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16. Abstract An efficient multimodal transportation system is critical to the economic vitality of large metropolitan areas, smaller communities, and rural areas. While transportation issues in urban areas receive a good deal of attention, the needs of rural areas are also important. This report summarizes the results of a research project examining the rural transportation system in Texas. The demographic and economic characteristics of the state's rural population are highlighted. The report also presents a multimodal approach to enhance mobility and economic development in rural parts of Texas. Researchers examine the status of highways, roadways, public transit services, intercity buses, airports, and railroads serving rural portions of the state and discuss future needs.					
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**THE RURAL TRANSPORTATION NETWORK
IN TEXAS—SUMMARY REPORT**

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DISCLAIMER

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TABLE OF CONTENTS

LIST OF FIGURES	viii
LIST OF TABLES	ix
IMPLEMENTATION RECOMMENDATIONS	xi
CHAPTER ONE—INTRODUCTION	1
Research Objectives	1
Research Approach	1
Population and Economic Characteristics of Rural Texas	2
Report Organization	3
CHAPTER TWO—MULTIMODAL APPROACH TO RURAL TRANSPORTATION IN TEXAS	5
CHAPTER THREE—RURAL TRANSPORTATION NETWORK IN TEXAS	7
Rural Roadway System in Texas	7
Rural Transit and Intercity Bus Services in Texas	10
General Aviation System in Texas	20
Rural Railroad System in Texas	27
CHAPTER FOUR—ASSESSMENT	39
Economic Impact of the Rural Transportation Network	39
Assessment and Future Needs	41
Implementation Recommendations	43
REFERENCES	45

LIST OF FIGURES

Figure	Page
1. Farm-to-Market 2972 in Cherokee County	8
2. State Highway 118 and the Davis Mountains	8
3. Texas Highway Trunk System	9
4. Distribution of Total TxDOT Receipts - Fiscal Year 1997	11
5. Rural Public Transit Operators in Texas	12
6. Brazos Transit District Rural Bus	16
7. Counties with Section 5310 Vehicles	17
8. Intercity Bus Routes in Texas	19
9. Transport Airports in Texas	22
10. Example of General Utility Airport in Texas	23
11. General Utility Airports in Texas	24
12. Basic Utility Airports in Texas	25
13. Railroads in Texas	31
14. Rural Rail Transportation Districts	34
15. AMTRAK Services in Texas	36
16. Texas State Railroad	37

LIST OF TABLES

Table	Page
1. State-Maintained Roadway System	7
2. Other Components of the State-Maintained Roadway System	7
3. Rural Public Transit Systems in Texas	13
4. Classification of Freight Railroads in Texas	28
5. Freight Railroads Operating in Texas	29
6. Rural Rail Transportation Districts in Texas	33

IMPLEMENTATION RECOMMENDATIONS

This report summarizes the results of a research project examining the rural transportation network in Texas. Researchers analyzed available information on the current status, condition, and funding of roadways, transit and intercity bus services, airports, and railroads in rural areas of the state. The future needs associated with these modes were also reviewed. A multimodal transportation system to enhance mobility and economic development in rural areas was presented.

The project results provide a snapshot of the current rural transportation system in the state and future needs associated with this network. The project results can be used by TxDOT in a number of ways. First, the research report and this summary report can be used to raise the awareness of staff, policy makers, and other groups about the rural transportation system. Second, TxDOT can utilize the information to develop a proactive approach to funding and operating a diverse multimodal rural transportation system. The following steps are recommended to help raise awareness and to promote the multimodal transportation needs in rural areas of the state.

1. An ongoing information program should be developed and implemented with TxDOT Districts and Divisions to promote a multimodal approach to the rural transportation system. Elements of this program should include the distribution of the research and summary reports from this project, the development of training modules on the multimodal rural transportation network, and the development and implementation of an ongoing monitoring program to help document the benefits of all modes to rural portions of the state.
2. TxDOT staff should continue to pursue a multimodal transportation system in the state, from the planning process through design, construction, and operation. The project summary and final reports should be distributed to policy makers and other groups to help promote this multimodal approach.
3. TxDOT staff should continue to pursue funding to address future capital and operating needs of the various modes, as well as intermodal facilities, through appropriate sources.
4. TxDOT staff should continue to work with private transportation providers, local jurisdictions, and other groups to further enhance the multimodal transportation system in rural areas. These groups include the railroads, the Rural Rail Transportation Districts, transit agencies, intercity bus operators, local governments, and other groups.

