary Need for Transit Service - Many persons at one time or another probably have experienced some type of temporary situation which prevented utilization of their usual form of mobility. Whether transportation is by automobile, bicycle, walking, or another private means, situations sometimes occur where alternative forms of mobility are temporarily needed.

Weather conditions undoubtedly are a major factor adversely affecting bicycle and motorcycle travel, or walking. At times,

severe weather limits a travel mode, and an alternative means becomes necessary. In addition, there are numerous examples of temporary problems which forestall one's driving capability at times.

Auto breakdown, illness, the use of the car by another member of the family, or temporary suspension of the driving privilege, can occasionally disrupt access to the private auto.

When there is a need for mobility at these times, and private transportation is not available, alternative forms of mobility must be sought to fulfill one's travel needs. The alternative possibilities, depending upon the nature of the trip, could take the form of getting a ride from a friend, calling a taxi, or riding a bus.

When available, public transportation provides an important "stand-by" service, to fulfill many of the travel needs of persons who are temporarily without their usual means of mobility. Transit passenger surveys have documented this temporary utilization of public transportation by indicating there are a considerable number of "infrequent" transit users.

Studies in Texas have noted from 20 to 40 per cent of passengers are infrequent transit riders--indicating that public transit is utilized to fulfill many temporary travel needs.

d. Permanently Handicapped - Estimates supplied by the Texas Rehabilitation Commission indicate that at least 500,000 persons living in communities throughout Texas have physical handicaps to the extent that they are unable to operate a motor vehicle.

These citizens, due to their restricted mobility, are in most cases dependent on others for fulfilling even their most basic mobility needs. Even a simple trip to the grocery store for these individuals can require a considerable expenditure of effort, and many times is totally impossible without external assistance.

Although handicapped, these individuals have a desire to provide for themselves, seek gainful employment, and function as contributing members of society. If family or friends are unable to fulfill their transportation needs, they are dependent on alternative transportation services.

Taxi service, although requiring a relatively high out-of-pocket cost, often is a necessary alternative for those with extreme physical handicaps. When it is available, public transportation is, however, a viable transportation alternative for those capable of walking to bus stops, and able to board transit vehicles.

A void exists, then, for those handicapped individuals residing in cities throughout the State, or areas within such cities, without adequate public transportation services. To these individuals, if family or friends cannot provide routine mobility, then taxis or buses, (when available) are their only alternative for fulfilling even their most basic trip needs.

e. Other Considerations - Other developments recently have placed emphasis on the role of public transportation, nationally, and in Texas. Decreasing energy supplies, rising costs of fuel for the automobile, possibilities of fuel rationing, in addition to increases in congestion, noise and air pollution, especially in large urbanized areas, all indicate the need for improving and expanding public transportation facilities to meet the increasing requirement for alternative forms of mobility.

2. Mass Transportation

Mass Transportation is generally defined as the movement of large numbers of people between fixed points in vehicles with high passenger capacity.

Mass transportation systems are most effectively used to serve high-volume person-trip demands in major travel corridors connecting high density residential areas and focal points of concentrated activity within a city--such as the central business

district, convention centers, medical complexes, and large shopping centers. However, the effective application of mass transportation systems is not limited to use within the boundaries of a city.

Many persons associate rail-rapid transit or other more recently developed technology, such as the tracked-air-cushioned vehicle, with the term "mass transportation." However, any means of travel that can meet the criteria of the definition is serving as a form of mass transportation.

Service Potentials - The application of mass transportation service can be made within cities, between cities, or anywhere large numbers of people travel from common or closely located origins to common or closely located destinations within a major travel corridor.

Mass transportation could take the form of a bus which would serve a number of local citizens traveling to and from work in a nearby city. This application of the mass transportation concept fits the criteria of moving a large number of people in a relatively few vehicles.

However, if area resident work trips all go in separate directions, and no particularly significant number in any one direction, mass transportation service will have very limited potential, if any.

Potential Benefits - There exists a number of advantages to the application of mass transportation. The number of persons per vehicle (i.e., a busload versus many private vehicles) can significantly decrease automobile usage and congestion within a travel corridor.

More recently, environmental and energy considerations have given impetus to consideration of "mass transportation" proposals in well defined travel corridors in cities, between cities and from suburbs to cities.

The energy efficiency and emission reduction on a per-passenger basis overwhelmingly favor moving as many persons as possible in a single vehicle. The advantages of mass transportation within a major travel corridor can easily be visualized.

3. Specialized Transit Systems

The role of specialized transit systems in Texas is that of providing a travel alternative in special or unique situations.

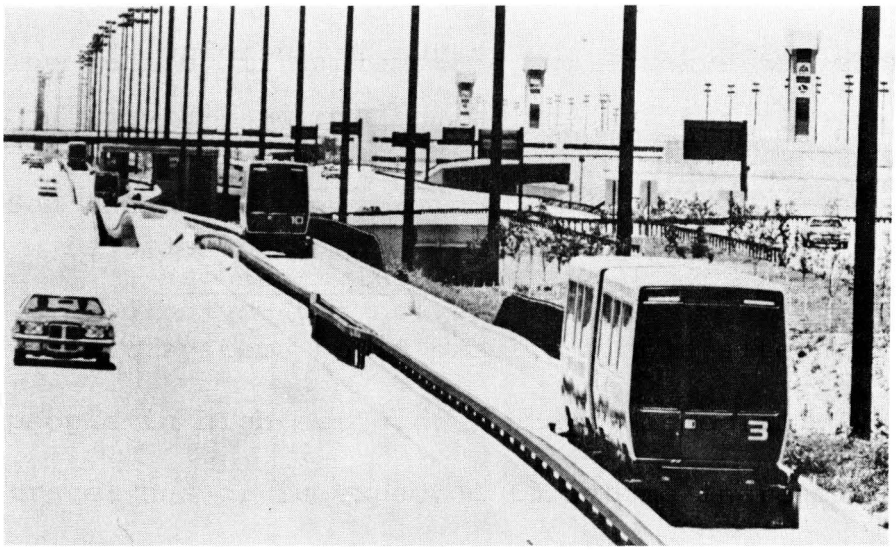
A unique situation, with geography as the influencing constraint favoring a specialized system, is the proposed River Taxi system for the San Antonio River within San Antonio.

In this particular instance, the San Antonio River offered the means for application of a river taxi service for moving people.

The option, if implemented, will serve travel needs associated with the increased activity and resurgence of growth along the San Antonio River corridor.

High-Activity Centers - Other specialized types of transit systems could provide viable alternatives for moving people in high-activity centers--especially where pedestrian travel has or is expected to become increasingly burdensome--or vehicle travel is an infeasible or otherwise undesirable alternative. Moving sidewalks and bikeways are two of several such possible types of alternatives within the overall realm of people movement.

A form of personal rapid transit, such as the Airtrans installation at the Dallas-Fort Worth Airport, is an example of a system designed to meet a specialized trip purpose while having the capability and the capacity to serve varying travel demands in other high-activity centers where pedestrian movements are extensive.



Several of the 51 Automatic Driverless vehicles of the Airtrans System at the Dallas/ Fort Worth Airport.

LTV AEROSPACE CORP.

Accurately defining travel corridors for any such specialized system proposal is a paramount consideration in attempting to serve the actual or expected trip demands.

If a specialized system is sought, but existing or expected trips are so dispersed that no major travel corridors can be identified, then such a system would have only limited potential--and only for those particular trips it could adequately serve.

4. Rural Transportation Needs

Some evidence exists that in rural communities and areas, there does exist an unmet transportation need. Unlike the larger urban areas of the state, however, the rural sections have no comparatively large numbers of persons desiring public mobility. There exists, nonetheless, a significant number of citizens in the rural communities and areas of Texas without a travel means of their own.

Many rural Texans, including elderly, handicapped, and poor persons, or those who are otherwise unable or have no desire to operate a motor vehicle, must rely completely on other persons to provide for their travel needs. Whether they simply need access to the grocery store or to church, any trip beyond their immediate capability of traveling by foot requires some type of outside assistance.

In the smaller communities throughout Texas, the total number of residents is relatively small and the geography problems relating to transportation are considerable. The

costs of conventional urban public transportation service would seem to outweigh entirely the advantages to be realized by providing this type of service in these areas of the State. Costs would certainly exceed revenues from passenger or user fares. It should be noted that in the formation of certain transportation systems permits may be necessary from the Railroad Commission.

Possible Approach to Problem - The problem is not unsolvable, but providing even a minimal level of basic mobility would be a costly proposal on a per-passenger or per-resident basis. Since the majority of rural communities and areas generally are unable to produce the necessary funds for meeting all the transportation needs of the citizens, substantial external financial assistance would be required for such an undertaking.

Options for supplemental financial sources for rural transportation service could encompass a variety of proposals. One possibility might be purchase of vehicles for community use with State or Federal funds, in conjunction with some type of lease-back arrangement.

Small vans, buses, or even automobiles, could be utilized in fulfilling many existing rural transportation needs, with community participation provided by supplying operators, fuel, and vehicle maintenance.

Policy, Goals, and Objectives for Transit in Texas

CHAPTER 4

Chapter 4

POLICY, GOALS, AND OBJECTIVES FOR TRANSIT IN TEXAS

Transportation policy within the State of Texas is established by the Legislature. The primary responsibility for execution of policy is delegated to the appropriate state transportation agency.

Policy Execution

Goals and objectives are devices used by each agency to execute and accomplish the overall purpose of the policy. Goals are the statement of policy implementation steps in general terms, often without relation to a time element. Objectives are a list of specific, often time-based, implementation steps.

Establishing Criteria for Meeting Objectives

Generally, it is necessary to establish a criteria for use in accomplishing each specific objective. Standards and procedures are identified to accomplish the effort within the criteria established.

If acceptable standards and procedures are used within the criteria established, there is progress toward objectives, which in turn indicates progress toward goals and the execution of policy.

A graphical representation of this process is illustrated in Figure 4.1. Feedback to the policy makers is necessary to ensure that policy is being executed as intended, and that the policy is still valid and not in need of revision.

Mass Transportation Commission Act

The original policy for public and mass transportation within Texas was established by House Bill 738 of the 61st Legislature in 1969. This Act created the Texas Mass Transportation Commission and defined the duties and responsibilities of the Commission.

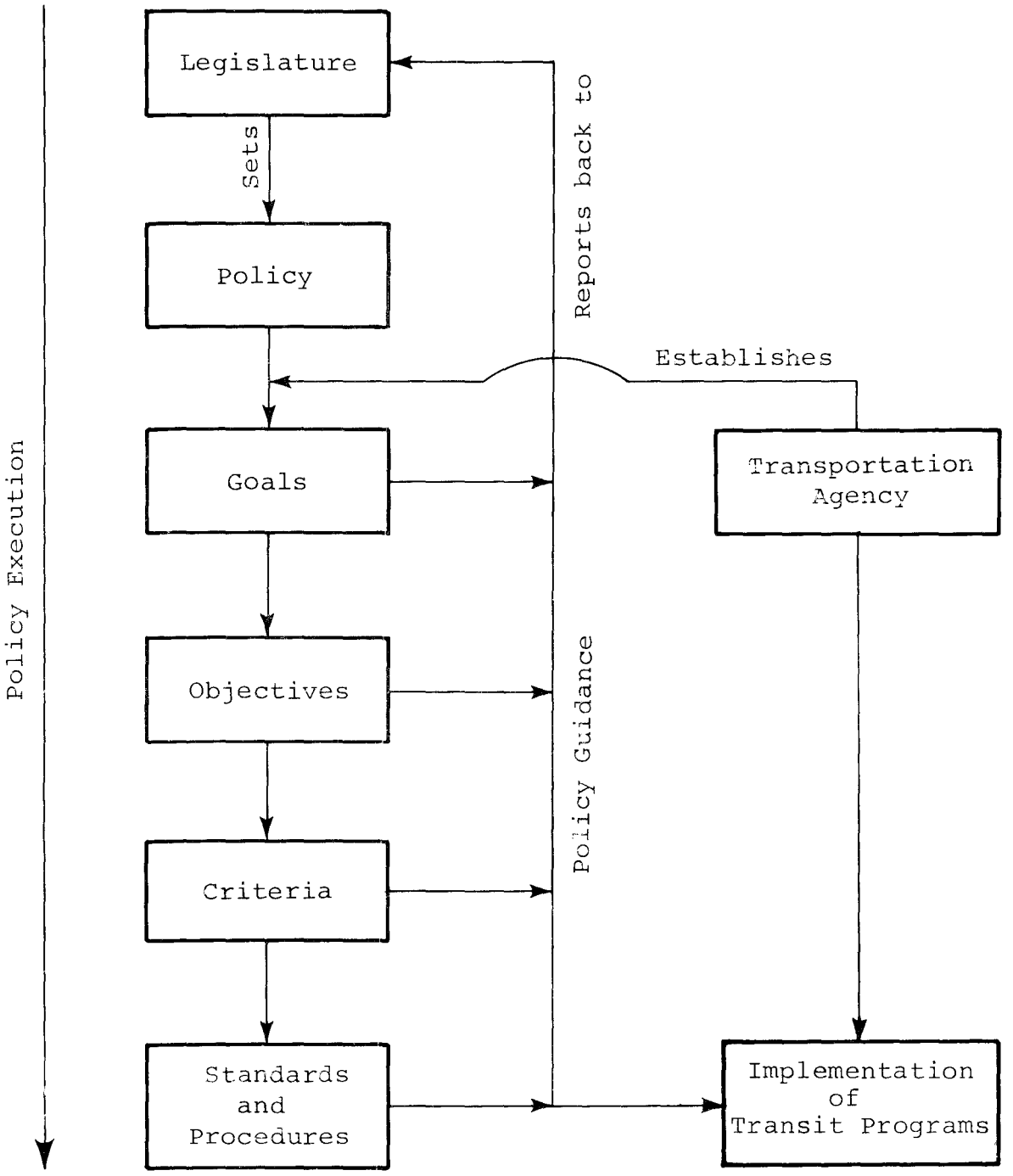
This legislation states that "The Governor, with the advice and consent of the Senate, shall appoint the six commission members for staggered terms of six years." Vacancies on the Commission are filled in the same manner as original appointments "but only for the unexpired portion of the term."

Commission Membership - The law further directs that one commission member is to be appointed from each of the five geographic divisions of the State, while one member is appointed from the State-at-large.

To be qualified for appointment, a person must be a citizen of the state, of voting age, and engaged in or have an

Figure 4.1

STEPS IN TRANSPORTATION POLICY EXECUTION



interest in public mass transportation, but shall not be an official or employee of any local government, state or federal department or agency.

The law specifically states that no more than two members of the Commission may be employed by, or own an interest in, a public mass transportation system or a business manufacturing public mass transportation media or their components.

The Commission is required to hold an annual meeting and may hold additional meetings upon the request of the chairman or a quorum of members.

Duties of Commission - The Act enumerates the duties and authorities of the Commission as follows:

A. The Commission shall

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

2.) encourage the establishment of rapid transit and other transportation media.

B. The Commission may not promulgate rules or regulations which impose a greater restriction upon public mass transportation than now exists, or which impose economic controls.

C. The Commission may recommend necessary legislation to advance the interests of the state

in public mass transportation and may represent the state in mass transportation matters before federal and state agencies.

D. The Commission may render financial assistance in the planning of public mass transportation systems out of appropriations made by the Legislature for that purpose.

E. The Commission may enter into any contracts necessary to exercise the powers granted by this Act, but may not enter into any contract

1.) obligating the State to pay money which has not been appropriated to the Commission; or

2.) binding the State in a manner not authorized by this Act.

F. The Commission may not issue certificates of convenience and necessity.

G. The Commission 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 public mass transportation systems owned, operated, or directly financed in whole or part by the state. It shall also assist any political subdivision of the state

in procuring aid offered by the federal government for the purpose of establishing and maintaining public mass transportation systems.

H. The Commission may accept and receipt for federal and other grants, either public or private, for the State or any political subdivision thereof, when authorized by the state or subdivision for the acquisition, construction, improvement, maintenance, or operation of public mass transportation facilities. Grants may be accepted under this subsection whether the work is to be done by the State, municipality, or any other political subdivision of the state aided by grants from the United States upon terms and conditions now or later prescribed by the laws of the United States. The state or the governing body of a municipality or other political subdivision may designate the Commission as its agent to receive money under this section and the Commission acting as agent may contract with the federal government for the acquisition, construction, improvement,

maintenance, or operation of public mass transportation facilities.

I. All contracts for the acquisition, construction, improvement, maintenance or operation of public mass transportation facilities made by the Commission acting as agent under Subsection (h) of this section must conform to state law.

The legislation directs the Commission to appoint a director of mass transportation as executive officer who ". . . shall develop and maintain a comprehensive master plan for public mass transportation development in the State and shall correlate the master plan with plans of the Texas Railroad Commission and other agencies or departments concerned with public transportation."

State Role in Transit Programs

In the same 1969 session at which the Mass Transportation Commission Act was adopted, the Legislature passed House Bill 1404, authorizing Texas cities to deal directly with the Federal government in obtaining financial assistance for improvement of mass transit service in their incorporated areas, and their suburbs and adjacent areas.

Senate Bill 642 (a bill authorizing the Houston Transit Authority) was passed in the recent 63rd Legislature. Subsection (d) declares that "...it is in the public interest to encourage and provide for efficient and economical local mass rapid transit systems in such areas for the benefit and convenience of the people and for the purpose of improving the quality of the ambient air therein and reducing vehicular congestion..."

From these and other Acts of the Legislature, it would seem that the State's responsibility in transit programs is:

1. To encourage provision of appropriate public and mass transit systems in and between urban regions.

2. To reserve to local and regional governments the initiative and responsibility for system operations.

3. To provide assistance, including financial assistance for transit planning as funds are appropriated, to local and regional governments for transit programs.

4. To develop and maintain a comprehensive master plan for public mass transportation development in Texas.

Statement of Commission Goals

The directives in the 1969 Mass Transportation Commission Act relative to the duties of the Commission and the executive director, as well as the other legislative actions, form the basic policy by law under which the Commission must function. In

view of this policy, the following goals have been established by the Texas Mass Transportation Commission.

> GOAL: THE STATE OF TEXAS WILL ENCOURAGE AND FOSTER THE ESTABLISHMENT AND CONTINUED PROVISION OF PUBLIC TRANSPORTATION SYSTEMS DESIGNED TO PROVIDE AT LEAST A MINIMAL LEVEL OF MOBILITY TO URBAN CITIZENS IN ALL OF ITS CITIES LARGE ENOUGH TO WARRANT SUCH A SYSTEM.

To better understand the language of this goal and its intended meaning, it is necessary to define some of the phrases used.

Criteria on Size of City - The Commission considers any city to be of sufficient size to warrant a public transportation system when distances from the home to essential services (medical, food, schools, etc.) and employment opportunities result in walking distances unacceptable to the citizens of the city.

The major urban areas in Texas have developed in accordance with the transportation service provided by the private automobile. Therefore, in most of these areas, persons who do not have access to a private automobile are severely restricted in employment opportunities and availability of needed services. The provision of public transportation can ameliorate these restrictions to some degree.

Levels of Mobility - The definition of a minimal level of mobility must be made in rather broad terms as it relates to the size and character of the city or urban area under consideration.

In small cities of the State, a minimal level of mobility could be provided citizens without private transportation by supplemental public-service payments to cooperating taxicab companies, a demand-responsive bus service, or a bus service sponsored by a local civic organization. These and other possible solutions could be utilized, depending on the desires of local government.

In larger cities of the State (50,000 population or greater), a minimal level of mobility might be defined as a fixed-route bus system designed so that routes operate within some desirable distances of a large percentage of the housing units on an established time schedule.

In some cities, it might be sufficient to operate a system within one-half mile of 90 per cent of all housing units, each hour of the daylight period. Other cities might require operating a system within a quarter-mile of 95 per cent of all housing units on a 30-minute schedule.

Levels of Service - The travel demand level and the type of system desired for the community, along with other factors,

would define the minimal level of service for each city.

The specific objectives of the Texas Mass Transportation Commission under this goal are:

1.) The State shall encourage establishment of a minimal public transportation system in every urbanized area of 50,000 or more population.

2.) The State shall assist in establishment of some form of public transportation service in urban areas under 50,000 population, for those cities desiring such service.

3.) The State shall begin providing financial aid to its political subdivisions to assist in development of public transportation service by fiscal year 1976.