CHAPTER ONE—INTRODUCTION

Transportation is critical to the economic vitality of large metropolitan regions, smaller communities, and rural areas. Responding to the transportation needs in major urban areas has been a priority in many states, including Texas. Emphasis has been placed on addressing increasing levels of traffic congestion, declining mobility, and air quality concerns in these areas. Multimodal approaches and the application of advanced technologies are being used to improve the movement of people and goods in major metropolitan areas throughout the state and country.

An efficient multimodal transportation system is just as important for the economic and social vitality of rural areas. Transportation is especially critical in a large and diverse state like Texas. Although agriculture, ranching, and oil and gas still dominate the economies of many rural portions of the state, the nature of many areas is changing. Tourism, recreation, retirement living, high technology industries, and residential areas linked to long-distance commute trips have emerged recently as growing segments of the rural economy.

An effective and efficient system of freeways, roadways, public transit services, intercity buses, airports, and railroads is important to maintain and enhance the economic base of rural areas in the state. Ensuring that rural residents have access to jobs, schools, medical services, businesses, and social and recreational opportunities is critical, as is the efficient movement of agricultural produce, manufactured goods, and other commodities.

Research Objectives

This research project explores elements of the rural transportation system in Texas. The project was designed to meet several objectives. The first was to document the demographic and economic characteristics of the state's rural population. Examining the status of the various modes serving rural areas of the state represents the second objective. Researchers explored the current system of highways, roadways, public transit services, intercity buses, airports, and railroads serving rural parts of the state. Reviewing funding needs for the various modes and the potential impact of additional resources on rural areas represents the final objective.

Research Approach

The research team conducted a number of activities to accomplish these objectives. First, information from the U.S. Census Bureau, the U.S. Department of Commerce, and the Texas State Data Center was examined. Recent data on population, per capita income, total personal income, earnings by industry group, and other economic variables were analyzed and mapped.

Second, information was obtained on the historical development and current status of freeways, roadways, public transit operations, intercity buses, airports, and railroads serving rural

parts of the state. Available literature, reports, Internet sites, and other documents were used in this effort. In addition, a telephone survey was conducted to identify the current status of Rural Rail Districts in the state.

Researchers used this information to help identify the attributes of the various modes that enhance the economic and social viability of rural areas. The approach used in this analysis varied by mode, with the methodology matched to the characteristics of each mode and available data. Additional case studies were completed on rural transit systems and rural airports. Telephone interviews with representatives from selected systems were conducted to obtain additional insights into the nature of the services and the benefits to the local areas.

Four general types of economic impacts or benefits were considered in the assessment. The first three measures focus on the direct, indirect, and induced economic benefits of rural transportation, while the last examines community impacts. Finally, identified improvements or enhancements and available estimates of funding needs for the different modes were reviewed. The impacts of additional resources were considered, along with the influence of these investments on rural parts of the state.

Population and Economic Characteristics of Rural Texas

Texas ranks second to California as the most populous state in the country, with a 1996 population of approximately 19.1 million. This figure represents an increase of 2.1 million people, or 12.8 percent, since the 1990 census. The population of the U.S. grew by only 6.7 percent over the same period. Texas experienced the largest increase in population of any state in the country over this six-year period (1).

The majority of the state's population is concentrated in the major metropolitan areas. The Austin, Houston, Dallas-Fort Worth, and San Antonio metropolitan areas account for approximately 58 percent of the total state population. Adding in all the metropolitan statistical areas (MSAs) in the state brings the total up to 84 percent (2). On the other hand, some 26 percent of the state population resides in rural areas and small communities. The population and economic characteristics of the 196 rural counties in the state are different than those in the 58 urban counties.

Although the out-migration trends of the 1980s have slowed, 23 percent of the rural counties in the state are estimated to have lost population between 1990 and 1998. Seventy-seven percent of the rural counties experienced population increases over the same period of time. Most of the counties experiencing losses in population are located in the Panhandle and West Texas regions, while rural areas in Northeast, Central, and South Texas gained new residents (2).

In 1990, Texas had the fifth largest elderly population—individuals 65 years of age or older—among states in the country. Between 1980 and 1990, Texas had the third largest growth

in elderly population, trailing only California and Florida. In 1990, approximately 10 percent of the state's population was 65 and older. The elderly population in Texas is also among the poorest in the country, with the state ranking as the tenth highest in the number of elderly individuals at or below the poverty level. Although 70 percent of the elderly population resides in metropolitan areas, individuals over 65 years of age account for a large share of the population in rural areas. Approximately 16 percent of the population in rural areas was elderly in 1990, compared to 9 percent in metropolitan regions. Further, in 55 rural counties, individuals 65 and over comprised at least one-fifth of the population. The growth in the state's elderly population is forecasted to continue and may account for 16 to 20 percent of the total state population by 2030 (3).