GOAL: THE STATE OF TEXAS SHALL ENCOURAGE THE LARGER CITIES WITHIN THE STATE TO DEVELOP OR IMPROVE MASS TRANSPORTATION SYSTEMS IN ORDER TO SUPPORT CONTINUED ECONOMIC GROWTH OF THE CITIES, REDUCE TRAFFIC CONGESTION AND POLLUTION RESULTING THEREFROM, AND PROVIDE AN ACCEPTABLE ALTERNATE TRAVEL SERVICE TO URBAN COMMUTERS MAKING TRIPS TO OR FROM WORK.

In the cities of Houston, Dallas, Fort Worth, San Antonio, El Paso, Austin, and Corpus Christi, the need for expanding mass transportation service has been increasing, and the rising prices of gasoline along with the possibility of gasoline rationing adds emphasis to this problem. Each of these cities is currently involved in analysis and planning for a long-range mass transportation

system to serve the communities and also to provide some type of regional transit service.

Planning for mass transportation in Texas cities is complex. High downtown daytime population densities exist in the larger cities, but low-density residential development (2,500-3,500 persons per square mile) is prevalent. This combination makes it extremely difficult to serve the urban area mass transportation needs with available resources.

Local Transit Planning - This very factor makes it important for urbanized areas considering a transit system to conduct a comprehensive analysis of ridership potential in conjunction with capital and operating cost estimates for proposed systems.

Rational decisions then can be made, taking every precaution to ensure that the mass transportation systems selected for implementation are compatible with planned urban land use and expected financial resource.

Objectives under this goal are:

1. The state shall encourage local agencies to identify appropriate plans and begin implementation work to achieve expanded mass transportation systems in the Houston and Dallas-Fort Worth regions prior to 1980.

2. The State shall make every effort to ensure that local governments involved in developing mass transportation systems recognize

the potential and limitations of each system and are also aware of any urban redevelopment that may be required to support a system that does not conform to the current urban form.

GOAL: THE STATE OF TEXAS WILL DEVELOP AND CONTINUOUSLY MAINTAIN A COMPREHENSIVE MASTER PLAN FOR TRANSIT DEVELOPMENT. IN CONJUNCTION WITH AND AS PART OF THIS EFFORT, THE STATE OF TEXAS WILL MAINTAIN A PUBLIC EDUCATION FUNCTION TO INFORM THE PUBLIC OF STATEWIDE TRANSIT NEEDS AND DEVELOPMENT.

As directed by its enabling legislation, the Texas Mass Transportation Commission has produced this statewide public transportation plan. TMTC is involved in a continuing transit planning function in cooperation with the Texas Railroad Commission, the Texas Highway Department, the Governor's Office of Planning Coordination, other state agencies, Regional Councils of Governments, and local political subdivisions.

Future Transit
Travel in Texas

CHAPTER 5

Chapter 5

FUTURE TRANSIT TRAVEL IN TEXAS

As Texas continues to grow in population and to become more urbanized, the need for improved and expanded public transit service will intensify.

Between 1940 and 1970, the state's urban population more than tripled, rising from 2,911,389 to 8,920,946. In these same three decades, the state's rural population declined one-third, from 3,503,435 to 2,275,784. As a result, four in every five Texas residents now live in urban areas.

There now are 27 urbanized areas in the state which contain 50,000 or more persons. This number is projected to increase to 32 areas by 1990. These 32 large urbanized areas will contain more than 10,000,000 persons and will represent approximately 70 per cent of the state's population in 1990.

Transit Ridership Trends

Despite this tremendous growth in urban population, transit ridership declined steadily in the period after World War II. As stated in Chapter 2, transit service has terminated in 19 Texas cities since 1954. The loss of these transit systems accelerated the rate of decline in total state transit ridership.

As a result of declining transit ridership, and consequent revenue losses, ownership of transit systems in Texas has changed from a total private-enterprise operation in 1954 to a predominantly local government operation. Of the four remaining Texas cities with privately owned transit systems, at least two of these cities have been notified by the private transit owners that service may be terminated within 1974.

However, it is expected that these cities will assume operation of their transit service if private operation ceases. The statewide trend toward public ownership of transit systems represents a commitment by local government officials to continue transit service.

Prospects for Ridership Increase

Ridership on existing transit systems in Texas is largely by persons who have no other means of transportation for their particular trips. It can be expected that these individuals will continue to utilize transit service as long as the service is available, or until they can provide their own means of transportation.

The current energy shortage, coupled with increases in new-car and gasoline prices, has increased the cost of automobile transportation.

A continuation of these price increases, and possible future shortages of gasoline supplies, will cause more Texas residents to consider transit as an acceptable alternative for making some trips, or as an alternative to multiple-car ownership by households. Individuals with low incomes also will find it increasingly difficult to obtain private transportation.

These developments have resulted in a significant increase in urban transit ridership within the last year or so, both in Texas and nationwide, as shown in Figure 2.3. For these same reasons, continuing increases in transit ridership can be expected.

Bus Transit Ridership Projections

In order to project future transit ridership in Texas, it is necessary to evaluate a number of variables. Some of the important variables to be evaluated are (1) the population within the service areas of transit systems, (2) the daily trip-making characteristics of individuals, and (3) the per cent of person-trips served by transit.

Urban Population Growth

Growth within the State's urban areas will account for all population growth in Texas by 1990. Most of this growth

will occur in the 32 urbanized areas which each are expected to have more than 50,000 population by 1990. Population projections for these areas for 1980 and 1990 are listed in Table 5.1.

The population of urbanized areas over 50,000 persons is expected to increase from the 1970 figure of 7,150,422 to 10,205,000 by 1990. The total state population is estimated to increase from the 1970 figure of 11.2 million persons to 14.3 millions persons by 1990, as shown in Figure 5.1. There is however, some disagreement within the state concerning population projection figures. A need exists in the state for the establishment of uniform population projections to be used for planning purposes by all state agencies. If such figures become available, TMTC will revise the report to reflect these figures.

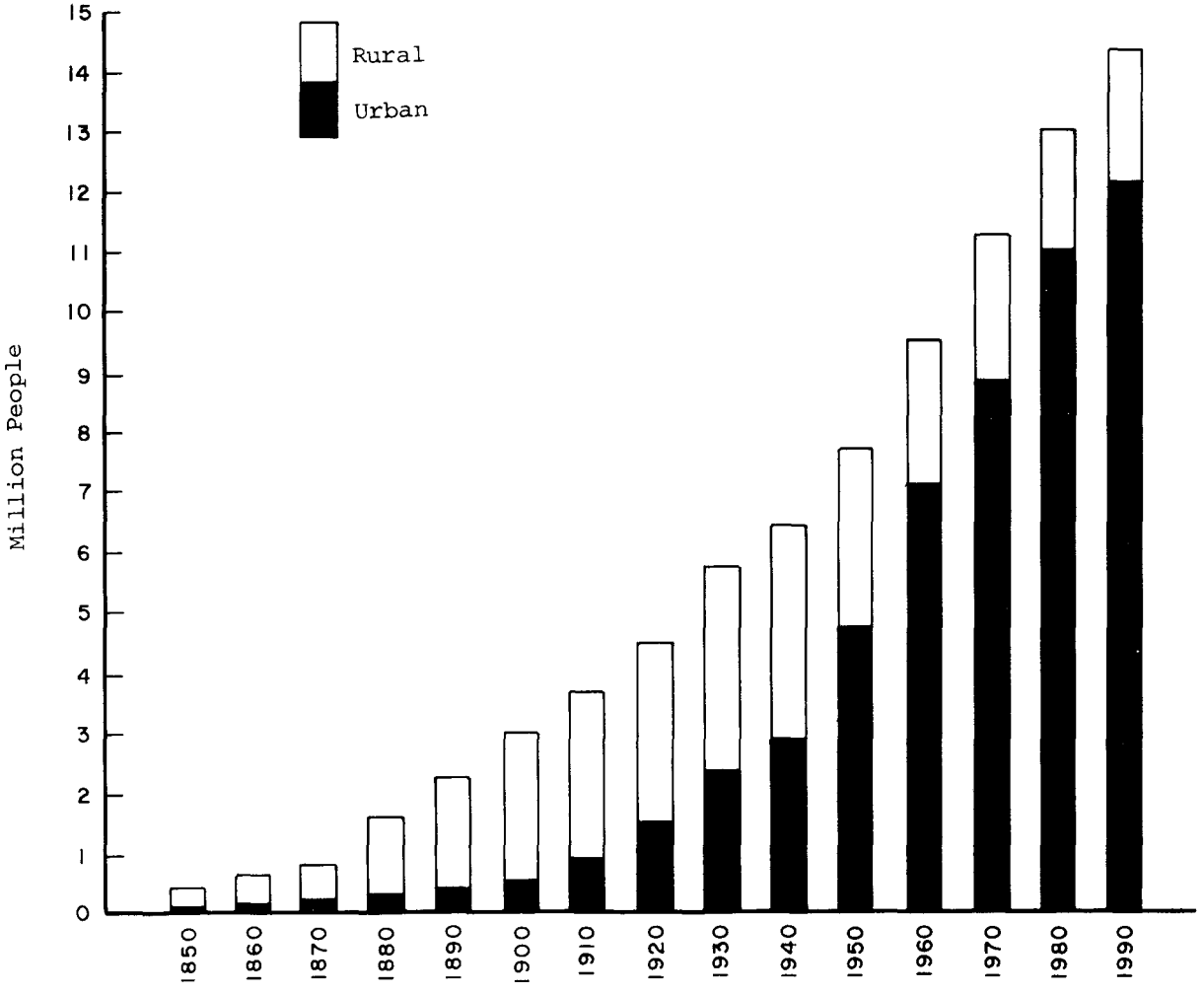
The increased availability of the auto significantly affected the decrease in transit ridership in recent decades. However, this influence of automobile availability is not likely to exhibit the same influence in future years.

If indeed transit ridership has stablized, due to the factors previously discussed, growth of urbanized areas in the state, and extension of adequate transit service in these areas, will result in increased transit ridership.

Person-Trips in Texas Cities

The 1962 Federal Highway Act, Section 134, required all states to undertake a program of comprehensive, continuing transportation planning in all of their urbanized areas. Since the early 1960s, the Texas Highway Department, in cooperation with local and federal officials, has been actively engaged in this program.

FIGURE 5.1
PAST AND PROJECTED TEXAS POPULATION
BY URBAN-RURAL DISTRIBUTION
1850-1990



Source: U. S. Bureau of Census

Table 5.1

POPULATION PROJECTIONS FOR TEXAS URBANIZED AREAS

URBANIZED AREAS	1970 POPULATION	POPULATION FORECASTS	
		1980	1990
Over 500,000			
Houston	1,677,863	2,025,000	2,371,000
Dallas	1,338,684	1,640,000	1,926,000
San Antonio	772,513	963,000	1,154,000
Fort Worth	676,944	852,000	1,030,000
200,000-500,000			
El Paso	337,471	382,000	427,000
Austin	264,499	332,000	399,000
Beaumont-Orange-Port Arthur (1)	257,281	354,000	375,000
Corpus Christi	212,820	238,000	264,000
100,000-200,000			
Lubbock	150,135	176,000	203,000
Galveston-Texas City-LaMarque (1)	145,863	252,000	357,000
Amarillo	127,010	144,000	160,000
Waco	118,843	131,000	143,000
Less Than 100,000			
Wichita Falls	97,564	107,000	117,000
McAllen-Pharr	91,141	105,000	120,000
Abilene	90,571	99,000	109,000
Odessa	81,645	92,000	102,000
Laredo	70,197	74,000	78,000
San Angelo	63,884	71,000	79,000
Midland	60,371	67,000	73,000
Tyler	59,781	74,000	88,000
Sherman-Denison	55,343	67,000	80,000
Brownsville	52,627	61,000	70,000
Bryan-College Station	51,395	59,000	66,000
Harlingen-San Benito	50,469	62,000	73,000
Longview	45,547	51,000	56,000
Temple-Belton	42,127	50,000	52,000
Victoria	41,349	50,000	55,000
Texarkana (Texas Part)	36,888	44,000	51,000
Denton	39,874	51,000	62,000
Killeen-Harker Hts.(2)	39,723	52,000	65,000
	7,150,422	8,725,000	10,205,000

SOURCE: 1974 National Transportation Study, Manual II, Vol. 2, Appendix F, Revised April, 1973.

(1) Includes two urbanized areas.

(2) Not including Fort Hood population.

In an effort to define the travel patterns and travel characteristics within the urbanized areas of the state, extensive trip origin-and-destination studies have been conducted. This information provides reliable information upon which to base estimates of existing and future trip-making patterns.

Trip Generation Rates - In April, 1973, Texas Transportation Institute published a report entitled "A Preliminary Evaluation of the Temporal Stability of Trip Generation Rates," as part of its cooperative research program with the Texas Highway Department. Table 5.2 taken from this report lists each of the origin and destination studies conducted in the state by the study name and year.

The population of the study area, the total number of internal person-trips (including an adjustment for trips made via pickup trucks), and the total adjusted person-trips per capita, also are listed for each study.

The ratio of daily trips per person varied from a low of 1.8 in San Antonio in 1956 to a high of 4.1 trips per person per day in Victoria in 1970.

A close examination of the data indicates that a correlation exists between the magnitude of the ratio, automobile ownership, and per capita income. Generally, areas with lower per capita income and automobile ownership have a considerably

Table 5.2

PERSON-TRIPS PER CAPITA IN TEXAS CITIES

STUDY AREA AND STUDY YEAR	POPULATION	TOTAL DAILY PERSON-TRIPS	PERSON-TRIPS PER PERSON
Abilene, 1965	100,865	327,344	3.24
Amarillo, 1964	156,356	516,073	3.30
Austin, 1962	209,608	583,975	2.79
Brownsville, 1970	65,018	232,557	3.57
Bryan-College Sta., 1970	57,008	198,245	3.48
Corpus Christi, 1961	196,093	463,106	2.36
Dallas, 1950	533,606	1,067,205	2.00
Dallas-Ft. Worth, 1964	1,821,468	5,491,999	3.01
El Paso, 1958	268,968	538,846	2.00
El Paso, 1970	362,794	919,490	2.54
Galveston, 1964	167,842	478,763	2.85
Harlingen-S. Benito, 1965	67,653	132,174	1.95
Houston, 1953	878,629	1,922,449	2.18
Jefferson-Orange Co., 1963	314,714	868,110	2.96
Laredo, 1964	64,311	144,869	2.25
Lubbock, 1964	152,780	432,251	2.83
McAllen-Pharr, 1968	79,413	212,018	2.67
San Angelo, 1964	63,438	177,988	2.81
San Antonio, 1956	601,586	1,084,843	1.80
San Antonio, 1969	825,843	2,280,492	2.76
Sherman-Denison, 1968	62,121	212,312	3.42
Texarkana, 1965	64,278	175,971	2.74
Tyler, 1964	64,512	206,116	3.19
Victoria, 1970	45,863	188,001	4.10
Waco, 1964	132,350	348,259	2.63
Wichita Falls, 1964	107,704	364,646	3.39

SOURCE: Texas Transportation Institute, Report 167-6, 1973

lower ratio of trips per person than other cities of the state. In urbanized areas with higher per capita income and higher automobile ownership, trips per person are substantially higher.

Trip Projections to 1990

Projection of the trips-per-person ratio to 1990 is extremely difficult, due to a number of reasons. For the past few years, an increase of approximately 4 per cent per year in trips per person has occurred. However, it is doubtful that increases of this magnitude will be realized in coming years.

The shortage of gasoline and its increasing cost has resulted in some restriction of trips. The gallons of taxable gasoline sold in Texas for the first five months of 1974 were 9.6 per cent less than the total for the five corresponding months of 1973. A substantial portion of the decrease in gallons sold occurred in March, during the height of the energy squeeze of 1974. When March is excluded, the average decrease still amounts to 7.8 per cent.

Basis of Projections - If gasoline prices stabilize and an adequate supply is available, travel in all probability will begin to increase at or near the previous rate of increase, after an adjustment to higher fuel prices occurs. However, there also is the possibility that gasoline prices will continue to

rise and that availability of gasoline will be a problem periodically. If this is the case, growth in travel will be considerably less than historical trends.

For the purpose of this study, the effect on individual trip production of these two possibilities will be evaluated, and an estimate will be presented on the per-capita daily trips in 1990 for the 32 urbanized areas which will have 50,000 or more population in 1990.

Regardless of the occurrence of either situation, the life style of urbanized areas will remain oriented to auto travel and will generate a ratio of trips per person higher than the national average. It is logical to assume a continuation of predominantly auto-oriented travel for a number of years into the future.

Projected 1990 Trips Per Capita - The anticipated ratio of total daily person-trips per capita, based on an assumption of a stabilized price and an adequate supply of gasoline, was calculated under procedures used in the TTI Report No. 167-6, previously cited. This is regarded as an "optimistic" forecast.

Projections of trips per capita based on an assumption of continuing increases in gasoline prices and periodic supply shortages represent a "conservative" forecast and would result in very little future increase in daily per capita trips.

There is a substantial probability that neither of these two extreme conditions will occur. Therefore, a third estimate of per capita daily trips has been developed, which falls between the high and low extremes.

Per capita daily person-trip forecasts for 1990 in the 32 listed urbanized areas are presented in Table 5.3.

Factors Affecting Future Transit Trends

Transit ridership in Texas as a percentage of total person-trips has been decreasing for several decades. Table 5.4 indicates the estimated per cent of total person-trips currently made by transit in each city with an existing system. The per cent of total trips made by transit varies from 0.24 per cent in Abilene to 5.18 per cent in El Paso.

These percentages are not expected to decrease in the future. Instead, it is very probable that increases will be realized in the per cent of person-trips made by transit.

Basis for Expected Transit Use Increases - Several reasons underlie this prediction. Many Texas cities have implemented, or have indicated they will implement, expanded transit service in the future.

"Passenger Transport," a weekly periodical of the American Transit Association, reported in its July 26, 1974

Table 5.3

ESTIMATED 1990 PERSON-TRIPS PER CAPITA IN 32 URBANIZED AREAS

POPULATION GROUP	PROJECTED DAILY PERSON-TRIPS PER CAPITA		
	Conservative	Optimistic	Median Estimate
Over 500,000			
Houston	3.40	4.56	4.10
Dallas-Fort Worth(1)	3.55	5.25	4.60
San Antonio	3.20	4.28	3.85
200,000-500,000			
El Paso	2.85	4.20	3.65
Austin	3.55	5.25	4.60
Beaumont-Port Arthur-Orange(1)	3.55	4.76	4.30
Corpus Christi	3.35	4.49	4.05
100,000-200,000			
Lubbock	3.55	5.98	5.00
Galveston-Texas City-LaMarque(1)	3.35	4.49	4.05
Amarillo	3.70	5.98	5.10
Waco	3.40	5.50	4.65
Less Than 100,000			
Wichita Falls	3.75	6.07	5.15
McAllen-Pharr-Edinburg	3.20	5.18	4.40
Abilene	3.70	5.98	5.10
Midland-Odessa(1)	3.70	5.98	5.10
Laredo	3.15	5.10	4.25
San Angelo	3.70	5.98	5.10
Tyler	3.70	5.98	5.10
Sherman-Denison	3.75	6.07	5.15
Brownsville	3.75	6.07	5.15
Bryan-College Station	3.95	6.40	5.40
Harlingen-San Benito	2.75	4.45	3.80
Texarkana	3.30	5.35	4.55
Longview	3.30	5.35	4.55
Temple-Belton	3.40	5.50	4.65
Victoria	3.35	4.49	4.05
Denton	3.75	6.05	5.15
Killeen-Harker Hts.	3.40	5.50	4.65

(1) Includes two urbanized areas.