Per capita income, which is calculated by aggregating the income of all individuals in an area and dividing by the total population, provides a general measure of the economic well-being of the population as a whole and a perspective on income distribution across all groups. Texas ranks in the lower half of all states in the country in per capita income, averaging approximately 92 percent of the national average. Within the state, the per capita income in rural counties is lower than their urban counterparts. The 1992 per capita income for all rural counties was approximately 94 percent of the average for Texas metropolitan counties. Counties in the Panhandle region had the highest average per capita income among rural areas, while counties in South and West Texas had the lowest (4, 5).

Examining earnings by industry group provides an indication of the economic base in rural counties. Earnings include wages and salaries, other labor income, and farm and non-farm proprietor's income. The industry with the highest earnings was identified for each county. The transportation, finance, and trade industries category was the dominant industry in 34 percent of the rural counties. This grouping was followed by farming, 24 percent; government, 21 percent; manufacturing, 11 percent; mining, 7 percent; and services, 3 percent (6).

Report Organization

The remainder of this report is divided into three chapters. [Chapter Two](#) discusses the multimodal transportation approach needed to enhance mobility and economic development in rural parts of the state. [Chapter Three](#) highlights the major characteristics of the roadway, public transit and intercity bus, aviation, and railroad network in rural parts of the state. The report [concludes](#) with a discussion of the economic impacts and future needs of the various modes, implementation recommendations, and areas for further research.

CHAPTER TWO—MULTIMODAL APPROACH TO RURAL TRANSPORTATION IN TEXAS

The rural transportation system in Texas includes freeways, roadways, transit and intercity bus services, airports, and railroads. While each mode is important individually, they become more significant when operated in a coordinated and compatible manner. Multiple modes are needed to meet the diverse transportation demands of residents and visitors, as well as to transport the wide range of raw materials, agricultural commodities, and products found throughout the state. Further, intermodal approaches involving more than one mode are often necessary. This chapter highlights a few examples of the multimodal and intermodal approaches currently found in the state and identifies future needs in these areas.

The exact modes, as well as the intermodal connections, depend on the characteristics of different parts of the state. Factors influencing the demand for various modes include the type of raw materials and commodities to be shipped, tourism and visitor attractions, the nature of local businesses, and other features. The roadway system is critical for individual travel as well as truck movements throughout the state. Roadways also provide key links to airports, rail terminals, and ports. Heavy and bulky commodities are transported by railroads in many parts of the state, while general aviation airports in these areas serve local business travel and transport high value, time-sensitive products. Rural transit operators and intercity buses provide mobility for individuals in these areas.

The following examples highlight multimodal and intermodal approaches currently in use throughout the state. Examples of multimodal and intermodal transportation linkage for travelers and for the shipment of raw materials and finished products are provided.

Air and Truck Connections. High value and time-sensitive products are frequently shipped by air, with local connections made by trucks or other delivery vehicles. Ellison Greenhouse, located in Brenham, grows and sells a wide range of flowers, plants, trees, and garden materials. Many of the plants are grown at the facility. Given the competitive global economy, however, flowers and plants are also purchased from growers in other parts of the country and world, and transported to Ellison's through a combination of air and truck. Products are flown into the Bush Intercontinental Airport in Houston by commercial airlines and shipped by truck to Brenham. Ensuring that the air-to-truck connections at Bush Intercontinental Airport occur in a rapid and efficient manner is important given the perishable nature of flowers and plants. Other examples of high value, time-sensitive products transported by air and truck can be found at airports throughout the state.

Rural Transit Connections with Airports. Most rural transit systems provide on-request service to local airports, and a few operate service to major airports. For example, Parker

County Transportation provides on-request shuttle service to the Dallas/Fort Worth and Love Field Airports, and Kleberg County Human Services operates to and from the local airport.

Rural, Urban, and Metropolitan Transit Connections. Some rural transit systems have coordinated service agreements with metropolitan transit authorities, allowing passengers to transfer between the two systems. Capital Area Rural Transportation System (CARTS) and Capital Metro in Austin have a long-standing agreement that provides links between the two systems. CARTS also coordinates services with intercity bus operators in three communities.

Truck and Rail Connections. Intermodal truck and rail facilities are located in Amarillo, Dallas, Fort Worth, El Paso, Harlingen, Houston, Laredo, Marshall, and San Antonio. These facilities allow goods to be transferred between trucks and rail cars, maximizing the efficiency of both modes. Further, some industries use both rail and trucks to ship raw materials and finished products into and out of plants. For example, Hirschfeld Steel Company, Inc. in San Angelo brings in steel and other raw materials by rail and ships out finished products by truck.

Rail and Port Intermodal Facilities. Connections between railroads and water-borne ships are located at ports in Beaumont, Brownsville, Corpus Christi, Freeport, Galveston, Houston, Lavaca, Orange, and Port Arthur. These facilities provide access to worldwide markets for commodities from Texas and other parts of the country. They also bring goods, such as automobiles, into Texas which are moved by rail to locations throughout the state and North America.

Maintaining the existing individual modal infrastructures and intermodal facilities is critical to ensuring the safe and efficient operation of the rural transportation system in Texas. In addition to maintaining and enhancing each mode, improvements are also needed to the intermodal facilities and operations. Available resources should be targeted at identified improvements to existing intermodal terminals and new facilities. Institutional arrangements and operating policies encouraging intermodalism should also be encouraged and pursued.

This research project identified the importance of all elements of the transportation system to the economic health and vitality of rural portions of the state. Overall, the general condition of all modes in the state—roadways, public transit and intercity buses, general aviation airports, and railroads—is good. Providing adequate funding to maintain each mode, to add needed infrastructure improvements, and to support ongoing operations is critical to ensure that the state continues to maintain its position in the U.S. and the global economy.

CHAPTER THREE—RURAL TRANSPORTATION NETWORK IN TEXAS

Rural Roadway System in Texas

The state-maintained roadway system in Texas comprises approximately 77,145 centerline miles. As highlighted in [Table 1](#), the Farm-to-Market (FM) network comprises slightly over half of the centerline miles, and the combination of FM and state highways accounts for 74 percent of the system total. Additional components of the state-maintained system are shown in [Table 2](#). [Figure 1](#) illustrates an example of an FM roadway in the state and [Figure 2](#) shows a state highway. [Figure 3](#) highlights the Texas Highway Trunk System, which includes the Interstate, U.S., and State Highways.

Table 1. State-Maintained Roadway System.

Roadway Classification	Centerline Miles	Percent of System
Interstate Highways	3,233	4%
Interstate Frontage Roads	4,514	6%
U.S. Highways	12,114	16%
State Highways	16,388	21%
Farm-to-Market Roads	40,896	53%
Total	77,145	100%

(7)

Table 2. Other Components of the State-Maintained Roadway System.

Component	Number
Bridges	
On-State System	32,200
Off-State System	16,300
Total	48,500
Rest Areas	110
Picnic Areas	790
Acres within Right-of-Way in State System	1.3 million

(7)



Figure 1. Farm-to-Market 2972 in Cherokee County.
Photo Credit – Kevin Stillman, TxDOT



Figure 2. State Highway 118 and the Davis Mountains.
Photo Credit – J. Griffis Smith, TxDOT