Table 5.4

1973 TRANSIT RIDERSHIP IN TEXAS CITIES WITH EXISTING BUS SYSTEMS

POPULATION GROUP	POPULATION (Thousands)	PER CENT SERVED	1973 TRIPS PER CAPITA	PERSON-TRIPS IN SERVICE AREA (Thousands)	PER CENT TRIPS BY TRANSIT	1973 TRANSIT RIDERSHIP (Thousands)
Over 500,000						
Houston	1,779	60	1,168	1,246,723	2.94	36,500
Dallas	1,423	60	1,168	997,238	2.58	25,696
San Antonio	831	72	1,168	698,838	3.43	23,968
Fort Worth	730	50	1,168	426,320	1.34	5,701
200,000-500,000						
El Paso	350	60	1,040	218,400	5.18	11,308
Austin	283	60	1,186	201,383	2.11	4,241
Beaumont	123	60	1,223	90,257	1.16	1,048
Corpus Christi	221	60	1,223	162,170	1.23	2,000
100,000-200,000						
Lubbock	158	50	1,223	96,617	0.47	451
Galveston	68	70	1,223	58,215	2.03	1,180
Amarillo	132	60	1,351	124,832	1.12	1,200
Waco	123	60	1,186	87,527	0.91	797
Less than 100,000						
Wichita Falls	99	80	1,369	108,424	0.37	405
Abilene	94	50	1,351	63,497	0.25	156
Laredo	71	70	1,150	57,155	4.37	2,500
San Angelo	66	73	1,223	58,924	0.32	187
Brownsville	56	70	1,369	53,665	1.70	910

NOTE: This table lists all significant public bus transit systems in Texas. A significant system is defined as "a system with more than five buses which are operated on scheduled routes." A number of small bus systems in the state do not meet this definition.

issue that for the first six months of 1974, ridership of member systems showed the following increases:

- Cities over 500,000 +5.5%
- Cities between 250,000 - 500,000 +5.3%
- Cities between 100,000 - 250,000 +8.3%
- Cities between 50,000 - 100,000 +12.0%
- Cities less than 50,000 +11.3%

Ridership increases in Texas have not been this large. However, for the first quarter of 1974, transit ridership in Texas increased 3 per cent, according to data reported to TMTC.

Projections of the per cent of total trips by transit in Texas cities are made for the two extreme possibilities of gasoline price and availability previously discussed. Also, as before, a middle-range estimate was used in projecting transit ridership.

Table 5.5 contains the projected per cent of total trips made by bus transit in Texas cities under these three assumptions.

Expanded Transit Service - Many Texas cities contacted by TMTC for data for the 1974 National Transportation Study sponsored by the U. S. Department of Transportation indicated that transit service would be extended to other areas of their city. Special transit service, such as park-and-ride systems and bus pools, have been successfully implemented in several cities.

Table 5.5

ESTIMATED 1990 PERCENT OF TRAVEL BY BUS TRANSIT

POPULATION GROUP	PROJECTED PERCENT OF TRIPS BY TRANSIT		
	Conservative	Optimistic	Median Estimate
Over 500,000			
Houston	3.5	5.5	4.5
Dallas	3.0	5.0	4.0
San Antonio	4.0	6.5	5.5
Fort Worth	2.0	3.0	2.5
200,000-500,000			
El Paso	6.5	9.0	8.5
Austin	3.0	5.0	4.0
Beaumont-Port Arthur-Orange	2.0	3.0	2.5
Corpus Christi	2.0	3.0	2.5
100,000-200,000			
Lubbock	1.5	2.5	2.0
Galveston-Texas City-LaMarque	2.0	3.0	2.5
Amarillo	2.0	3.0	2.5
Waco	2.0	3.0	2.5
Less than 100,000			
Wichita Falls	1.5	2.5	2.0
McAllen-Pharr-Edinburg	5.0	8.0	6.5
Abilene	1.5	2.5	2.0
Midland-Odessa	.5	2.5	2.0
Laredo	5.0	8.0	6.5
San Angelo	1.5	2.5	2.0
Tyler	1.5	2.5	2.0
Sherman-Denison	1.5	2.5	2.0
Brownsville	5.0	8.0	6.5
Bryan-College Station	1.5	2.5	2.0
Harlingen-San Benito	5.0	8.0	6.5
Texarkana	1.5	2.5	2.0
Longview	1.5	2.5	2.0
Temple-Belton	1.5	2.5	2.0
Victoria	1.5	2.5	2.0
Denton	1.5	2.5	2.0
Killeen-Harker Hts.	1.5	2.5	2.0

Continued expansion of transit service can be expected because of the increased amounts of federal monies available to assist cities in transit programs. It also is anticipated that state transit aid funds will be available in the near future.

Projected Bus Ridership

Several projections of bus transit ridership in Texas will be presented, based on different underlying assumptions. However, a number of assumptions are made which are common to all of the projections. These are:

1. The 1990 population total within the 32 Texas urbanized areas over 50,000 population will be 10,205,000.

2. All cities over 50,000 population will have bus transit systems in operation in the year 1990.

3. Service-area coverage will be expanded in urbanized areas which have transit service. The percentage of 1990 population within the service area of local transit systems was estimated by officials in each city for the 1974 National Transportation Study and remains constant for all ridership projections.

Low Ridership Estimate - The low estimate of bus transit ridership, Estimate I, is presented for each city in Table 5.6. This projection is based on two additional assumptions:

1. The per cent of trips to be made by transit will remain at the 1973 level.

Table 5.6

ESTIMATE I OF 1990 BUS TRANSIT RIDERSHIP IN TEXAS

URBAN AREA	POPULATION (Thousands)	PER CENT SERVED	1990 TRIPS PER CAPITA	PCT. TRIPS BY TRANSIT	1990 TRANSIT RIDERSHIP (Thousands)
Houston	2,371	75	1,168	2.94	61,064
Dallas	1,926	80	1,168	2.58	46,431
San Antonio	1,154	75	1,168	3.43	34,674
Fort Worth	1,030	70	1,168	1.34	11,285
El Paso	427	80	1,040	5.18	18,403
Austin	399	80	1,186	2.11	7,988
Beaumont-Port Arthur-Orange	375	70	1,223	1.16	3,724
Galveston-Texas City-LaMarque	357	70	1,223	2.03	6,204
Corpus Christi	264	70	1,223	1.23	2,780
Lubbock	203	70	1,223	0.47	817
Amarillo	160	75	1,351	1.12	1,816
Waco	143	75	1,186	0.91	1,157
McAllen-Pharr-Edinburgh	120	70	1,150	4.30	4,154
Wichita Falls	117	85	1,369	0.37	504
Abilene	109	60	1,351	0.25	221
Odessa	102	70	1,223	0.30	262
Tyler	88	70	1,351	0.40	333
Sherman-Denison	80	70	1,369	0.40	307
San Angelo	79	75	1,223	0.32	232
Laredo	78	90	1,150	4.37	3,528
Harlingen-San Benito	73	70	1,150	4.30	2,527
Midland	73	70	1,223	0.30	187
Brownsville	70	80	1,369	4.30	3,296
Bryan-College Station	66	70	1,460	0.80	540
Killeen-Harker Heights	65	70	1,186	0.80	432
Denton	62	70	1,369	0.40	238
Longview	56	70	1,205	0.40	189
Victoria	55	70	1,223	0.80	377
Temple-Belton	52	70	1,186	0.80	345
Texarkana (Texas part)	51	70	1,205	0.40	172
				TOTAL	214,187

2. Total per capita trips for Texas urbanized areas also will remain at the 1973 level.

Based on these assumptions, the lowest projection for bus transit ridership in the state in 1990 is 214,187,000 passengers. This would represent a 77 per cent increase in ridership over a 16-year period, or an annual increase of nearly 5 per cent.

This projected increase in bus transit ridership would result primarily from an expansion of bus routes to serve approximately 75 per cent of the population of all 32 of the Texas urbanized areas expected to exceed 50,000 population by 1990. If this level of service is attained by 1990, a substantial commitment of state and local funding will be necessary to purchase the equipment needed to expand service and replace existing equipment.

The pricing and availability of gasoline assumptions for this projection are:

(1) Gasoline will be available in ample quanities to satisfy travel demands.

(2) Prices of gasoline will remain at the current level.

If this situation prevails, the primary purposes for expanding transit facilities and service will be the continued improvement of service for the transit dependent, as well as providing improved service for the home to work trips.

Median Ridership Estimate - Estimate II is based on an assumption that total trips per person will increase over the next 16 years, but that the rate of increase will be lower than that experienced in recent years. All other parameters are identical to those used in Estimate I.

Projected bus transit ridership, by city, is presented in Table 5.7 for Estimate II. Total bus ridership is projected at 283,123,000--an increase of 134 per cent during the 16-year period, or an annual growth rate of 8.4 per cent.

This projection most likely would be valid in a situation under which gasoline prices have stabilized at higher than current levels and an adequate supply of gasoline is periodically unavailable. The level of state financial commitment required to provide bus service for this estimate will be higher than for Estimate I. Implementation of an adequately funded program of state financial assistance will be required in the near future to insure that planning, capital, and operating needs of bus systems can be met.

The primary purposes for improving transit are the same as in the previous assumption. However, an additional impetus will be the increased demand by citizens for an acceptable alternative to automobile travel for some trip purposes.

Table 5.7

ESTIMATE II OF 1990 BUS TRANSIT RIDERSHIP IN TEXAS

URBAN AREA	POPULATION (Thousands)	PER CENT SERVED	1990 TRIPS PER CAPITA	PCT. TRIPS BY TRANSIT	1990 TRANSIT RIDERSHIP (Thousands)
Houston	2,371	75	1,497	2.94	78,264
Dallas	1,926	80	1,679	2.58	66,745
San Antonio	1,154	75	1,405	3.43	41,710
Fort Worth	1,030	70	1,679	1.34	16,222
El Paso	427	80	1,332	5.18	23,570
Austin	399	80	1,679	2.11	11,308
Beaumont-Port Arthur-Orange	375	70	1,570	1.16	4,781
Galveston-Texas City-LaMarque	357	70	1,478	2.03	7,498
Corpus Christi	264	70	1,478	1.23	3,360
Lubbock	203	70	1,825	0.47	1,219
Amarillo	160	75	1,862	1.12	2,503
Waco	143	75	1,697	0.91	1,656
McAllen-Pharr-Edinburgh	120	70	1,606	4.30	5,801
Wichita Falls	117	85	1,880	0.37	692
Abilene	109	60	1,862	0.25	305
Odessa	102	70	1,862	0.30	399
Tyler	88	70	1,862	0.40	459
Sherman-Denison	80	70	1,880	0.40	422
San Angelo	79	75	1,862	0.32	353
Laredo	78	90	1,551	4.37	4,758
Harlingen-San Benito	73	70	1,387	4.30	3,048
Midland	73	70	1,862	0.30	285
Brownsville	70	80	1,880	4.30	4,525
Bryan-College Station	66	70	1,971	0.80	729
Killeen-Harker Heights	65	70	1,697	0.60	618
Denton	62	70	1,880	0.40	327
Longview	56	70	1,661	0.40	261
Victoria	55	70	1,862	0.80	574
Temple-Belton	52	70	1,697	0.80	494
Texarkana (Texas Part)	51	70	1,661	0.40	237
				TOTAL	283,123

High Ridership Estimate - Estimate III is based on an assumption that the per cent of trips by transit will attain the level presented in the Median Estimate (Table 5.5). All other parameters for this projection are identical with those in Esimate I. Trips per capita are assumed to remain at the 1973 level rather than increase at the historical rate.

Projections contained in Estimate III would likely be valid in a situation where gasoline prices are much higher than current levels and frequent gasoline shortages occur. Bus transit ridership under Estimate III totals 359,168,000, as shown in Table 5.8. This represents an increase of approximately 200 per cent over the 16-year period, or 12.5 per cent annually.

The level of state financial commitment to implement the bus service requirements for this estimate will be substantially higher than for the two previous estimates. The primary purposes for improving transit systems in the state under these conditions will be to provide an acceptable alternative means of travel to the automobile, to relieve congestion, and to reduce energy consumption.

Texas Transportation Institute Estimate - Under a contract to assist the Texas Mass Transportation Commission in developing the Texas public transit section of the 1974 National Transportation Study, the Texas Transportation Institute projected 1990 bus transit ridership in the state at 225,000,000 passengers. This is lower than Estimates II or III. However, the TTI made its projection before the start of the fuel shortage of 1973.

Local Estimates - Bus transit ridership projections developed for the Dallas/Fort Worth metroplex by the Dallas/Fort Worth Urban Transportation Study staff are considerably higher than the three ridership estimates previously discussed in this Plan. These three projections assumed the expansion of existing scheduled route operations, implementation of express bus runs, and a limited mileage of exclusive transitways in the major cities of the state.

The recently adopted Dallas/Fort Worth Transportation Plan contains an extensive system of exclusive transitways as well as expanded bus service in mixed flow. With these different assumptions, the Texas Transit Plan projections and Dallas/Fort Worth projections naturally differ. The combined 1990 Dallas/Fort Worth bus ridership estimate is 166,000,000.

Bus ridership projections for 1990 furnished by other cities to be used in this plan are shown below:

City	1990 Ridership
San Antonio	35,000,000
Austin	15,500,000
Beaumont*	2,000,000

*Based on the assumption that Beaumont will be the only city in the Beaumont, Port Arthur, Orange area with a transit system.

Establishment of Ridership Target

Total bus transit ridership under each of the four listed projections are plotted in Figure 5.2. At first glance, all projections may appear optimistic in view of ridership

FIGURE 5.2
1990 PROJECTIONS OF BUS TRANSIT RIDERSHIP

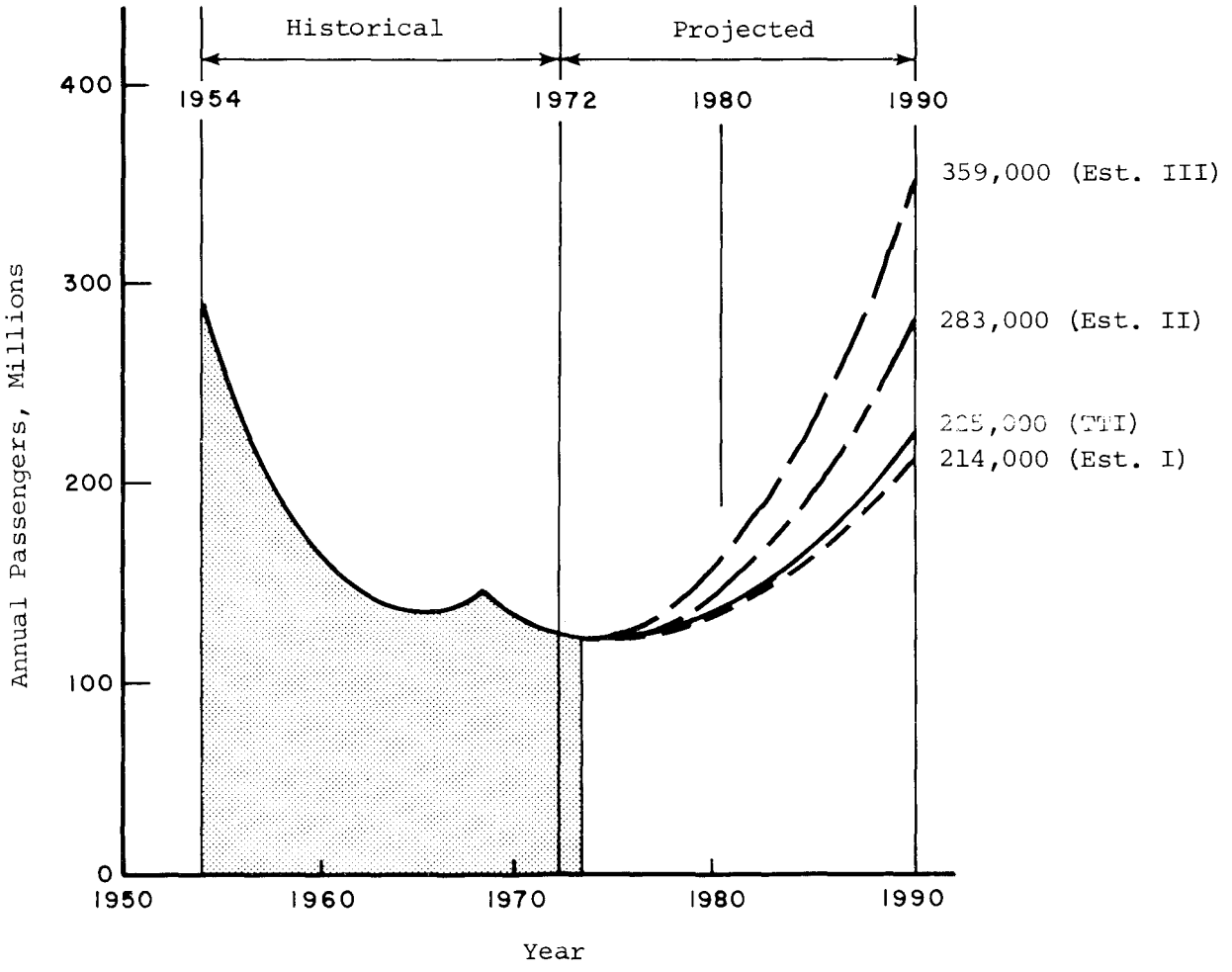


Table 5.8

ESTIMATE III OF 1990 BUS TRANSIT RIDERSHIP IN TEXAS

URBAN AREA	POPULATION (Thousands)	PER CENT SERVED	1990 TRIPS PER CAPITA	PCT. TRIPS BY TRANSIT	1990 TRANSIT RIDERSHIP (Thousands)
Houston	2,371	75	1,168	4.5	93,465
Dallas	1,926	80	1,168	4.0	71,986
San Antonio	1,154	75	1,168	5.5	55,600
Fort Worth	1,030	70	1,168	2.5	21,054
El Paso	427	80	1,040	8.5	30,198
Austin	399	80	1,186	4.0	15,143
Beaumont-Port Arthur-Orange	375	70	1,223	2.5	8,026
Galveston-Texas City-LaMarque	357	70	1,223	2.5	7,640
Corpus Christi	264	70	1,223	2.5	5,650
Lubbock	203	70	1,223	2.0	3,477
Amarillo	160	75	1,351	2.5	4,054
Waco	143	75	1,186	2.5	3,179
McAllen-Pharr-Edinburgh	120	70	1,150	6.5	6,279
Wichita Falls	117	85	1,369	2.0	2,724
Abilene	109	60	1,351	2.0	1,768
Odessa	102	70	1,223	2.0	1,747
Tyler	88	70	1,351	2.0	1,665
Sherman-Denison	80	70	1,369	2.0	1,535
San Angelo	79	75	1,223	2.0	1,450
Laredo	78	90	1,150	6.5	5,248
Harlingen-San Benito	73	70	1,150	6.5	3,820
Midland	73	70	1,223	2.0	1,247
Brownsville	70	80	1,369	6.5	4,982
Bryan-College Station	66	70	1,460	2.0	1,350
Killeen-Harker Heights	65	70	1,186	2.0	1,080
Denton	62	70	1,369	2.0	1,190
Longview	56	70	1,205	2.0	945
Victoria	55	70	1,223	2.0	943
Temple-Belton	52	70	1,186	2.0	863
Texarkana (Texas part)	51	70	1,205	2.0	860
				TOTAL	359,168

declines of recent years. However, a number of factors can be cited to support the projected ridership increases.

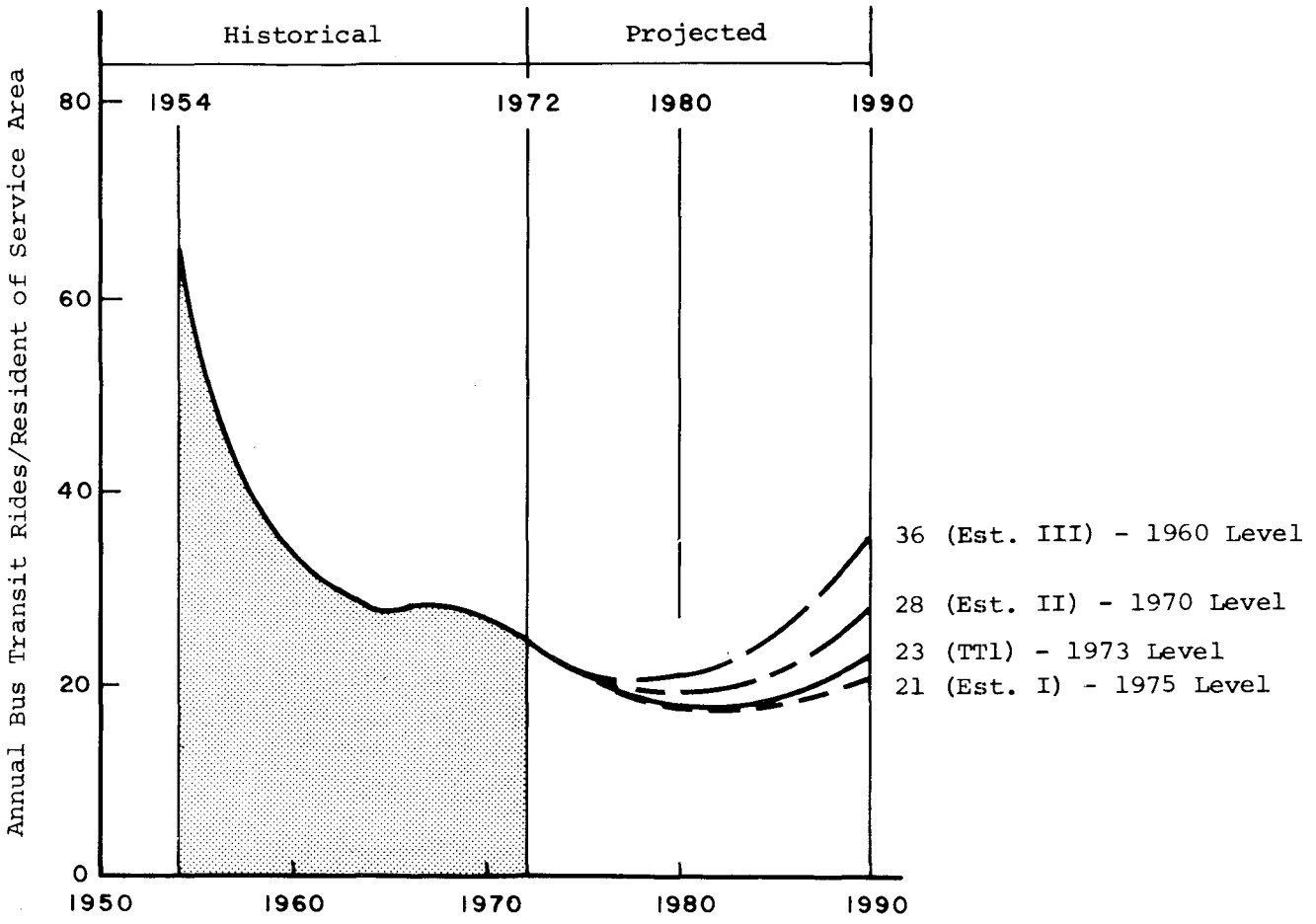
Population Within Transit Service Areas - Estimates of the per cent of 1990 population in the 32 largest urbanized areas of Texas which will be within the service area of local bus transit systems were prepared by local officials for the 1974 National Transportation Study.

These estimates, which indicate that 75 per cent of the total population in these 32 urbanized areas will be within acceptable walking distance (generally one-quarter mile) of a transit route, appear reasonable and represent a desirable planning objective.

Per Capita Transit Ridership - If this service-area coverage objective can be attained, annual transit ridership per resident of the transit service areas under Estimate II will be at approximately the same level as for the year 1970, as shown in Figure 5.3.

A ridership total in the order of Estimate III would represent a return to the per capita ridership level which prevailed in 1960. As stated previously, this transit ridership level would appear to be attainable only under conditions of continuing increases in gasoline prices and frequent supply shortages.

FIGURE 5.3
PER CAPITA BUS TRANSIT RIDERSHIP



1990 Ridership Target - Based on these considerations, a 1990 bus transit ridership level of 360,857,000 passengers appears a realistic planning objective for the 32 largest urbanized areas of Texas. This target figure is based on the projection presented as Estimate II, with revised ridership estimates furnished by four cities as previously discussed.

In keeping with the concept of continuing planning, periodic reevaluation of bus transit ridership projections will be necessary. This will permit future developments in the many variables involved to be used in making adjustments to the underlying assumptions embodied in these estimates. For example, public policies concerning efforts to deal with congestion, air polution or related matters in urbanized areas could have substantial impact on ridership levels. And, such policy guidelines need to be inserted into the planning process as soon as they might occur.

Projected Rail Transit Ridership

Projection of rail-rapid transit ridership is a complex undertaking. The time constraints imposed by a requirement to develop initial plans for rail systems have limited the efforts made thus far in this area of transit development in Texas.

At present, no city in Texas is committed to construction of a rail-rapid facility, although several cities are investigating the potential for fixed-rail and other related types of high-speed transit systems. Projections of possible RRT ridership presented here are based on the planning work accomplished to date in these cities.

The estimated ridership on rail-rapid and related systems currently under investigation is presented in Table 5.9. These estimates will be revised as new developments warrant, under the continuing transportation planning process now underway in all urbanized areas of 50,000 or more population in Texas.

Table 5.9

ESTIMATED 1990 RAIL TRANSIT RIDERSHIP

CITY	1990 RIDERSHIP
Houston[1]	30,000,000
Dallas-Fort Worth[2]	34,000,000
El Paso[3]	3,000,000
TOTAL	67,000,000

Projected 1990 Ridership on Specialized Systems

Recent reports submitted to TMTC by municipal officials indicate that as many as five specialized transit systems will be in operation in Texas urbanized areas in 1990. Projected ridership on these five systems, as shown in Table 5.10, totals 27,800,000 in 1990.

(1) SOURCE: Transit Program for Houston, prepared by Alan M. Voorhees & Associates.
(2) SOURCE: North Central Texas Council of Governments.
(3) SOURCE: City of El Paso. Local streetcar service only.

Table 5.10

PROJECTED 1990 RIDERSHIP ON SPECIALIZED TRANSIT SYSTEMS

URBANIZED AREA	SYSTEM TYPE	1990 RIDERSHIP
Houston	People Mover (Downtown)	13,000,000
San Antonio	People Mover (Downtown)	2,000,000
San Antonio	River Taxi (IH-10 to Mulberry Dr.)	300,000
El Paso	People Mover (To Juarez)	10,000,000
Laredo	People Mover (To Nuevo Laredo)	2,500,000
	TOTAL	27,800,000

Summary of 1990 Ridership Projections

Based on the 1990 bus ridership target of 360,857,000 passengers, and the projections on 1990 ridership of rail transit and specialized systems, total Texas transit ridership for 1990 is projected at 455.7 million. This would be 3.7 times the 1973 total transit ridership of 122.0 million.

As shown in Table 5.11, bus transit systems would account for 79.2 per cent of this total ridership in 1990; rail systems, nearly 15 per cent; and the five specialized transit systems, about 6 per cent.

Table 5.11

PROJECTED 1990 RIDERSHIP BY TRANSIT SYSTEM TYPES

SYSTEM TYPE	RIDERSHIP	PER CENT
Bus	360,857,000	79.2
Rail	67,000,000	14.7
Specialized	27,800,000	6.1
TOTAL	455,657,000	100.0

Transit Cost-Revenue Projections for 1980 and 1990

CHAPTER 6

Chapter 6

TRANSIT COST-REVENUE PROJECTIONS FOR 1980 AND 1990

This chapter presents estimated capital and operating costs and operating revenues for improved and expanded transit systems in 1980 and 1990 in the 32 urbanized areas of Texas.

In developing these estimates, the Texas Mass Transportation Commission has sought maximum input from local government officials. In those large cities which have recently completed or are developing long-range regional transit planning studies, data from these studies were used to the degree they were available.

In urban areas without long-range transit plans, projections were based on data supplied by the central cities in the 1974 National Transportation Study, but with adjustments made by TMTC to take into account such relatively recent developments as the rise in gasoline and new-car prices and the 1974 upturn in transit ridership in Texas.

Long-range plans for improvement in transit service in Texas urbanized areas will be reviewed in terms of (a) bus-related systems, (b) rail-related systems, and(c) specialized transit systems.

Bus Transit Programs for 1980

By 1980, bus transit systems are expected to be operational in the 27 Texas urbanized areas which will have central-city populations of 50,000 or more. The number of buses in these urbanized areas is expected to increase from the 1973 total of 1,582 to a 1980 total of 2,345; or 48 percent, as shown in Table 6.1.

These vehicles are expected to range in size from minibuses with 12 to 17 passenger seats to the conventional transit buses seating 33 to 51 passengers. In a relatively few major urban transit corridors, new articulated buses with substantially higher passenger capacities may be utilized.

The average age of these buses in 1980 is expected to be 5 years, compared to a 1973 average of 8.7 years for Texas transit bus fleets. In order to achieve this average age level, approximately 2,100 new buses will need to be acquired by Texas transit systems between 1975 and 1980, or 350 per year.

Projected Bus-Miles and Route-Miles - Bus transit systems are expected to provide a total of 81.7 million bus-miles of service in 1980 as shown in Table 6.2. Round-trip length of bus routes is projected at 7,260 miles, while the

Table 6.1

ESTIMATED BUS FLEET REQUIREMENTS IN 1980

URBANIZED AREAS	1973 BUS FLEET	1980 FLEET TOTALS
Houston	376	570
Dallas	419	540
San Antonio	263	350
Fort Worth	110	230
El Paso	144	160
Austin	50	80
Beaumont, Pt. Arthur, Orange(1)	21	30
Galveston, LaMarque, Texas City(1)	15	40
Corpus Christi	49	40
Lubbock	17	25
Amarillo	27	35
Waco	20	26
McAllen, Pharr, Edinburg	-	30
Wichita Falls	13	15
Abilene	12	20
Odessa	-	15
Tyler	-	13
Sherman, Denison	-	13
San Angelo	10	12
Laredo	24	25
Harlingen, San Benito	(2)	16
Midland	-	10
Brownsville	12	25
Bryan-College Station	-	15
Texarkana	-	10
TOTAL	1,582	2,345
Average Age (Years)	8.7	5.0

(1) Includes two urbanized areas.
(2) Excludes 42 buses of Valley Transit Company, Harlingen, which operated mainly in intercity service in 1973.

Table 6.2

CURRENT AND PROJECTED 1980 TRANSIT BUS-MILES

URBANIZED AREA	1973 BUS-MILES (Thousands)	1980 BUS-MILES (Thousands)
Houston	15,402	23,800
Dallas	13,650	19,440
San Antonio	8,091	11,200
Fort Worth	4,200	6,325
El Paso	3,960	6,240
Austin	2,417	3,200
Beaumont-Port Arthur-Orange[1]	588	818
Galveston-La Marque-Texas City[1]	630	1,464
Corpus Christi	1,274	1,420
Lubbock	532	920
Amarillo	875	1,225
Waco	648	835
McAllen-Pharr-Edinburg	0	750
Wichita Falls	273	458
Abilene	648	385
Odessa	0	375
Tyler	0	325
Sherman-Denison	0	325
San Angelo	400	510
Laredo	672	785
Harlingen-San Benito	(2)	400
Midland	0	250
Brownsville	525	625
Bryan-College Station	0	375
Texarkana	0	250
TOTAL	54,525	81,700

(1) Covers two urbanized areas.
(2) Excludes intercity service by Valley Transit Company

actual physical length (one way) of streets and highways used for service is projected at 3,840 miles.

In addition, a total of 582 miles of special facilities (exclusive transitways, "metered" freeway access ramps with preferential bus access lanes, and exclusive bus lanes in freeways and on major city streets) are projected to be operational in Texas urbanized areas in 1980.

Bus Ridership Projection - Bus ridership in the 27 urbanized areas is projected at 163 million in 1980, or 36 percent above the 1973 total. Based on 319 workdays per year, average weekday bus ridership is projected at 510,600 bus passengers per workday.

Transit Fare Level - An average bus transit fare of 33 cents per revenue passenger is projected for 1980 in Texas cities. This takes into account the impact of lower child-student fares, lower fares for senior citizens, and the transfer and extra-zone fares in particular cities.

This fare level represents only a 12 percent increase from the 29.4-cent average fare per passenger reported for the first quarter of 1974 by the 18 Texas cities with existing transit service. This modest projected fare increase is in

accord with the overall strategy for making a concerted effort to maintain the current upturn in Texas transit ridership and to begin to build a still higher level of transit ridership in the years immediately ahead.

It should be noted that this strategy will result in higher operating deficits for Texas transit systems in the period 1975-1980, during the time when a buildup of transit ridership is under way, because operating costs are expected to to rise at a substantially faster rate than the projected fare increases.

Operating Cost-Revenue Projections for 1980 - Average passenger revenue per bus-mile is projected at 66 cents for 1980. Average number of revenue passengers per bus-mile is projected at 2.0, compared to a 1973 average of 2.17 passengers per bus-mile.

The anticipated decline in average passenger occupancy per bus-mile is due to the substantial increase expected in annual bus-miles of service--from 54.4 million in 1973 to 81.7 million in 1980. It is probable that some of the new bus routes will average no more than one passenger per bus-mile in 1980. However, this expansion of service is a necessary element in a program designed to attract new transit riders.

Average operating cost per bus-mile is projected at $1.10 in 1980, compared to 82 cents reported by Texas transit systems for the first quarter of 1974--an increase of 34 percent, or nearly 6 percent annually. The net effect is a projected operating cost of $90 million in 1980.

Total bus system operating revenues are estimated at $54 million in 1980. When related to the projected operating cost of $90 million, this will mean an operating deficit of $36 million in 1980, or 44 cents per bus-mile.

Capital Costs for Bus Systems - City officials in the 27 urbanized areas which are expected to have bus systems in operation in 1980 were contacted by the Texas Transportation Institute, which had contracted with the Texas Mass Transportation Commission to carry out the state transit phase of the 1974 National Transportation Study.

These city officials were requested to estimate their requirements for new buses, maintenance facilities, special transitways, and other bus-related facilities. TTI then estimated the capital cost of these bus systems in 1971 dollars.

It therefore was necessary for TMTC to expand the 1971 capital cost up to 1980, and, it was concluded that the 1971 capital cost projections should be increased by 40 percent.

On this basis, total capital expenditures for bus systems in the 27 urbanized areas between 1975 and 1980 will amount to $800,815,000 as shown in Table 6.3. Of this total, $149,255,000 (18.6 percent) is for new buses, and $651,560,000 (81.4 percent) is for new or improved maintenance facilities, special busways, and related facilities for bus operations and servicing.

Thus, an average yearly expenditure of some $133.5 million appears necessary for 1975 through 1980 for expansion and improvement of bus systems in Texas.

Rail Transit Programs for 1980

A new rail-rapid transit system is in the early planning stages in the Houston area. It is not expected to be operational by 1980, and no information is presently available as to the amount of capital expenditures that may be made on this system by 1980.

Dallas-Fort Worth Area - In the Dallas-Fort Worth region, current plans call for one rail transit system to be in operation and another system near completion by 1980.

A rail-rapid transit system is proposed to be operational shortly after 1980 for a 40-mile corridor extending from the Dallas central business district to the Dallas-

Table 6.3

CAPITAL COST PROJECTIONS TO 1980 FOR BUS TRANSIT SYSTEMS

URBANIZED AREA	CAPITAL COSTS (THOUSANDS) Buses	Other	Total
Abilene	$ 980	$ 100	$ 1,080
Amarillo	1,225	140	1,365
Austin	5,040	1,400	6,440
Beaumont-Port Arthur-Orange (1)	1,470	1,400	2,870
Brownsville	1,225	140	1,365
Bryan-College Sta.	735	140	875
Corpus Christi	2,520	420	2,940
Dallas	39,310	497,969	537,279
El Paso	10,080	2,240	12,320
Fort Worth	14,490	72,851	87,341
Galveston-Texas City-LaMarque (1)	1,960	280	2,240
Harlingen-San Benito	785	140	925
Houston	38,300	64,400	102,700
Laredo	1,225	140	1,365
Lubbock	1,225	140	1,365
McAllen-Pharr-Edinburg	1,470	140	1,610
Midland	490	140	630
Odessa	735	140	875
San Angelo	590	140	730
San Antonio	21,630	8,400	30,030
Sherman-Denison	635	140	775
Texarkana	490	140	630
Tyler	635	140	775
Waco	1,275	140	1,415
Wichita Falls	735	140	875
TOTAL	$149,255	$651,560	$800,815
PER CENT	18.6	81.4	100.0

(1) Contains two urbanized areas.

Fort Worth Airport, and thence into the Fort Worth central business district.

Total 1980 capital costs to develop this system are estimated at $488 million. The system is not expected to be operational until shortly after 1980. Consequently, a major portion of the capital expenditures would be required prior to 1980.

The City of Fort Worth also plans to acquire the Leonard Department Store downtown subway system and expand it to 3.5 route-miles by about 1980. Total capital costs by the time the system is completed are estimated at $78 million. The enlarged system is projected to carry 11.2 million passengers in 1980, generating $2.8 million in yearly revenue while incurring only $475,000 in operating costs.

El Paso Area - The local trolley system in El Paso is expected to resume operations prior to 1980, and to carry 2 million passengers annually by 1980 over a 4.5-mile route. Revenues are estimated at $500,000 in 1980 at a 25-cent fare. Operating costs are extimated at $740,000 for a 1980 operating deficit of $240,000.

This results in a total 1980 Texas rail transit system operating over a total of 8 route-miles, with annual ridership of 13.2 million persons. Total revenue is projected at $3.3 million, and operating costs at $1.2 million.

Specialized Transit Programs for 1980

None of the five specialized transit systems discussed in Chapter 5 are expected to be operational by 1980. While some capital expenditures may be made on several of these systems by 1980, TMTC was unable to obtain definite estimates from the affected cities on the probable expenditure levels. Therefore, no capital costs are included here for these systems by 1980.

Bus Transit Programs for 1990

By 1990, bus transit systems are expected to be operational in all 32 Texas urbanized areas which will have central-city populations of 50,000 or more. The number of buses in these urbanized areas is expected to increase from the 1980 total of 2,345 to a 1990 total of 3,652, as shown in Table 6.4. This will be 56 percent more buses than the expected 1980 fleet total, and 131 per cent more buses than the 1973 total of 1,582.

Table 6.4

ESTIMATED BUS FLEET REQUIREMENTS IN 1990

URBANIZED AREAS	1973 BUS FLEET	1990 FLEET TOTALS
Houston	376	990
Dallas	419	772
San Antonio	263	400
Fort Worth	110	307
El Paso	144	227
Austin	50	158
Beaumont, Pt. Arthur, Orange(1)	21	35
Galveston, LaMarque, Texas City(1)	15	80
Corpus Christi	49	73
Lubbock	17	46
Amarillo	27	60
Waco	20	42
McAllen, Pharr, Edinburg	0	75
Wichita Falls	13	22
Abilene	12	24
Odessa	0	21
Tyler	0	17
Sherman	0	16
San Angelo	10	18
Laredo	24	45
Harlingen, San Benito	(2)	39
Midland	0	15
Brownsville	12	60
Bryan-College Station	0	24
Killeen-Harker Hts.	0	20
Denton	0	12
Longview	0	10
Victoria	0	18
Temple-Belton	0	16
Texarkana	0	10
TOTAL	1,582	3,652

(1) Includes two urbanized areas.
(2) Excludes 42 Valley Transit Company buses used in intercity service.

In order to maintain for the 1990 bus fleet the 5-year average age expected for the 1980 fleet, a total of approximately 3,800 new buses will need to be acquired by Texas transit systems between 1980 and 1990, or an average of 380 per year.

Projected Bus-Miles and Route-Miles - Bus transit systems in Texas are expected to provide a total of 116.2 million bus-miles of service in 1990, as shown in Table 6.5. Round-trip length of bus routes is projected at 8,916 miles, while the physical length (one way) of streets and highways to be used for bus service in 1990 is projected at 4,918 miles.

In addition, a total of 764 miles of special facilities (exclusive transitways, "metered" freeway access ramps with preferential bus access lanes, and exclusive bus lanes in freeways and on major city streets) are projected to be operational in Texas urbanized areas in 1990.

1990 Bus Ridership Projection - Bus ridership in the 32 urbanized areas is projected at 361 million in 1990. This is 74 per cent above the projected 1980 riderships of 163 million, and 121 percent above the 1973 bus ridership total of 117,451,000. Average weekday bus ridership in 1990 is projected at nearly 1,131,661, based on an annualization factor of 319.

Table 6.5

CURRENT AND PROJECTED 1990 TRANSIT BUS-MILES

URBANIZED AREA	1973 BUS-MILES (Thousands)	1990 BUS-MILES (Thousands)
Houston	15,402	31,686
Dallas	13,650	27,810
San Antonio	8,091	11,763
Fort Worth	4,200	8,449
El Paso	3,960	9,031
Austin	2,417	5,071
Beaumont-Port Arthur-Orange[1]	588	952
Galveston-La Marque-Texas City[1]	630	2,918
Corpus Christi	1,274	2,036
Lubbock	532	1,693
Amarillo	875	1,668
Waco	648	1,357
McAllen-Pharr-Edinburg	0	1,871
Wichita Falls	273	659
Abilene	288	449
Odessa	0	525
Tyler	0	437
Sherman-Denison	0	402
San Angelo	400	425
Laredo	672	1,416
Harlingen-San Benito	(2)	983
Midland	0	375
Brownsville	525	1,508
Bryan-College Station	0	598
Killeen-Harker Heights	0	507
Denton	0	311
Longview	0	249
Victoria	0	442
Temple-Belton	0	405
Texarkana	0	226
TOTAL	54,425	116,222

(1) Includes two urbanized areas.
(2) Excludes intercity service by Valley Transit Company.