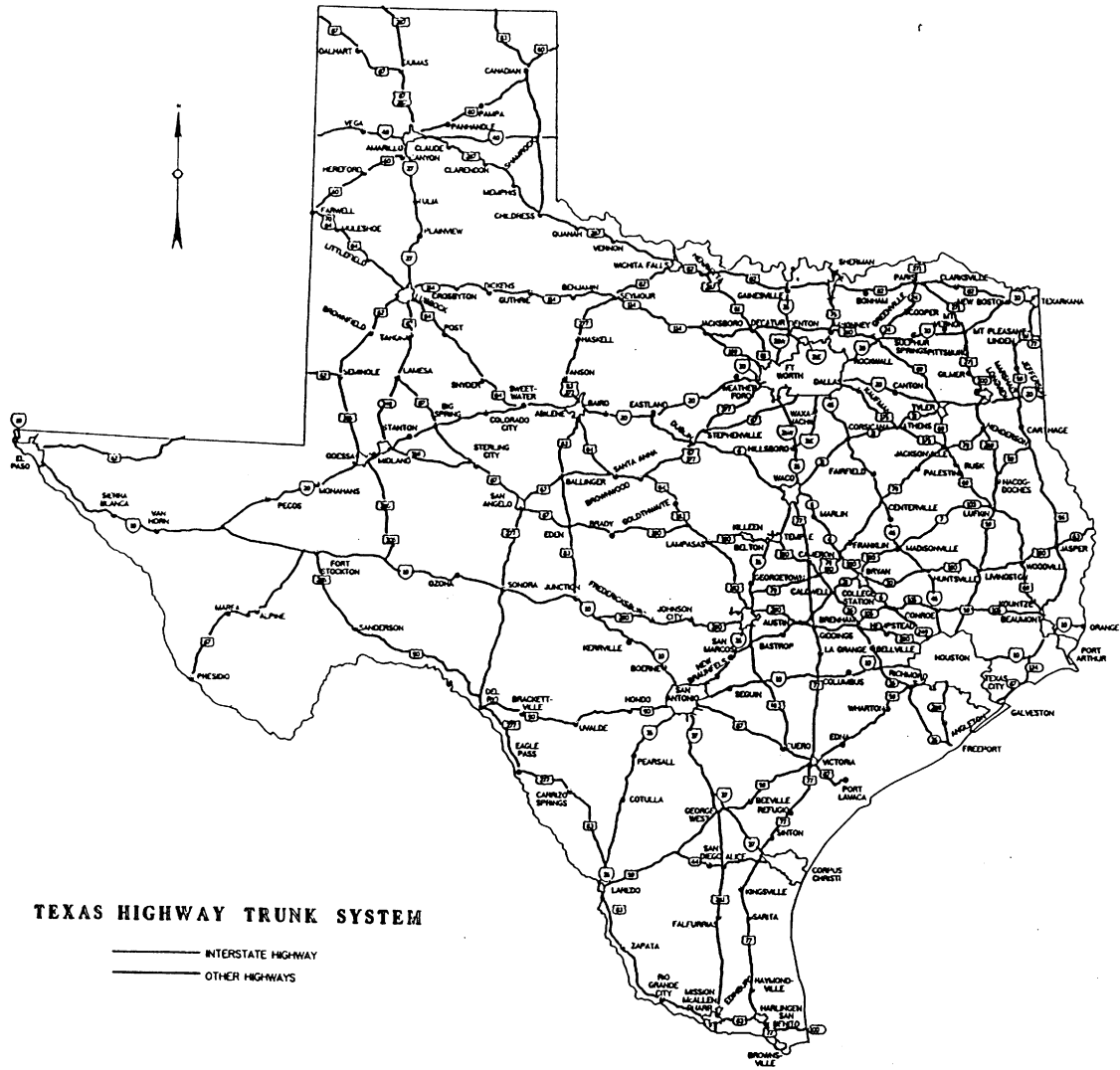


Figure 3. Texas Highway Trunk System.

(8)

In addition to the state-maintained roadway system, city, county, and township roads comprise important components of the rural transportation system. According to the Highway Performance Monitoring System (HPMS), there are some 141,000 miles of local roads in rural portions of the state (9).

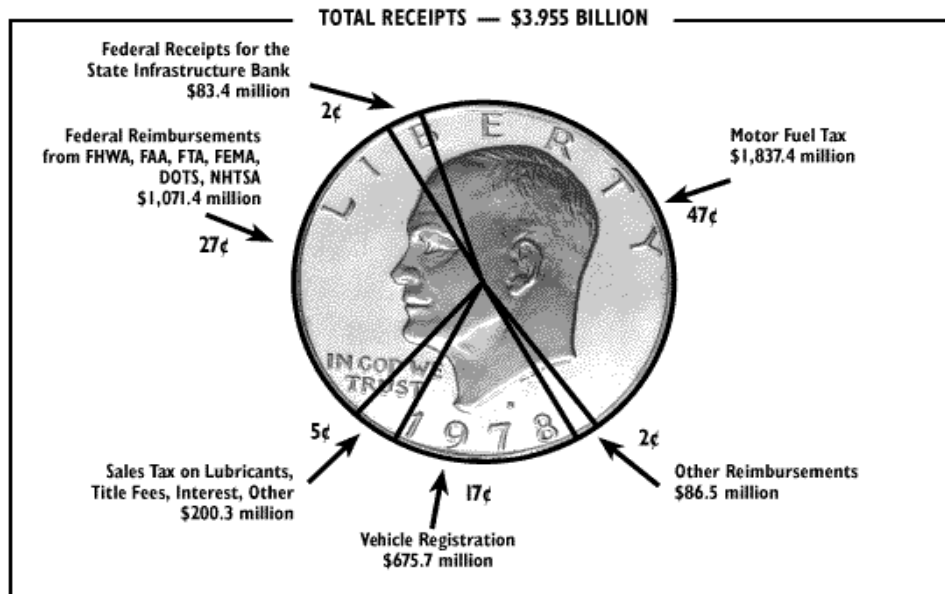
Funding for the state-maintained roadway system comes from a mix of federal and state sources. The Transportation Equity Act for the 21st Century (TEA-21) provides funding authorization for federal highway, highway safety, public transportation, and other surface transportation programs for the six-year period from 1998 through 2003. The policies and programs contained in TEA-21 continue those established in the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991.