Transit Fare Level in 1990 - An average bus transit fare of 53 cents per revenue passenger is projected for 1990 in Texas. This is 80 percent above the 29.4-cent average fare reported by Texas transit systems for the first quarter of 1974, and represents an average 5 percent per year fare increase for the period 1974 to 1990.

Since transit operating cost increases are projected at 6 percent annually in this same time interval, the projected fare increases would occur at a slightly lower rate than the rise in transit operating costs.

However, the 53-cent average fare projected for 1990 is 60 percent higher than the projected 33-cent average fare for 1980, and would result in Texas transit systems being able to keep pace with anticipated increases in operating costs for the decade 1981-1990.

Operating Cost-Revenue Projections for 1990 - Average passenger revenue per bus-mile is projected at $1.65 in 1990. The average number of revenue passengers per bus-mile is projected at 3.11, compared to an expected 2.0 passengers per bus-mile in 1980 and 2.17 in 1973.

The increase in average passenger occupancy per bus-mile in 1990 results from the expected impact of continuing growth in transit ridership with addition of more exclusive transitways, preferential treatment of buses in freeway operations, and other measures being planned for making bus travel speeds competitive with those for automobiles in Texas urbanized areas.

Average operating cost per bus-mile is projected at $1.76 in 1990, which is 60 percent above the projected cost of $1.10 in 1980, or a 6 percent yearly increase. The net effect is a projected bus transit operating cost of $204,200,000 in 1990.

Total bus operating revenues are estimated at $191.3 million in 1990, or nearly 3.5 times the projected 1980 revenue of $54 million. When related to the projected 1990 operating cost of $204.2 million, this will mean an operating deficit of $12.9 million in 1990, or 11 cents per bus-mile. This compares with a projected 44-cent operating deficit in 1980.

Capital Costs for Bus Systems - Estimated capital costs for bus systems through 1990 were developed in the same manner as for 1980. That is, estimates of bus system requirements were prepared by city officials in the 32 Texas

urbanized areas expected to have central cities of 50,000 or more population in 1990.

These reports were submitted to Texas Transportation Institute, which estimated the capital costs in 1971 dollars.

TMTC then prepared an estimate of the rate of capital cost increases for the period up to 1990, and applied this rate to bus system requirements from 1975 through 1990. This resulted in an assumption that bus system capital costs for the period 1981 through 1990 will be 80 percent higher than the 1971 capital cost estimates.

On this basis, total capital expenditures in the 32 Texas urbanized areas between 1975 and 1990 will amount to an estimated $1,804,089,000, as shown in Table 6.6. Of this total, $495,324,000 (27.5 percent) is for new buses, and $1,308,765,000 (72.5 percent) is for new or improved maintenance facilities, special transitways, and related facilities for bus operations and servicing.

Thus, while a total capital expenditure of $800,815,000, or nearly $134,000,000 per year, appears necessary for bus systems in the 1975-1980 period, an expenditure of $1,003,274,000 is projected in the decade from 1981 through 1990, or an average of $100,327,400 per year.

Table 6.6

CAPITAL COST PROJECTIONS TO 1990 FOR BUS TRANSIT SYSTEMS

URBANIZED AREA	CAPITAL COSTS (THOUSANDS) Buses	Other	Total
Abilene	$ 2,770	$ 1,080	$ 3,850
Amarillo	5,355	1,080	6,435
Austin	19,305	55,440	74,745
Beaumont-Port Arthur-Orange (1)	7,092	3,600	10,692
Brownsville	5,355	1,080	6,435
Bryan-College Sta.	2,460	1,075	3,535
Corpus Christi	9,155	27,360	36,515
Dallas	122,800	606,400	729,200
Denton	1,260	900	2,160
El Paso	31,350	3,960	35,310
Fort Worth	43,500	192,420	235,920
Galveston-Texas City-LaMarque (1)	9,720	56,160	65,880
Harlingen-San Benito	3,465	1,080	4,545
Houston	134,785	263,355	398,140
Killeen	1,890	900	2,790
Laredo	4,725	1,080	5,805
Longivew	1,260	900	2,160
Lubbock	4,475	1,440	5,915
McAllen-Pharr-Edinburg	6,615	1,080	7,695
Midland	1,575	1,080	2,655
Odessa	2,270	1,080	3,350
San Angelo	1,890	1,080	2,970
San Antonio	57,822	77,400	135,222
Sherman-Denison	1,640	1,080	2,720
Temple-Belton	1,260	900	2,160
Texarkana	1,260	1,080	2,340
Tyler	1,890	1,080	2,970
Victoria	1,765	900	2,665
Waco	4,285	1,615	5,900
Wichita Falls	2,330	1,080	3,410
TOTAL	$495,324	$1,308,765	$1,804,089
PER CENT	27.5	72.5	100.0

(1) Contains two urbanized areas.

Rail Transit Programs for 1990

In the Houston urbanized area, a new rail-rapid transit system is expected to be operational by 1990. Thus, with the new Dallas-Fort Worth rail-rapid transit system, the Leonard Department Store subway system, and the El Paso street railway system, all expected to be operating in 1990, a total of four rail transit systems is projected.

These systems will utilize 400 rail transit vehicles, operating over 92 route-miles. Annual vehicle-miles for these systems is estimated at 15 million. Annual ridership is projected at 67 million, or an average of 4.47 passengers per vehicle-mile.

Rail System Capital Costs-- Capital costs of these planned rail transit systems are projected at over $2.3 billion by 1990, based on an anticipated cost increase averaging 6 percent annually, beyond the initial capital cost estimates.

Of this total, $264 million (10.7 percent) is the estimated capital cost of rolling stock. The remainder of the capital cost covers rights-of way, tracks and structures, and terminals and maintenance facilities. The estimated capital cost by rail system is shown in Table 6.7.

Table 6.7

1990 RAIL TRANSIT CAPITAL COST PROJECTIONS
(In Millions)

RAIL SYSTEM	RIGHT-OF-WAY	LINE CONSTRUCTION	VEHICLES	OTHER	TOTAL
Houston	$270	$1,129	$203	$169.0	$1,771.0
Dallas-Fort Worth	18	406	36	28.0	488.0
Fort Worth Subway	12	54	5	7.0	78.0
El Paso	-	-	8	0.9	8.9
	$300	$1,589	$252	$204.9	$2,345.9

Rail Operating Cost-Revenue Projections - Average per-passenger fare for the rail systems is projected at 90 cents in 1990 (which assumes a 50-cent fare in El Paso and on the Fort Worth subway system, and a $1 average fare on the Houston and Dallas-Fort Worth rapid-transit systems).

At the projected average of 4.47 passengers per vehicle-mile, this fare structure will produce 60 million in yearly operating revenue, or $4.03 per vehicle-mile. Operating costs for the rail systems are projected at $38 million, or $2.53 per vehicle-mile. Thus, operating revenue in 1990 is projected at $22 million in excess of operating costs. These

estimates were based on recent studies conducted by consultants at the direction of the urban regions concerned. The rail improvements in the Dallas-Fort Worth area were recently approved by the local transportation policy body. The proposed rail systems in all the other cities are under consideration, but have not received approval of the local transportation bodies.

Specialized Transit Programs for 1990

The five specialized transit systems discussed in Chapter 5 are all assumed to be in operation by 1990. However, the proposed El Paso-to-Juarez "people-mover" system is excluded from consideration in this discussion, because it is being planned as a privately financed system--so no public funds would be involved in either its capital costs or operating expenses.

Capital Costs - The other four specialized transit systems are expected to involve a total of 253 vehicles, operating over 27 route-miles in 1990. Capital costs are projected at $227.5 million, as shown in Table 6.8.

Of this total, $47.8 million, or nearly 21 percent, would be for vehicles, with the remainder of capital costs covering right-of-way, tracks and structures, and terminals and maintenance facilities.

Table 6.8

1990 CAPITAL COSTS OF SPECIALIZED TRANSIT SYSTEMS
(In Millions)

SYSTEM	RIGHT OF-WAY	LINE CONSTRUCTION	VEHICLES	OTHER	TOTAL
Houston	$9.0	$72.0	$36.0	$63.0	$180.0
San Antonio					
Downtown	2.5	9.5	9.0	9.0	30.0
River Taxi	-	0.9	1.8	1.8	4.5
Laredo	1.0	9.0	2.0	2.0	13.0
TOTAL	$12.5	$91.4	$48.8	$75.8	$227.5

Operating Cost Revenue Projections - Total 1990 ridership of the four specialized transit systems is projected at $18 million. An anticipated average fare of 28 cents will result in 8.4 million in operating revenue in 1990. Operating costs are projected at $8 million, for a 1990 revenue surplus of $400,000.

The El Paso-Juarez people-mover system, which is excluded from this review because it involves no public funding, has a projected capital cost of $14 million. The system would contain 1.75 route-miles, and yearly operating costs are estimated at $1 million.

At a projected 30-cent fare and a yearly ridership estimate of 10 million, revenues would total $3 million. This would leave $2 million yearly in operating revenues available for debt-service costs on planned revenue bonds.

Financing Texas Transit Programs

CHAPTER 7

Chapter 7

FINANCING TEXAS TRANSIT PROGRAMS

One of the most important aspects of the transit planning effort is an analysis of financial resources required to implement specific programs. In order to perform a meaningful evaluation, it is necessary to define the essential elements of the plan, and to estimate, as accurately as possible, both the capital costs and the operating costs and revenues.

The purpose of this chapter is to summarize the cost estimates for transit systems in Texas from 1975 to 1980, and to 1990, and to compare these costs with present and anticipated future financial resources which may be applicable to these systems.

Estimated costs for transit operations and capital improvements were developed in Chapter 6, along with projections of operating revenues. These cost and revenue estimates for the years 1973, 1980, and 1990 are summarized in Table 7.1

Transit Capital Costs Up to 1980

Capital costs for transit improvements up to 1980, as shown in Table 7.1, are estimated at $1,367 million. This is made up of $801 million for bus systems, and $566 million for

Table 7.1

CURRENT AND PROJECTED TEXAS TRANSIT OPERATIONS

BUS SYSTEMS	1973 INVENTORY	1980 PROGRAM	1990 PLAN
Urban Areas Served	18	27	32
Number of Buses	1,582	2,345	3,652
Bus Route-Miles	5,043	7,260	8,916
Yearly Bus-Miles (millions)	54	82	116
Annual Ridership (millions)	117	163	361
Average Fare (cents)	29	33	53
Operating Revenue (millions)	$38	$54	$191
Operating Costs (millions)	$39	$90	$204
RAIL SYSTEMS			
Number of Systems	2	2	4
Total Vehicles	24	34	400
Miles of Route	5.3	8	92
Yearly Vehicle-Miles (millions)	0.3	0.9	15
Annual Ridership (millions)	5	13	58
Average Fare (cents)	5	25	96
Operating Revenue (millions)	$0.3	$3.3	$56
Operating Costs (millions)	$0.7	$1.2	$38
SPECIALIZED SYSTEMS			
Number of Systems	0	0	4
Total Vehicles	0	0	253
Miles of Route	0	0	27
Annual Ridership (millions)	0	0	28
Average Fare (cents)	0	0	30
Operating Revenue (millions)	0	0	$0.4
Operating Costs (millions)	0	0	$8
CAPITAL COSTS			
Bus Systems (millions)	-	$801	$1,804
Rail Systems (millions)	-	$566	$2,346
Special Systems (millions)	-	0	$228
Total Capital Costs (millions)	-	$1,367	$4,378
TOTALS (ALL SYSTEMS)			
Number of Vehicles	1,606	2,379	4,305
Miles of Route	5,048	7,268	9,035
Annual Ridership (millions)	122	176	447
Operating Revenue (millions)	$38.3	$57.3	247
Operating Costs (millions)	$39.7	$91.2	250

rail systems. No capital costs for specialized transit systems are anticipated up to 1980. Thus, rail systems account for 41 per cent of the projected capital expenditures up to 1980.

These estimated capital costs in 1971 dollars, $976 million, are less than the $1.182 billion in 1971 dollars in Texas transit improvement expenditures estimated in the 1974 National Transportation Study for the period up to 1980.

The total capital cost of $1,367 million, spread over the five-year period of 1975 through 1979, represents an average yearly expenditure of $273.4 million in 1971 dollars inflated through 1977 at an inflation rate of 6 per cent annually. Considered in current dollars, the total capital costs of approximately $1.178 billion is equivalent to an average annual cost of $236 million.

Federal Capital Grants for Transit Systems

Existing Federal legislation establishes a total of $11.8 billion in federal funds for U.S. transit systems available through the Urban Mass Transportation Administration (UMTA) of the U.S. Department of Transportation between 1972 and 1980.

Of this 11.8 billion, $7.825 billion is available for continuation of the existing UMTA capital grant program. An additional $3.975 billion is available under Section 5 of the Urban Mass Transportation Assistance Act of 1974 for capital grants or operating subsidies. Under the provisions of this section, funds are apportioned to states and urbanized areas

based on the urbanized area population and population density.

Present Fund Allocation Guidelines - The historical share of UMTA transit improvement grants to Texas systems between 1964 and 1972 amounted to only 2.1 per cent of the national total. Lack of available matching funds for Texas transit systems was a primary reason for this relatively low share of total national transit capital grants.

The guideline for total UMTA capital improvement funds available for Texas by 1980, as defined in Manual II of the 1974 National Transportation Study, is $344 million, or 4.4 per cent of the national total of $7.825 billion. In addition, approximately $185 million will come to Texas urbanized areas by 1980 from the apportioned UMTA fund totaling $3.975 billion.

State Transit Funding Proposals

If the total program is to be implemented, the net difference between the amount of UMTA capital-improvement funds coming to Texas and the total estimate capital cost must be provided from State and local government sources.

It appears probable that some level of State transit capital improvement funding will be established in 1975. Levels currently being discussed range from as little as $5 million to as much as $50 million annually.

Local Government Funding Requirements

Local governments in the 27 Texas urbanized areas which expect to have transit systems in operation in 1980

probably will need to finance a significant share of the cost of any major transit improvement projects implemented as part of the 1980 Program.

The total amount of local government capital improvement funds required to implement the 1980 Program under various combinations of State and Federal funding are shown in Table 7.2.

Effect of Alternate Federal-State Fund Levels - Two levels of federal funding are shown in Table 7.2 for the 5-year period of 1975 through 1979. Federal Funding Level I, $529 million, is based on the UMTA suggested guideline of 4.4 per cent of currently authorized $7.825 billion in capital funds, plus $185 million in apportioned funds. Federal Funding Level II, $349 million, is based on the 2.1 per cent historical Texas share of currently authorized UMTA capital grant funds plus $185 million in apportioned funds.

Three State funding levels are shown in the tabulation for the five-year period: $250 million, $150 million, and $25 million. Under each of these State-Federal funding combinations, the local funding requirements are shown. All funding combinations also are presented in terms of yearly expenditure requirements by the Federal, State and local governments.

Under the maximum assumed Federal-State funding level, involving 105.8 million in yearly UMTA grants and $50 million in yearly State grants, the local governments still would be required to provide $79.8 million per year in capital funds if the 1980 Program is to be implemented on schedule.

Under the lowest level of Federal-State funding, involving $69.8 million in yearly UMTA grants and $5 million in State grants, the required local government contribution would increase 102 per cent, to $160.8 million annually.

Table 7.2

1975-1979 LOCAL CAPITAL COSTS FOR TRANSIT SYSTEMS UNDER VARIOUS STATE-FEDERAL CAPITAL FUND LEVELS

	Federal Funding Level I (Millions)		Federal Funding Level II (Millions)	
	5-Year Total	Annual	5-Year Total	Annual
Federal	$ 529	$105.8	$ 349	$ 69.8
State	250	50.0	250	50.0
Local	399	79.8	987	115.8
TOTAL	$1,178	$235.6	$1,178	$235.6
Federal	$ 529	$105.8	$ 349	$ 69.8
State	150	30.0	150	30.0
Local	499	99.8	622	135.8
TOTAL	$1,178	$235.6	$1,178	$235.6
Federal	$ 529	$105.8	$ 349	$ 69.8
State	25	5.0	25	5.0
Local	624	124.8	1,093	160.8
TOTAL	$1,178	$235.6	$1,178	$235.6

Need for New Funding Sources - Historically, the outlay by local governments in Texas for capital improvements for transit systems has averaged approximately $2 million per year. Currently, no governmental subdivision of the State, or the State itself, has any dedicated tax source for transit financing. All money comes from local general revenue funds.

It therefore appears clear that if the total 1980 Transit Capital Improvement Program is to be implemented on

schedule, new financial resources will need to be made available to both the State and local governments.

1980 Transit Operating Costs

During the five years from 1975 through 1979, transit operating deficits are estimated at $81 million, for a yearly average deficit of $16.2 million. The projected deficit for 1980 is nearly $35 million.

Currently, Texas cities with tax-supported transit systems meet operating deficits through local general funds. Recently passed federal legislation provides Federal assistance of 50 per cent in meeting transit operating deficits after compliance with certain standards.

Even with this 50 per cent matching ratio, a minimum annual average of $8 million in local funds will be required to meet projected transit operating deficits over the next five years.

1980 Planning Fund Requirements

A recently conducted survey of transit planning requirements of the 18 largest Texas urbanized areas indicated a need for approximately $2.5 million in planning study funds annually--under UMTA requirements, both initial and continuing transit planning studies are a prerequisite for capital improvement grants.

The Federal matching ratio for transit planning studies is 80 per cent. Assuming that adequate UMTA transit planning funds are available, Texas cities of 50,000 or more population

can expect about $1,600,000 in UMTA planning funds annually up to 1980. The balance in planning funds of $400,000 would have to be supplied by local governments and/or the State.

Additional planning funds would be required for transit development studies in cities under 50,000 population, and for any proposed county or regional transportation service as currently being implemented in some counties of the State.

Adequate funding for this planning is estimated to exceed $200,000 yearly. At present, UMTA funds are not available for this planning. State assistance could be provided to local areas, at some specified matching ratio, to help implement this effort.

Transit Capital Costs to 1990

Capital costs for bus-related transit improvements are estimated to total $1.804 billion by 1990, as shown in Table 7.1. For rail systems, the capital cost is estimated at $2.346 billion; and for specialized systems, $228 million.

This statewide total of $4.4 billion represents an average yearly expenditure of $273 million for 1975 to 1980, and $301 million annually for 1980 through 1989.

Federal capital improvement funds available to Texas transit systems annually up to 1980 equal $105.8 million. An additional $838 million (or $167.6 million annually) would need to be provided by State-local funding in order to implement the 1980 program on schedule.

Federal capital improvement funding levels are not known for the 1980 to 1989 period. However, if the 1975 to 1980 level of $105.8 million annually was continued, State-local funding would have to increase to $195.2 million annually in order to successfully move from 1980 to the 1990 plan.

1990 Transit Operating Costs

By 1990, accrued transit deficits for Texas systems are projected at $266 million. This represents an annual average operating deficit of $16 million from 1975 to 1980, and a yearly average deficit of $18.5 million from 1980 to 1990.

It is assumed that the recent Federal legislation providing 50 per cent of transit operating costs will be funded through 1990, resulting in an average annual state-local cost of $10.5 million.

1990 Planning Fund Requirements

It is difficult to estimate the level of transit planning funds required for the period from 1980 to 1990. However, the average annual requirement of approximately $2.5 million for 1975 to 1980 can be expected to increase over the 1980-1990 decade to perhaps $3.3 million yearly.

Intercity Passenger Transportation

CHAPTER 8

Chapter 8

INTERCITY PASSENGER TRANSPORTATION

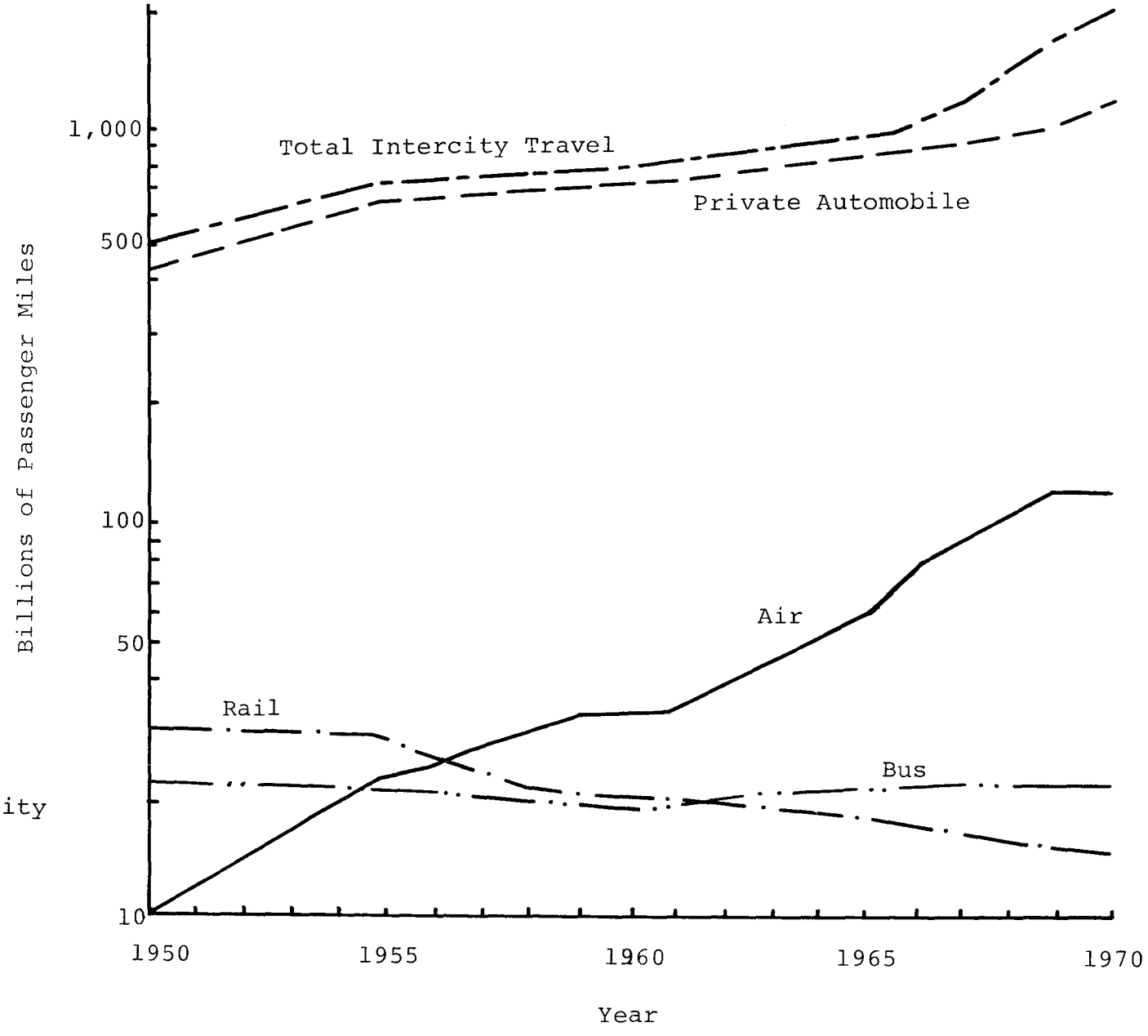
Intercity passenger travel in the United States more than doubled in the last twenty years, increasing from 508 billion passenger miles in 1950 to over 1200 billion passenger miles in 1971 (Figure 8.1). The private automobile has consistently served 85 to 90 percent of the intercity movement. Between 1950 and 1971, airlines increased their share of the intercity passenger market from 2 to 10 percent. The volume of intercity travel served by the bus remained relatively constant. However, in this same time period, the percentage of intercity travel served by the railroads declined from 6.4 to 0.8 percent. These trends indicate that, perhaps, a demand exists for two types of public intercity transportation - one that provides the fastest service (air) and another that provides the lowest cost service (bus).

This chapter is concerned with intercity surface passenger transportation other than by automobile therefore, it will deal with travel by bus and rail. We will also include a section on Daily Commuter Travel, an element that is important to a total transportation plan for Texas.

Existing Intercity Bus Travel

Intercity travel by bus in Texas is a vital part of the state's transportation system. The only available regularly scheduled intercity passenger transportation in more than

Figure 8.1: Trends in Intercity Passenger Travel By Mode, 1950-1971



Source:
Rail Passenger Transportation in Texas, T.T.I., Texas A&M University

1,000 communities in Texas is provided by bus lines.

Seventeen intercity bus lines operated scheduled service between Texas cities, four others provided service into Texas cities from points in adjacent states or Mexico, and a number of other bus lines provided local or charter service in 1973. Tables 8.1 and 8.2 show intercity bus service in Texas for 1972 and 1973 and operating statistics for Texas-based bus lines for these same years are shown in Tables 8.3 and 8.4.

Table 8.1: Intercity Bus Service in Texas - 1972

Type Carrier	Bus Line	Headquarters
Major U.S. Carrier	Continental Trailways	Dallas, Texas
	Greyhound Lines-West	San Francisco, California
Texas Based Carriers Operating Mainly in Texas	Arrow Coach Lines	Brownwood
	Central Texas Bus Lines	Waco
	Farmer Bus Line	Wichita Falls
	Kerrville Bus Company	Kerrville
	Mack's Lufkin-Beaumont Coaches	Lufkin
	Odessa-Midland Bus Lines	Midland
	Oilfield Bus Lines	San Angelo
	Painter Bus Lines	Kerrville
	Southwestern Transit Co.	Belton
	Sun Set Stages	Abilene
	Texas Bus Lines	Galveston
	Texas Electric Bus Lines	Waco
	Texas Motor Coaches	Grand Prairie
	T.N.M. & O. Coaches	Lubbock
	Valley Transit Company	Harlingen
	Welch Motor Coaches	Commerce
Interstate Carriers With Limited Operations in Texas	Jordan Bus Company	Hugo, Oklahoma
	New Mexico Transportation Company	Roswell, New Mexico
	Oklahoma Transportation Company of Texas	Oklahoma City, Oklahoma
Mexican Carriers	Transportes Fronterizos del Norte, S.A.	Monterrey, Mexico

Source: Texas Railroad Commission

Table 8.2: Intercity Bus Service in Texas - 1973

Type Carrier	Bus Line	Headquarters
Major U.S. Carrier	Continental Trailways	Dallas, Texas
	Greyhound Lines-West	San Francisco, California
Texas Based Carriers Operating Mainly in Texas	Arrow Coach Lines	Brownwood
	Central Texas Bus Lines	Waco
	Farmer Bus Line	Wichita Falls
	Kerrville Bus Company	Kerrville
	Oilfield Bus Lines	San Angelo
	Painter Bus Lines	Kerrville
	Permian Basin Coaches	Midland
	Southwestern Transit Co.	Belton
	Sun Set Stages	Abilene
	Texas Bus Lines	Galveston
	Texas Electric Bus Lines	Waco
	Texas Motor Coaches	Grand Prairie
	T.N.M. & O. Coaches	Lubbock
	Valley Transit Company	Harlingen
	Welch Motor Coaches	Commerce
Interstate Carriers With Limited Operations in Texas	Jordan Bus Company	Hugo, Oklahoma
	New Mexico Transportation Company	Roswell, New Mexico
	Oklahoma Transportation Company of Texas	Oklahoma City, Oklahoma
Mexican Carriers	Transportes Fronterizos del Norte, S.A.	Monterrey, Mexico

Source: Texas Railroad Commission

Between 1972 and 1973 one bus company ceased its operations; Mack's Lufkin-Beaumont Coaches, Inc. which was headquartered in Lufkin. However, in this same time period operating revenue for all bus companies increased by 11 percent.

By comparing Texas bus industry statistics with United States statistics (Tables 8.5 and 8.6), one can see how important the intercity bus system is to Texas compared with the rest of the country. In 1973 there were seventeen bus companies operating extensively in Texas. These seventeen bus companies accounted for 6.26 percent of the over one billion dollars in operating

revenue collected by the intercity bus industry in the United States. Total profits for the bus industry nationally were $85.6 million in 1973 and Texas accounted for 9.35 percent of this figure. Revenue from passengers was $385 million nationwide in 1973 with Texas revenue at $45.6 million or 11.84 percent of the national total.

The state's intercity bus systems are very important to Texas and are becoming more important each year. Operating revenues for the seventeen main bus companies in Texas rose by 9.98 percent between 1972 and 1973 and revenue from passengers rose 8.83 percent in this same time period.

The lower cost of intercity bus service makes it the choice for many people who do not own automobiles and cannot afford air travel. However, bus travel in the past and even today is often a relatively slow means of intercity travel. Special nonstop bus service between major cities, such as that provided between major cities of the state, can, however, provide a competitive alternative to short-haul air service.

Intercity bus service in 1973 was provided by 15 Texas Based Carriers operating mainly in Texas. Greyhound-West and Continental Trailways were the two major U.S. carriers in Texas.

TABLE 8.3:TEXAS-BASED BUS LINES OPERATING MAINLY IN TEXAS
OPERATING STATISTICS FOR THE YEAR 1972

Company	Miles Of Route	Operating Revenue	Passengers Carried	No. Of Vehicles	Bus Miles Operated	Headquarters
Arrow Coach Lines	568	$ 683,245	1,197,036	20	n.a.	Brownwood
Central Tex. Bus Lines	768	310,556	78,139	18	883,244	Waco
Farmer Bus Line	372	10,444	2,501	1	n.a.	Wichita Falls
Kerrville Bus Co.	1,410	4,573,864	597,914	62	5,111,462	Kerrville
Mack's Lufkin-Beaumont Coaches	110	60,721	11,159	2	164,010	Lufkin
Odessa-Midland Bus Lines*	386	110,099	9,500	5	459,170	Midland
Oilfield Bus Lines	159	119,468	14,250	5	278,710	San Angelo
Painter Bus Lines	287	886,439	162,678	Leased	1,026,196	Kerrville
Southwestern Transit Co.	68	609,815	1,120,797	28	1,069,878	Belton
Sun Set Stages	192	175,705	20,047	6	227,429	Abilene
Texas Bus Lines	588	1,158,009	473,836	33	1,883,603	Galveston
Texas Electric Bus Lines	98	234,484	51,396	5	465,471	Waco
Texas Motor Coaches	64	901,220	510,384	26	921,914	Grand Prairie
T.N.M. & O. Coaches	1,267	3,138,102	269,350	40	3,926,158	Lubbock
Valley Transit Co.	100	1,501,694	2,987,262	41	2,365,262	Harlingen
Welch Motor Coaches	416	26,380	n.a.	1	141,024	Commerce
TOTALS	6,853	$14,500,245	7,506,249**	293	18,923,531**	

*Not Operating at that time.
**Partial Totals

Source: Texas Railroad Commission

n.a. - Not Available

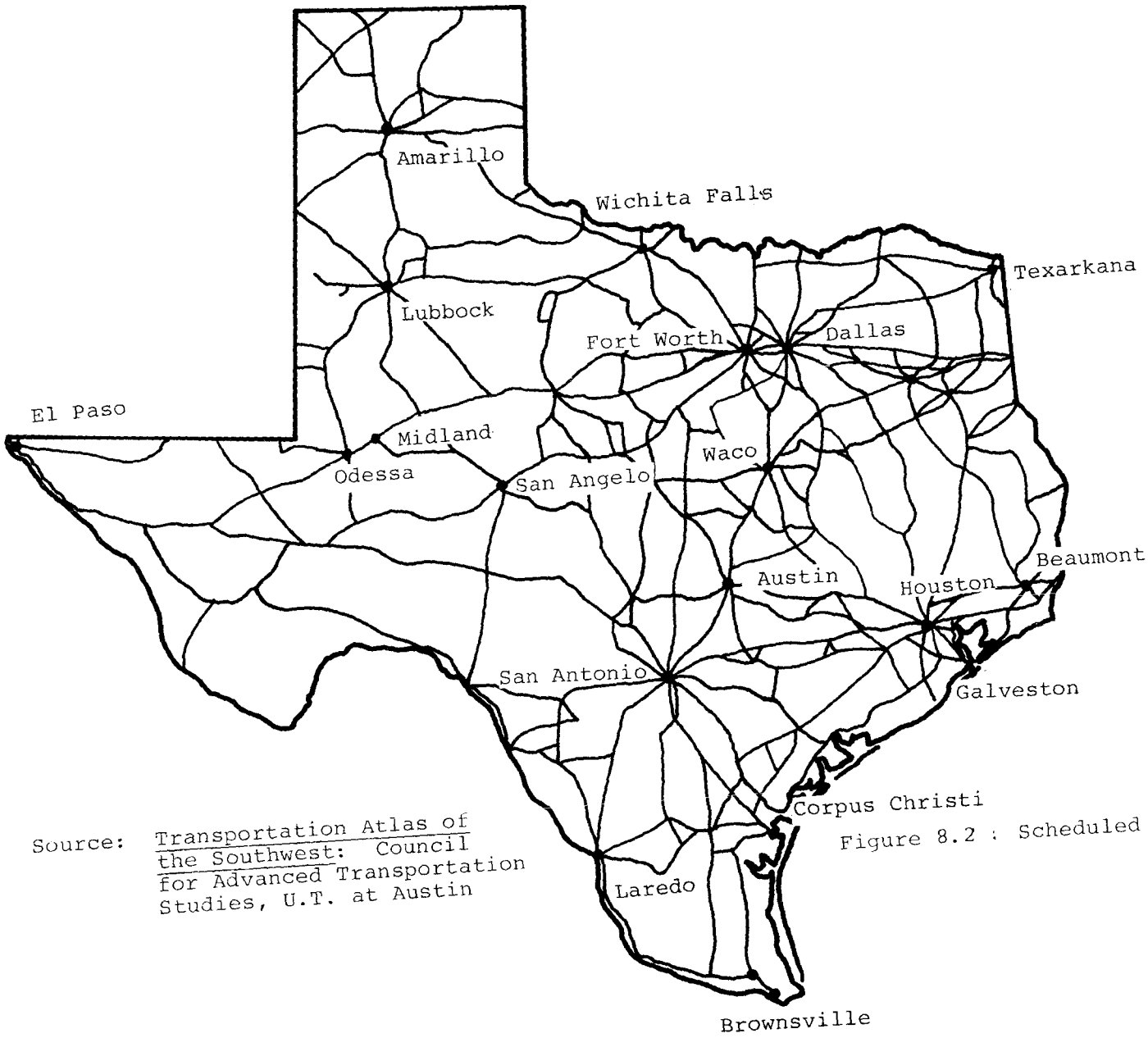
TABLE 8.4:TEXAS-BASED BUS LINES OPERATING MAINLY IN TEXAS
OPERATING STATISTICS FOR THE YEAR 1973

Company	Miles Of Route	Operating Revenue	Passengers Carried	No. Of Vehicles	Bus Miles Operated	Headquarters
Arrow Coach Lines	568	$ 795,659	142,089	22	n.a.	Brownwood
Central Texas Bus Lines	n.a.	357,742	74,296	19	883,244	Waco
Farmer Bus Lines	376	21,525	2,871	2	176,028	Wichita Falls
Kerrville Bus Company	1,410	5,274,728	628,857	64	5,340,494	Kerrville
Oilfield Bus Lines	159	123,068	14,443	3	265,163	San Angelo
Painter Bus Lines	287	984,287	164,352	Leased	998,756	Kerrville
Permian Basin Coaches	385	78,388	6,100	5	245,154	Midland
Southwestern Transit Co.	73	635,154	966,801	27	940,831	Belton
Sun Set Stages	192	181,450	19,670	6	214,035	Abilene
Texas Bus Lines	697	1,296,237	258,910	27	2,380,132	Galveston
Texas Electric Bus Lines	98	258,416	48,242	5	479,944	Waco
Texas Motor Coaches	64	1,092,925	508,872	29	961,990	Grand Prairie
T.N.M. & O. Coaches	1,267	3,419,157	299,076	42	n.a.	Lubbock
Valley Transit Company	100	1,577,999	2,986,541	42	1,340,622	Harlingen
Welch Motor Coaches	416	28,501	n.a.	1	141,024	Commerce
TOTALS	6,092*	$16,125,236	6,121,120*	294	14,367,417*	

*Partial Totals

n.a. - Not Available

Source: Texas Railroad Commission



Source: Transportation Atlas of the Southwest: Council for Advanced Transportation Studies, U.T. at Austin

Figure 8.2 : Scheduled Intercity Bus Service

Table 8.5: Intercity Bus Industry in the United States

	1972	1973
Number of Operating Companies	1,000	1,000
Number of Buses	22,500	22,300
Number of Employees	49,100	48,000
Total Bus Miles (Millions)	1,182	1,175
Revenue Passengers (Millions)	393.0	385.0
Operating Revenues, All Services (Millions)	$974.4	$1,020.7
Operating Expenses (Millions)	$882.1	$ 935.1
Profit (Millions)	$ 92.3	$ 85.6

Table 8.6: Intercity Bus Industry in Texas

	1972	1973
Number of Operating Companies	18	17
Number of Buses	1,772	1,799
Number of Employees	2,335	2,483
Total Bus Miles (Millions)	67.6*	64.3*
Revenue Passengers (Millions)	41.9	45.6
Operating Revenues, All Services (Millions)	$58.1	$63.9
Operating Expenses (Millions)	$51.1	$55.9
Profit (Millions)	$ 7.0	$ 8.0

*Partial Totals

Sources: National Association of Motor Bus Operators
Texas Railroad Commission

Existing Intercity Rail Travel

There is increasing interest in intercity rail passenger service even though trends indicate that the type of rail service being provided is not in great demand. The recent energy shortage has been a significant event in this increased interest. With the possible exception of the bus, railroads provide the most energy efficient means of accommodating intercity passenger movement, providing nearly three times as many passenger miles per gallon as the auto.

Table 8.7: Fuel Efficiency of Alternative Modes of Transportation

Mode of Transportation	Passenger Miles Per Gallon of Fuel
Bus	125
Commuter Train	100
Cross Country Train	80
Automobile	32
Jet Plane	22

Source: Rail Passenger Transportation in Texas, Texas Transportation Institute, Texas A&M University

Other events causing increased interest in rail passenger service are the reduction of speed limits on our highways by more than 20 percent and the curtailment of the construction of new highway facilities. The net result of these events have been an increase in travel time on highways which improves the competitive position of rail service.

Air transportation travel times have also increased because of increasing traffic congestion around older airports

and remote locations of newer airports. This has resulted in other modes of transportation being more competitive in travel time.

As a result of these problems with highway and air travel, increased emphasis has been placed on intercity rail transportation as a possible means of serving the increasing travel demand.

The U.S. Government responded to the increased interest in rail travel by enacting the Rail Passenger Service Act of 1970. This act provided for the establishment of a non-governmental, for profit corporation (AMTRAK) that would operate a national system of rail passenger service.

The existing AMTRAK system in Texas provides limited and infrequent service. Although Section 403(b) of the 1970 Rail Passenger Act does provide the opportunity for state, regional, or local agencies to request service beyond that included in the basic AMTRAK system, it also stipulates that not less than two-thirds of the losses associated with operational costs of such service and the capital cost for implementing the service must be financed by the requesting agency. Therefore, it seems appropriate for the State of Texas to evaluate its demand for intercity rail passenger service. The greatest demand for intercity rail passenger service should exist in the "Great Triangle" of Texas - Dallas-Fort Worth, Houston, and San Antonio.

AMTRAK presently provides rail passenger service with conventional passenger trains operating over existing tracks in conjunction with freight trains. Virtually all AMTRAK service

operates at maximum speeds below 80 miles per hour, and average speeds on existing AMTRAK routes in Texas are between 40 and 50 mph. These passenger trains encounter numerous grade-level street and highway crossings, and their speed is restricted to local slow orders in many communities.

The level-of-service provided by conventional intercity rail lies between that provided by the bus and that provided by air. Travel time is comparable to the bus but cost exceeds that of the bus. Rail does, however, provide a different travel experience. The traveller can get up and walk around, eat meals, etc., as a part of his travel experience. It is a very safe means of travel; the fatality rate of rail service is 30 times less than auto travel.

The three existing rail passenger routes in the Texas study triangle are segments of national AMTRAK routes. All rail passenger service in Texas is operated by AMTRAK.

At present all rail passenger service in Texas is operated by AMTRAK (Figure 8.3). The three existing rail passenger routes in the Texas study triangle are segments of national AMTRAK routes.