The major program elements include the National Highway System, Interstate System/Interstate Maintenance, Surface Transportation Program, Bridge Replacement and Rehabilitation, and Federal Lands Program. Federal funding levels and state matching requirements vary among these programs. TEA-21 continues the flexible funding provisions of the ISTEA, allowing states to shift resources among programs to better respond to local needs. Other federal funding sources include federal receipts for the State Infrastructure Bank (SIB) and programs administered by other federal agencies.

As highlighted in Figure 4, state funding for the roadway system comes primarily from four sources. These sources are taxes on the sale of motor fuels; vehicle registration fees; sales tax on lubricants, title fees, interest, and other elements; and other reimbursements. Revenues from these sources provide the state match for the federal programs described previously. In addition, these funds are used to finance state-sponsored programs. These include the State Preventative Maintenance, State Farm-to-Market Road System Expansion, State Farm-to-Market Road Rehabilitation, State Park Roads, State Rehabilitation, and North American Free Trade Agreement (NAFTA) Discretionary Programs. All of these fully state funded programs are important to rural areas in Texas.

Rural Transit and Intercity Bus Services in Texas

Transit services in most rural areas in Texas and throughout the country did not emerge until the late 1960s and 1970s. Many of these systems were implemented to respond to the mobility needs of elderly and low income residents in rural areas, as well as individuals with special needs. The Older Americans Act of 1965 and the Office of Economic Opportunity's Community Action Program were the first federal funding sources for these types of services. The 1973 Federal-Aid Highway Act included a rural transportation demonstration program, and the 1978 Surface Transportation Assistance Act established the Section 18 program, providing capital and operating assistance for transit services in non-urbanized areas. The Texas Legislature established state funding to help support transit services in smaller communities and rural areas in 1975.



(10)

Figure 4. Distribution of Total TxDOT Receipts - Fiscal Year 1997.

The number of rural transit systems in Texas and the areas served by these operators have grown significantly over the past 25 years. By 1982, there were 10 rural systems receiving federal and state funds, and by 1986, there were 31 systems providing service in rural areas of Texas. In 1998, 41 rural transportation systems operated almost 1,000 vehicles and provided 4.3 million one-way passenger trips. In addition, 319 private non-profit agencies provide service to the elderly and individuals with special needs using vehicles purchased with federal and local funds (11, 12, 13, 14).

When most people think of public transportation, commuter rail, heavy rail, light rail transit (LRT), and fixed route buses in metropolitan areas usually come to mind. The types of services and vehicles operated in rural areas are much different from these images. In addition, the organizational structures, funding sources, and operating environments for rural transit services vary from those found in urban regions.

Texas has the largest rural service area of any state in the country. Currently, 41 transit systems provide services to rural areas and cities with populations under 50,000. The systems and service areas are illustrated in Figure 5 and identified in Table 3. Based on state legislation passed in 1995, rural transportation providers receiving funds from TxDOT were established as rural transit districts. The legislation further provides guidance for creating new districts and requires that no non-urbanized portion of a county can be excluded from a rural transit district.

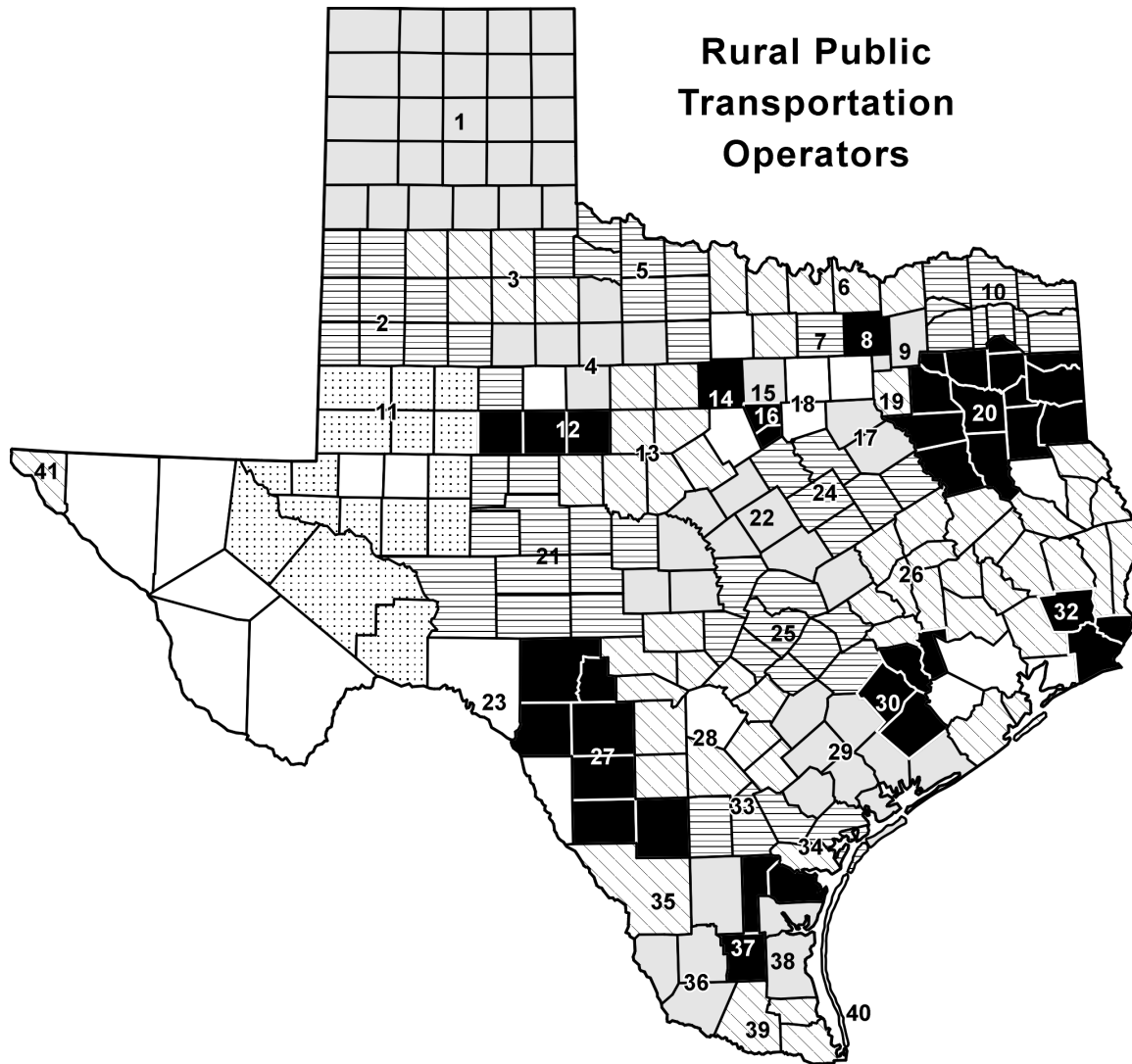


Figure 5. Rural Public Transit Operators in Texas.

(14)

Table 3. Rural Public Transit Systems in Texas.

Map Number*	Agency (System Name)
1	Panhandle Community Services, Inc. (Panhandle Transit)
2	South Plains Community Action Association, Inc. (SPARTAN)
3	Caprock Community Action Association, Inc. (CAP-TRANS)
4	Aspermont Small Business Development Center, Inc. (Double Mountain Coach)
5	Rolling Plains Management Corporation (Sharplines Public Transportation)
6	Texoma Area Paratransit System, Inc. (TAPS)
7	Services Program for Aging Needs in Denton County (SPAN)
8	Collin County Committee on Aging (CCART)
9	Hunt County Committee on Aging (The Connection)
10	Ark-Tex Council of Governments (TRAX)
11	West Texas Opportunities, Inc.
12	People for Progress (Stage Transit)
13	Central Texas Opportunities, Inc. (City and Rural Rides - CARR)
14	Palo Pinto County Transportation Council (Palo Pinto County Transit)
15	Parker County Transportation, Inc.
16	The Transit System, Inc.
17	Community Transit Services, Inc. (Corsicana)
18	City of Cleburne (CLETRAN)
19	Kaufman County Senior Citizens Services, Inc. (KART)
20	East Texas Council of Governments (TRAX)
21	Concho Valley Council of Governments (Thunderbird Transit)
22	Hill Country Community Action Association, Inc. (Hill County Transit)

Table 3. Rural Public Transit Systems - Continued.