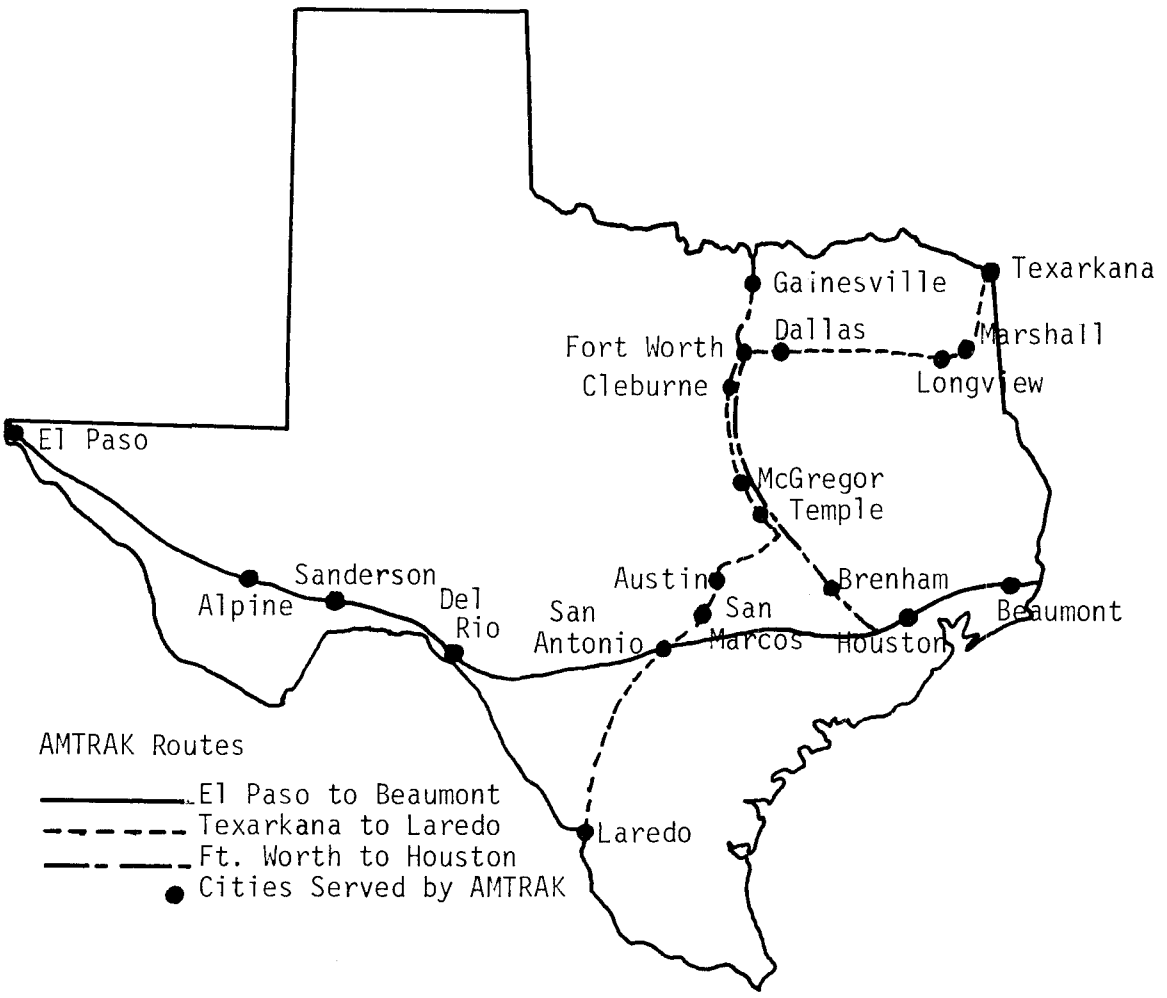
The Dallas-Fort Worth to San Antonio segment is a part of the St. Louis to Laredo route; the Houston to Fort Worth segment is a part of the Chicago to Houston route; and the Houston to San Antonio segment is a part of the New Orleans to Los Angeles route.

The Texarkana to Laredo route operates over tracks owned by four different railroad companies. The service provided between Dallas and San Antonio averages 38 mph with a scheduled trip time of 8.5 hours and the service is provided three days per week.

The Houston to Chicago route operates over tracks owned by the Southern Pacific and the Atchison, Topeka, and Santa Fe Railroads. Scheduled trip time between Houston and Fort Worth is 6.5 hours averaging 46 mph and the service is provided daily. Taxi trip time of one hour must be added to the Houston to Fort Worth trip time to obtain Houston to Dallas trip time. Recently AMTRAK has expressed an interest in changing this route to provide service between Dallas and Houston via Bryan-College Station. The cost required to upgrade the Southern Pacific tracks along this route has temporarily delayed this plan.

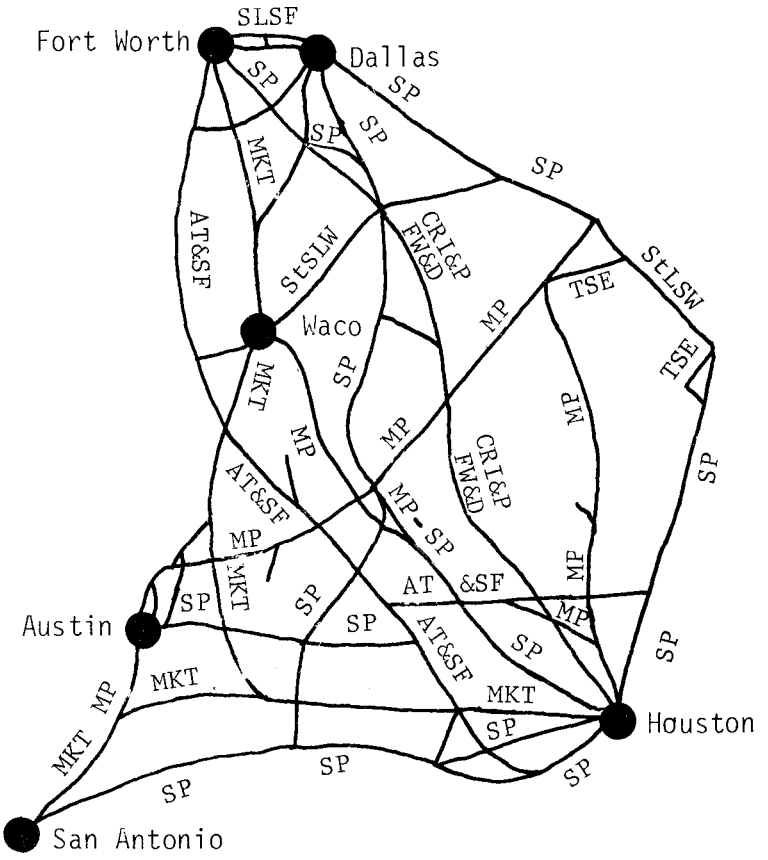
The New Orleans to Los Angeles route provides service between Houston and San Antonio and operates over Southern Pacific tracks. Average travel speed on this segment is 44 mph with a trip time of 4.5 hours. Service is provided three times per week. However, due to scheduling arrangements in New Orleans and Los Angeles, trains leave Houston at 9:50 P.M. in the evening and arrive at San Antonio at 2:15 A.M. in the morning.

Figure 8.3: Existing Rail Passenger Service in Texas



Source: Rail Passenger Transportation in Texas, Texas Transportation Institute, Texas A&M University

Figure 8.4: Existing Railroad Tracks Serving the Great Triangle



RAILROAD ABBREVIATIONS

A.T. & S.F. - Atchison, Topeka and Santa Fe
C.R.I. & P. - Chicago, Rock Island and Pacific
F.W. & D. - Fort Worth and Denver
M.K.T. - Missouri-Kansas-Texas
M.P. - Missouri Pacific
S.L.S.F. - St Louis-San Francisco
S.P. - Southern Pacific
ST.L.S.W. - St. Louis Southwestern
T.S.E. - Texas Southeastern

Source: Rail Passenger Transportation in Texas, Texas Transportation Institute, Texas A&M University

Table 8.8: Financial Operation of AMTRAK Routes in Texas, 1973

AMTRAK Route	Financial Operation (Millions of Dollars)		
	Revenue	Expenses	Deficit
Chicago to Fort Worth to Houston	4.3	8.7	4.4
Los Angeles to San Antonio to Houston to New Orleans	3.5	5.4	1.9
Fort Worth to San Antonio to Laredo	0.1	0.4	0.3

Source: Rail Passenger Transportation in Texas, Texas Transportation Institute, Texas A&M University

These three AMTRAK routes in Texas had a total deficit of $6.6 million in 1973. The Houston to Fort Worth route accounted for 66.7 percent of this deficit.

It should be noted that of the three routes studied, the Houston to Fort Worth route is the only one that offers daily service. However, if service on this route could be extended to Dallas, more passengers could be attracted to better support this daily service.

Problems With Intercity Bus Travel

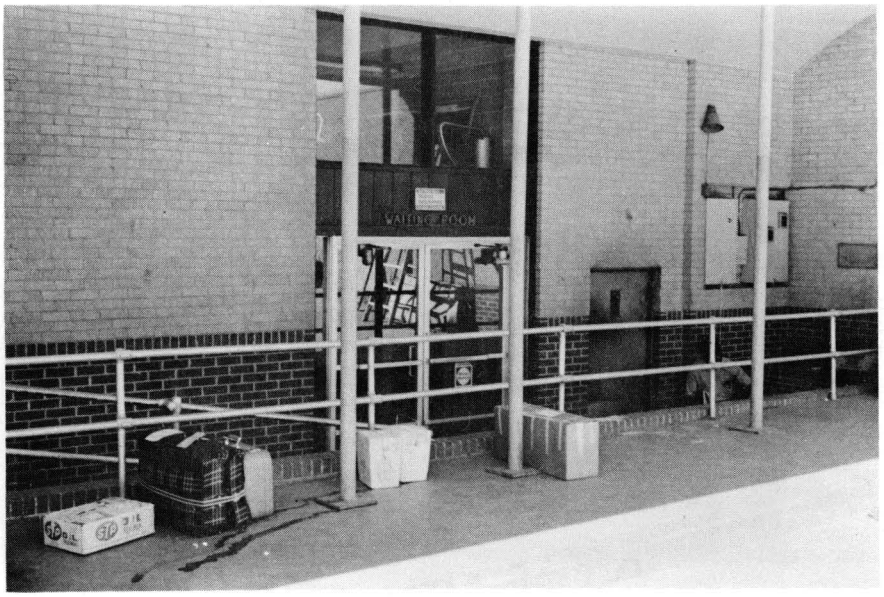
Even though bus service has increased greatly over the past few years, problems still exist that need to be solved. A large problem in Texas, with its sparse population scattered over a large area, is the lack of service to many of the state's smaller cities. There are 64 cities in Texas ranging in population from 1,000 to 5,000, which are without intercity bus service. Many more smaller cities with a population below 1,000 persons are also without intercity bus service.

In many places where service is available, connections are bad and passengers may have to travel many miles out of their

way to reach their destination. Except for express buses that generally operate over 100 miles and as much as 200 miles without stopping, bus travel is generally slow compared to other modes. Express bus operations in Texas have greatly improved travel time between a number of larger cities. However, more express bus service between more Texas cities is needed.

Another problem with Texas intercity bus service, is the lack of adequate terminal facilities. There are many terminals that are old and have not been well maintained. Recently, in Texas, many terminal facilities have been renovated or completely rebuilt. A continuation of this effort could relieve many existing problems. One solution to the problem of inadequate bus terminals may be for different bus lines in the same city to construct "joint terminals" along the lines of our modern airport terminals. Perhaps these terminals could even be publically owned to aid bus companies.

In some instances, the condition of the buses is a problem. Newer buses are needed to replace inadequate buses still in use.



A great problem in Texas is the lack of intercity bus service to many of the state's smaller cities.

Problems With Intercity Rail Travel

AMTRAK was created by Congress in 1970 to relieve the railroads of the burden of unprofitable passenger service and to prevent dismantling of the little service that remained. AMTRAK is responsible for passenger service but the contracting railroads own the trains and hire all employees. AMTRAK pays the railroads on an avoidable cost basis-i.e., for expenses that could be avoided were passenger service discontinued as the railroads prefer. The railroads maintain that they are subsidizing AMTRAK by $52 million a year due to use of tracks and other facilities for which they are not compensated. The railroads are contesting AMTRAK by resisting the creation of new routes.

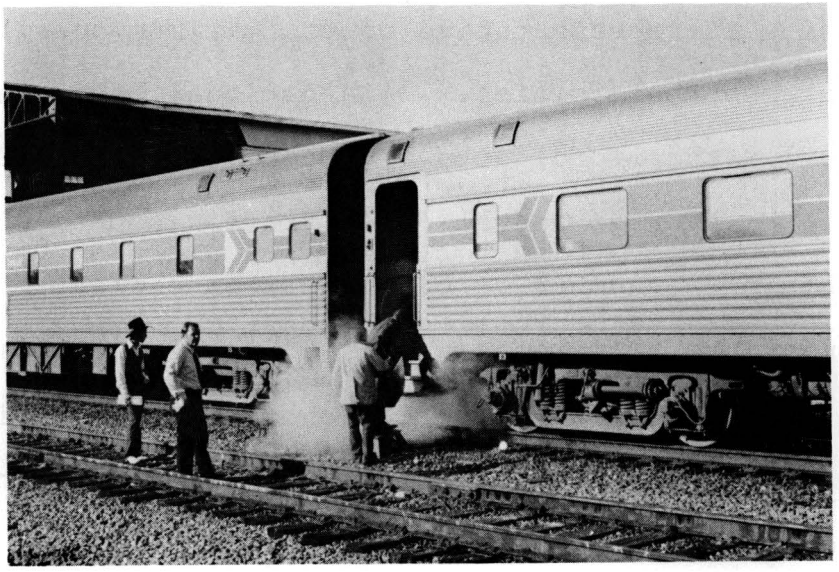
Nationally AMTRAK is beset by numerous problems including inadequate physical equipment, inadequate and inefficient scheduling, inadequate staffing and lack of support from the railroads. However, there seems to be general agreement that trains are better now than they were before AMTRAK, but not as good as they were 20 or 30 years ago.

AMTRAK was created by Congress in 1970 to relieve the railroads of the burden of unprofitable passenger service and to prevent the dismantling of the little service that remained.

In Texas, problems with the rail system are similar to national problems-i.e., more railroad cars are needed and improvements in train scheduling, connections and expansion of rail service are required. In addition, there are many miles of railroad track and right-of-way under-utilized. Railroad companies argue that certain routes are too congested by freight movements to accommodate passenger travel and presently passenger train delays are caused in many cases by interference with freight trains. Track conditions throughout the state cause AMTRAK operating speeds to range from 30 to 80 mph.

Only one percent of intercity travel in Texas is by train due to the limited railroad network and the poor service. Trains under their present operating structure in Texas are not attractive to businessmen. Only 10 percent of the total passenger train traffic in Texas is attributable to business trips.

It is obvious that the quality of rail service in Texas must be improved before rail travel can become a viable intercity transportation mode.



In Texas, more railroad cars are needed and improvements in train scheduling, connections and expansion of rail service are required.

Estimated Intercity Passenger Demand

Total intercity passenger travel in the United States increased at an annual rate of 8 percent between 1963 and 1973. Due to decreases in the rate of population growth and disposable income, this was assumed to represent a "high" growth rate.

The increasing cost and congestion associated with intercity travel indicates that the future rate of increase in intercity travel will be less than the 8 percent historical rate. However, an increasing population and an increase in leisure time indicates some increase in intercity travel. Therefore, it was assumed that 3 percent would be representative of a "low" rate of increase in future intercity travel.

Table 8.9 gives 1973 travel between cities, base data and Table 8.10 presents the estimated 1973 travel between city pairs by mode.

The estimate for auto traffic between city pairs was based upon Texas Highway Department counts of average daily traffic (ADT). The lowest ADT value on the major interstate roadways between city pairs is representative of the maximum possible vehicular travel between these cities. On a national basis, average auto occupancy is 1.9 therefore, auto occupancy for Texas was assumed to be 2.0.

Average annual daily traffic counts were also used to obtain the number of buses between cities. Assuming that each bus seats 50 persons and is 55 percent occupied, each bus carried approximately 30 people. Scheduled bus service between the cities in the study triangle were used as well as chartered buses and school buses.

The estimate for intercity air travel was derived from the number of scheduled flights, the type of aircraft, and average load factor (50 percent).

Table 8.9: 1973 Travel Between Cities, Base Data

Mode of Travel	City Pairs		
	Dallas-Houston	Houston-San Antonio	San Antonio-Dallas
Autos/Day	10,409	5,758	16,614
Persons Per Auto	2	2	2
Total Daily Auto Person Trips	20,818	11,516	33,228
Buses/Day	47	41	78
Persons Per Bus	30	30	30
Total Daily Bus Person Trips	1,410	1,230	2,340
Aircraft/Day	84	47	54
Persons Per Aircraft	55	58	56
Total Daily Air Person Trips	4,620	2,756	2,700
Total Daily Intercity Person Trips	26,848	15,502	38,268
Annual Intercity Person Trips (Millions)	9.8	5.7	14.0

Source: Rail Passenger Transportation in Texas, Texas Transportation Institute, Texas A&M University

Table 8.10: Estimated 1973 Travel Between City Pairs By Mode (Millions of Passengers)

City Pairs	Mode of Travel		
	Auto	Air	Bus
Dallas-Houston	7.6	1.7	0.5
Houston-San Antonio	4.2	1.0	0.4
San Antonio-Dallas	12.1	1.0	0.9

Source: Rail Passenger Transportation in Texas, Texas Transportation Institute, Texas A&M University

Table 8.11: Projected Range of Annual Intercity Travel Demand*, All Modes of Travel (Millions of Passengers)

City Pairs	Year					
	1973	1980	1985	1990	1995	2000
Dallas-Houston	9.8	12-17	14-24	16-36	18-53	21-77
Houston-San Antonio	5.7	7-10	8-14	9-21	11-31	12-45
San Antonio-Dallas	14.0	16-23	18-32	21-46	25-68	28-100

*The range in travel demand shown is the result of applying a low growth rate (3%) and a high growth rate (8%) to the estimated 1973 travel demand.

Source: Rail Passenger Transportation in Texas, Texas Transportation Institute, Texas A&M University

It is interesting to note that, although most attention is generally focused on travel between Dallas and Houston, the intercity demand between San Antonio and Dallas is 40 percent greater than the estimated Dallas-Houston demand.

Implications of Estimated Future Intercity Travel

It appears realistic to assume that neither the high nor the low estimate of future intercity travel will occur. A more realistic estimate of future intercity travel may be a median value of the estimated range. Table 8.12 shows this estimate of future travel demand. The values in Table 8.12 represent an annual compound growth rate in intercity travel of approximately 5.5 percent.

Table 8.12: "Best" Estimate of Future Travel Demand Between City Pairs in Study Triangle (Millions of Passengers)

City Pair	Year			
	1973	1980	1990	2000
Dallas-Houston	9.8	14.5	26.0	49.0
Houston-San Antonio	5.7	8.5	15.0	28.5
San Antonio-Dallas	14.0	19.5	33.5	64.0

Source: Rail Passenger Transportation in Texas, Texas Transportation Institute, Texas A&M University

The possible implications of this magnitude of increase are severe; intercity travel will increase by between 400 and 500 percent by the year 2000. As an example of what this means, the low count of autos on Interstate 35 between San Antonio and Dallas in 1973 was 16,614. If this increases by 450 percent, this four-lane freeway would need to accommodate nearly 75,000 vehicles per day (assuming existing travel patterns continued) by the year 2000. This volume of traffic is well in excess of the capacity of the roadway, and this is the lowest travel demand on the roadway. It is reasonable to assume that air travel will be similarly impacted.

Thus, the future demand for intercity travel will greatly exceed the existing capacity to serve travel. Significant improvements are needed to all modes of travel and the state needs to develop comprehensive intercity transportation plans.

Estimated Intercity Bus Travel in the "Great Triangle" of Texas

As noted in Figure 8.1 of this chapter, the volume of intercity travel served by bus between 1951 and 1971 has

remained relatively constant. It is believed that this trend will continue nationally and in Texas.

The percent of intercity bus travel to total intercity travel is shown below in Table 8.13.

Table 8.13: Estimated 1973 Percent Intercity Bus Travel To Total Travel (Millions of Passengers)

City Pairs	Total Intercity Travel	Total Intercity Bus Travel	% Bus Travel
Dallas-Houston	9.8	0.5	6
Houston-San Antonio	5.6	0.4	7
San Antonio-Dallas	14.0	0.9	6

These percentages are assumed to remain "stable" for use in projecting future intercity bus passenger demand in the Great Triangle.

Table 8.14: Projected Range of Annual Intercity Bus Travel Demand* (Millions of Passengers)

City Pairs	Year				
	1980	1985	1990	1995	2000
Dallas-Houston	0.6-0.9	0.7-1.2	0.8-1.8	0.9-2.7	1.1-3.9
Houston-San Antonio	0.5-0.7	0.6-1.0	0.6-1.5	0.8-2.2	0.8-3.2
San Antonio-Dallas	1.0-1.4	1.1-1.9	1.3-2.8	1.5-4.1	1.7-6.0

*The range in estimated values represents a high and a low estimate of bus passenger demand. The high estimate assumes an 8 percent growth rate in intercity travel. The low estimate assumes an annual growth rate of 3 percent in intercity travel. The percent of total intercity travel by bus on each leg of the "Great Triangle" is assumed to remain constant at the 1973 values presented in Table 8.13.

It is believed an estimate of intercity travel (annual compound growth of 5.5 percent) provides a realistic view of

future intercity travel. Table 8.15 presents this projection of intercity bus travel for the years 1980, 1990, and 2000.

Table 8.15: "Best" Estimate of Future Bus Travel Demand (Millions of Passengers)

City Pair	Year			
	1973	1980	1990	2000
Dallas-Houston	0.5	0.7	1.3	2.5
Houston-San Antonio	0.4	0.6	1.1	1.9
San Antonio-Dallas	0.9	1.2	2.0	3.8

*The estimates represent an annual growth rate of 5.5 percent in intercity travel with bus serving passenger demand at 1973 estimated values presented in Table 8.13.

Assuming that the percent of total travel demand accommodated by buses remains stable, and does not rise and assuming an intercity travel growth rate of 5.5 percent occurs, bus passengers will increase 356 percent by the year 2000. Plans need to be made to meet these rising demands in intercity bus travel.

Estimated Intercity Rail Travel in the "Great Triangle" of Texas

In the northeastern United States, rail serves approximately 6 percent of the intercity travel demand. Assuming that the quality of rail service in Texas will be improved, this 6 percent was used as the low percent of the total market that might be served by rail. Under extreme economic and energy conditions, it is assumed that the highest share of intercity travel served by rail would not exceed 25 percent of total intercity travel. During WW II rail served about 25 percent of total intercity travel, the greatest ridership acheived by rail to date. Today, all public

transportation serves only 15 percent of total intercity travel, while the automobile serves 85 percent.

Table 8.16 shows annual intercity rail passengers using the "high" and "low" percents of total travel demand. It should be noted that the conditions (fuel shortage, economic hardships, etc.) that would indicate 25 percent intercity rail travel are not conditions that would likely exist with an 8 percent annual growth in intercity travel. Thus, the highest estimate of possible rail travel should be considered an unrealistically high estimate.

Table 8.16: Projected Annual Intercity Rail Passengers* (Millions)

City Pairs	Year				
	1980	1985	1990	1995	2000
Dallas-Houston	0.7-4.3	0.8-6.0	1.0- 9.0	1.1-13.3	1.3-19.3
Houston-San Antonio	0.4-2.5	0.5-3.5	0.5- 5.3	0.7- 7.8	0.7-11.2
San Antonio-Dallas	1.0-5.8	1.1-8.0	1.3-11.5	1.5-17.0	1.7-25.0

*The range in estimated values represents a high and a low estimate of rail passenger demand. The high estimate assumes an annual 8 percent growth rate in intercity travel with rail serving 25 percent of the market. The low estimate assumes an annual growth rate of 3 percent in intercity travel with rail serving 6 percent of the market.

Source: Rail Passenger Transportation in Texas, Texas Transportation Institute, Texas A&M University

Conclusions and Recommendations

This chapter on intercity passenger transportation has identified specific problems that exist; however, a more in-depth study is needed in order to make detailed recommendations for improvement.

Virtually all intercity transportation in Texas is currently provided by auto, air and bus. The rail passenger service currently provided by AMTRAK is not competitive with these other modes in terms of either travel time or cost. It is recommended that an in-depth study be made of rail service in Texas, particularly in the Great Triangle. In evaluating rail passenger travel, the following factors must be considered and/or evaluated.

(1) Although rail passenger service may not presently be essential, rail freight service is essential. This freight service will become even more essential in the future. It will be necessary to assure that rail passenger operations do not unduly hinder rail freight operations.

(2) Railroad rights-of-way already connect virtually every urban area in the state. If these rights-of-way are to serve passenger demand in the future, it is essential to assure that these R.O.W. are not lost due to abandonment.

(3) Perhaps the greatest unknown is the cost required to provide rail service. This cost will, obviously, depend on the type of service provided. It must be decided what market rail

passenger operations will serve. If rail passenger service is to provide an alternative to other modes, some form of improved service will be necessary.

(4) Even after the type of rail service is identified, the cost of providing that service can vary greatly between corridors depending on track conditions and alignment.

(5) The attractiveness and success of intercity rail service is partially dependent on potential ridership associated with intermediate stops. The metroliner owes much of its success to the fact that Philadelphia, Baltimore, Newark, and Wilmington lie along the tract between Washington, D.C. and New York (a total population of more than 25 million persons). This type of concentrated development does not exist in Texas. The route between San Antonio and Dallas-Fort Worth offers the greatest potential for intermediate stops - Austin and Waco could be served by this route (a total population of less than 4 million persons).

Projections of intercity travel indicate that the transportation facilities presently available do not have the capacity needed to serve future demands. As a result, the State of Texas will need to take actions to assure that intercity travel can be accommodated in the study triangle and for that matter, all over the state. It is appropriate for the state to develop comprehensive intercity transportation plans for major intercity travel corridors.

These comprehensive plans must consider the advantages and disadvantages of the services provided by each travel mode.

These plans should accomplish the following.

(1) Formulate the future demand for intercity travel.

(2) Evaluate the facilities available to serve the projected demand. Identify capacity deficiencies.

(3) Determine the percentage of the total demand that might be served by each mode.

(4) Identify the facilities that are needed for each mode and the time at which the facilities will be needed.

(5) Determine the manner in which the systems will be financed.

In conclusion, it is recommended that the State of Texas actively pursue developing intercity transportation plans for the major travel corridors. These plans should include an in-depth study and recommendations on rail service in the Great Triangle and an in-depth study and recommendations for statewide bus travel.

DAILY COMMUTER TRAVEL

Moving large numbers of people in and out of the central business district of any major urban area during peak hours causes traffic congestion. With the average length of trips to work in large Texas cities in the range of 8 to 10 miles, the private automobile is both the most common and the most criticized method of commuting. Other modes of travel, however, are available to serve commuting demands:

(1) bus, either scheduled transit or commuter bus club; and

(2) rail, either commuter or rail rapid transit.

The average cost per passenger mile associated with these modes as well as the auto, is presented below in Figure 8.5.

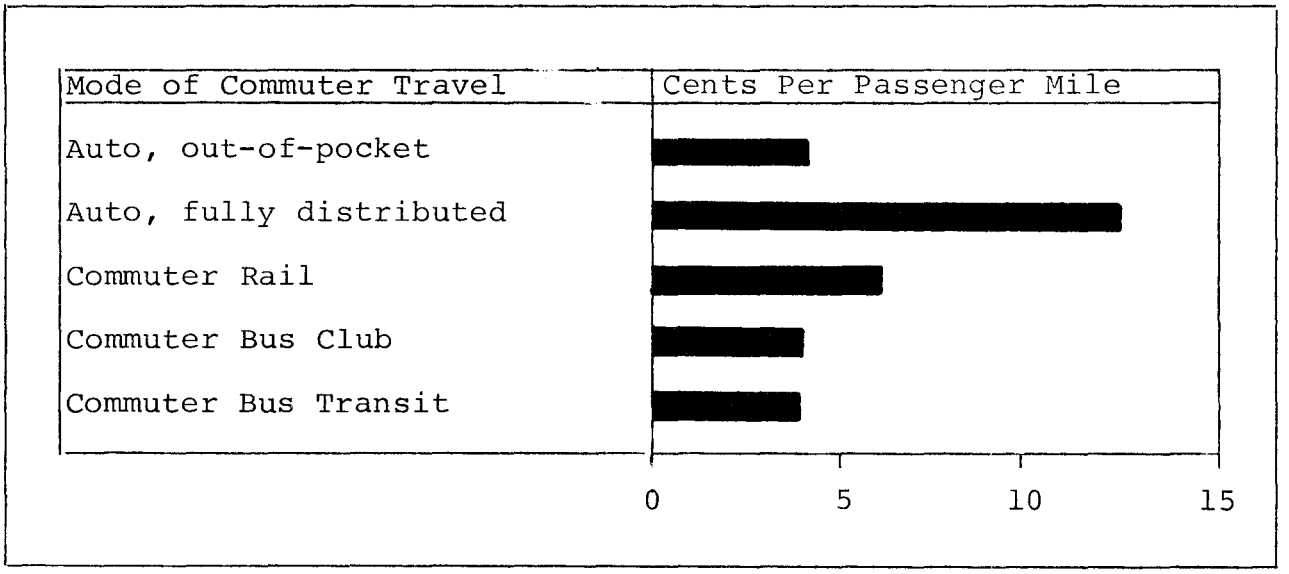


Figure 8.5: Average Costs of Commuter Person Movement

Source: Rail Passenger Transportation in Texas, Texas Transportation Institute, Texas A&M University

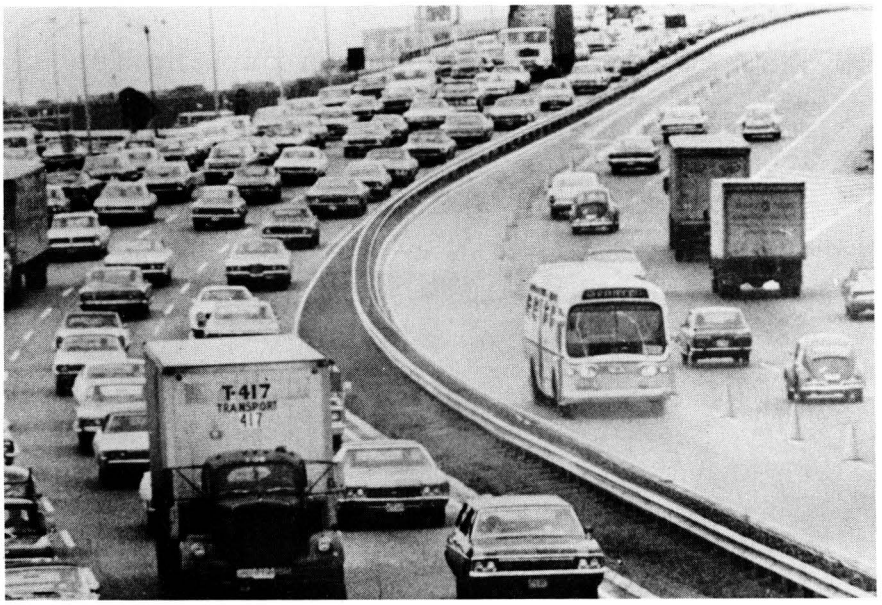
Texas cities have developed around the transportation service provided by the automobile. The automobile is the dominant mode of transportation in Texas cities and in Texas commuting patterns due to its flexibility, privacy, convenience and the fact that it is a reasonably fast means of transportation. However, the auto is an expensive means of transportation. In addition to the cost shown in Figure 8.5, a high parking fee (usually $35 to $50 per month in major Texas cities) must be paid for parking in the core of the CBD.

A high parking fee (usually $35 to $50 per month in major Texas cities) must be paid for parking in the core of the CBD.

Commuter Bus Service

Conventional transit service and subscription service are two forms of bus transportation commonly used. Conventional transit service is part of an overall transit operation with buses operating according to a fixed schedule. In many areas, buses pick up passengers at peripheral locations and operate

express service to the CBD. This is commonly referred to as "park and ride" service. Operation of the express service can be greatly improved by employing techniques such as exclusive busways and freeway surveillance and control.



Boston, 1972 - bus operating in reserved lane of freeway in reverse direction during peak-hours.

Subscription bus service is an operation where a group of commuters charter a bus(es) from a private operator on a regular basis or purchase their own bus. This bus is then made available to subscription members for transportation, generally nonstop, to their place of employment. This service can be highly attractive, especially in areas where no alternative transit service is available. Approximately twelve subscription bus services are currently operating in the United States. This type of service has recently been initiated between Conroe and Houston.

The greatest advantage of bus service over fixed guideway service is the flexibility in changing the service. Capacity can be increased or decreased at a minimal cost. However, unless preferential treatment is given to the bus, riders will suffer the same congestion delays as the people in private autos.

Commuter Rail Service

Commuter rail provides a daily passenger service, transporting persons from cities and towns outside of a metropolitan area to points within a metropolitan area. This service is usually provided by a private railroad as a part of its overall passenger and freight operation. Commuter rail service is usually oriented toward accommodating the peak period work trip and generally focuses on serving the CBD.

Commuter rail provides a somewhat higher level-of-service than does conventional rail rapid transit. Heavier rail cars are utilized and average operating speeds are in the range of 40 to 50 mph. The average trip length nationwide for commuter rail is approximately 22 miles.

In 1970, sixteen major commuter railroads were in operation in the United States which served primarily the densely populated cities of New York, Chicago, Philadelphia, Boston, and San Francisco. A study of 14 of these commuter railroads found that three were

covering operating expenses, and two operated at a profit. In 1970 these commuter railroads accrued a total deficit of $36 million. An analysis conducted by the Institute for Defense Analyses found that the various commuter railroads operated at deficits for different reasons. No single value of either cost per passenger mile or revenue per passenger mile was common to all commuter rail operations.

It should be noted that these commuter railroads transport a substantial volume of passengers. Except for one small commuter rail operation that carried 69,000 annual passengers, all of the commuter railroads carried in excess of 2.6 million passengers. Reliable data are not currently available concerning the cost to transport extremely low passenger volumes by rail.

Table 8.17: Population Characteristics of Cities Served By Commuter Rail and Selected Texas Study Cities

City	SMSA Population, 1970 (Millions)	Central City Population Density (Persons/Sq. Mile)
Cities With Commuter Rail Service		
New York	11.6	24,385
Chicago	7.0	12,283
Philadelphia	4.8	15,164
Boston	2.8	13,936
San Francisco	3.1	10,035
Texas Cities		
Dallas	1.6	3,179
Houston	2.0	3,102
San Antonio	0.9	3,555
Fort Worth	0.8	1,919

Source: Rail Passenger Transportation in Texas, Texas Transportation Institute, Texas A&M University

Commuter rail, in its conventional sense, may not be truly suited for Texas; it serves a trip length greater than that which is common to work trips in Texas. An operation similar to the Lindenwold Line may be more applicable.

The Lindenwold Line is a rail transit line that operates over a distance of 14.5 miles between Philadelphia and Lindenwold, New Jersey and has eight stations outside of the Philadelphia CBD. This system serves a shorter trip length than does commuter rail service but has a somewhat greater distance between stations than most conventional rail rapid transit systems. The line experienced a gross operating deficit of $147,000 in 1970. Revenue per passenger was $0.48 while cost per passenger was $0.50. Annually, the Lindenwold Line carries nearly 9 million passengers.

Railroad tracks presently exist that could accommodate commuter service in Houston, Dallas, Fort Worth, or San Antonio. However, commuter operation on any of these tracks would need to be coordinated with the other trains that are scheduled to use these tracks and many of the tracks would probably require major improvement in order to serve passenger trains. Also, if commuter rail service was implemented, stations would need to be constructed and/or renovated.

Potential Commuter Ridership

Origin-destination studies conducted by the Texas Highway Department and data from the 1970 Census can be used to make a

preliminary estimate of potential commuter ridership. Of the cities studied, only San Antonio had a origin-destination study which was prepared in 1969. More recent statistics are required for realistic estimates. It should be noted that with the limited data available and due to the preliminary nature of this analysis, it is not intended that immediate conclusions and recommendations be defined. The purpose is to see if a demand exists that warrants further study of commuter travel. In-depth research and study would be required before specific recommendations could be made.

San Antonio Corridors

Two corridors were evaluated from the San Antonio origin-destination data:

(1) A route from the San Antonio CBD along IH 10 and the Southern Pacific Railroad (S.P.R.R.) to Seguin.

(2) A route from the San Antonio CBD along IH 35 and the Missouri-Kansas-Texas (M.K.T.R.R.) and Missouri Pacific Railroad (M.P.R.R.) to New Braunfels and San Marcos.

Using the Texas Highway Department data, an estimate can be made of daily two-way person movements. The data in Table 8.18 represents this estimate for movements to or from the CBD in two corridors approximately one mile wide radiating out from the CBD. The data includes trips other than those originating or terminating in outlying areas therefore, many of these trips are not conducive to commuter service.

Table 8.18: Daily Travel in Possible Commuter Corridors

Corridor	Week-Day Two-Way Person Travel
Interstate Highway 10 (San Antonio CBD to Seguin)	6,200
Interstate Highway 35 (San Antonio CBD to New Braunfels and San Marcos)	3,600

Source: Rail Passenger Transportation in Texas, Texas Transportation Institute, Texas A&M University

Based on recent origin-destination studies, we may assume that a maximum of 25 percent of this travel might occur during the peak period. An analysis of the larger travel corridor (IH 10) indicates that a directional passenger flow of 775 (6200 X 0.5 X 0.25) could be expected in the peak. Assuming that 25 percent of this travel could be diverted to rail, about 200 directional riders would be served in the peak period. Assuming that 50 percent of daily directional travel would be served in the peak (a characteristic of transit systems), a daily directional ridership of 400 would exist. Daily two-way travel would be 800 persons and assuming work day travel is the primary travel served, about 200,000 (800 X 250) passengers would use this service annually.

With this preliminary ridership estimate, it would be difficult to justify operating more than one commuter train per day which would greatly restrict scheduling flexibility. However, other alternatives can be considered. For instance, a self-powered commuter car could serve this ridership level and offer a high quality of service to the commuter.

The volume of trips indicates that a demand may exist for some form of commuter passenger service. Demand in the San Antonio corridors appears to warrant further evaluation.

Dallas Corridors

Census data can be used to obtain a preliminary estimate of potential commuter ridership in Dallas. Of the persons working in the Dallas CBD:

74.4% live in the City of Dallas
22.1% live in the remainder of Dallas County
95.5% live in Dallas County

1.1% live in Collin County
0.6% live in Denton County
0.9% live in Ellis County
0.6% live in Kaufman County
0.2% live in Rockwall County

A commuter service would serve primarily persons living outside the City of Dallas and probably outside of Dallas County. This assumption would mean a commuter operation would be primarily directed toward about 3 to 4 percent of the persons working in the Dallas CBD. This could still result in a substantial potential ridership due to the large numbers of persons working in the CBD.

According to the 1970 Census, the following numbers of persons live in the locations listed and work in the Dallas CBD.

City of Dallas	49,100
Remainder of Dallas County	14,600
Collin County	700
Denton County	400
Ellis County	600
Kaufman County	400
Rockwall County	100
	65,900

Thus, for example, a commuter route operating along Highway 75 to Plano and McKinney (Collin County) could draw from a potential

one way market of 700 persons. It appears that additional analyses are warranted to determine if some form of commuter service might be suited to several Dallas Corridors.

Houston Corridors

Of the 100,000 persons working in the Houston CBD:

79.5% live in the City of Houston
18.3% live in the remainder of Harris County
0.5% live in Brazoria County
0.4% live in Fort Bend County
0.2% live in Liberty County
1.0% live in Montgomery County

It appears that the most obvious commuter route would serve Montgomery County since 1,000 persons live there and work in the Houston CBD. A route along Interstate 45 to Conroe should serve most of this population. A limited commuter bus club has recently been formed in Conroe. Members pay $45 per month, or about 3 cents per passenger mile (76 miles round-trip, 20 times per month).

It appears that an additional in-depth study would be required to evaluate the potential of this market for each of the major metropolitan areas in Texas.

Conclusions and Recommendations

Despite the preliminary nature of this chapter, several conclusions and recommendations can be drawn from the major findings.

(1) Buses provide considerable flexibility in serving commuter needs.

(2) Commuter rail service generally serves very high ridership corridors, much higher than those that exist in Texas. Therefore, if rail service were provided in Texas, it appears that a light rail transit operation would have the greatest applicability for Texas commuter needs.

(3) Preliminary estimates of potential ridership suggest that a demand for some form of commuter service may exist in several Texas corridors. Additional study is needed to accurately quantify this demand.

(4) If further research indicates that a sufficient demand for some form of improved commuter service does exist a variety of actions can be taken by local government to encourage the provision and use of commuter operations such as:

> Relaxation of zoning ordinances and tax incentives for business and industry encouraging employees to use commuter services.
>
> Provide preferential treatment for high occupancy commuter vehicles
>
> Financially assist commuter operations.