Map Number*	Agency (System Name)
23	City of Del Rio (Southwest Transit)
24	Heart of Texas Council of Governments
25	Capital Area Rural Transportation System (CARTS)
26	Brazos Valley Community Action Agency (Brazos Transit System)
27	Community Council of Southwest Texas, Inc. (Southwest Transit)
28	Alamo Area Council of Governments (Alamo Coordinated Transit - ACT)
29	Golden Crescent Regional Planning Commission (R TRANSIT)
30	Colorado Valley Transit, Inc.
31	Gulf Coast Center (Connect Transportation)
32	Southeast Texas Regional Planning Commission (South East Texas Transit)
33	Bee Community Action Agency
34	San Patricio County Community Action Agency (SPARTS)
35	Laredo-Webb County Community Action Agency (El Aquila Rural Transportation)
36	Community Action Council of South Texas (Rainbow Lines)
37	Rural Economic Assistance League, Inc. (REAL)
38	Kleberg County Human Services (Paisano Express)
39	Lower Rio Grande Valley Development Council (Rio Transit)
40	Town of South Padre Island (The Wave)
41	County of El Paso

*Number corresponds to number on [Figure 5 \(14\)](#)

Rural transit districts and services are provided using a variety of organizational structures. Currently, rural transit systems in Texas are operated by towns, cities, counties, Councils of Government, Community Action Associations, and private and public nonprofit organizations. The agencies and service areas range from the Town of South Padre Island to 26 counties served by Panhandle Community Services, Inc. The various approaches build on the institutional strengths in each area.

The types of transit services operated in rural areas differ from those commonly found in metropolitan regions. Rural transit tends to be oriented toward demand-response services, with some regularly scheduled trips, rather than the fixed-route services common in urban areas. The services offered reflect the lower population densities, dispersed origins and destinations, and lower demand levels in rural areas. Four general operating strategies are frequently found with rural services in the state—demand-responsive, standing orders or semi-fixed route, fixed-route, and commuter routes.

In addition, other services such as group trips, shuttle services, and special requests may be provided. As an example, Parker County Transportation provides shuttle service on request to the Dallas/Fort Worth and Love Field airports and can accommodate group trips. Further, some rural transit agencies have implemented, or are in the process of initiating, access to jobs or welfare-to-work programs with grants from the Texas Workforce Commission or other groups. Examples of these efforts include the Alamo Area Council of Governments' *Voyage to Vocations*, the Ark-Tex Council of Governments' *Choices Program*, and the South Plains Community Action Association, Inc.'s (SPARTAN) *Job Routes*. These programs provide transportation and other services to individuals looking for jobs or to the newly employed.

The vehicles operated by rural transit providers also differ from those used by their urban and metropolitan counterparts. Rather than regular 40 foot buses, articulated buses, and various rail vehicles commonly found in major cities, rural transit services are provided using vans and minibuses. [Figure 6](#) illustrates a minibus operated by Thunderbird Transit. These vehicles are better matched to the lower passenger volumes and the operating environments found in rural areas. Many Texas rural transit systems operate in remote and isolated environments. The condition of local roadways and the long distances between areas place extra demands on both vehicles and operating personnel. Maintaining vans, minibuses, and buses is more difficult under these conditions, and vehicles often need to be replaced more frequently than those in urban areas.

The fare structures and fare levels vary greatly among the 41 rural operators in the state. Some charge a flat fare, while others use a distance-based fare. For example, Brazos Transit charges a flat fare of \$0.25 to \$0.50 for fixed-route service and \$1.00 for demand responsive service. On the other hand, fares on City and Rural Rides (CARR) operated by Central Texas Opportunities, Inc. are based on the distance traveled, starting at \$1.00 and increasing by \$1.00 for every five miles traveled ([14](#)).



Figure 6. Brazos Transit District Rural Bus.

In addition to these rural transit operators, federal funding is available through the Federal Transit Administration (FTA) Section 5310 Program for 80 percent of the capital costs of vehicles, radios, and computer equipment used by private non-profit organizations and some public transportation agencies providing services to the elderly and to individuals with special needs. Purchases of service and preventative maintenance recently became eligible expenses under this program. Previously called the Section 16(b)(2) Program, this category has been in existence since 1970. Funding is not available for operating expenses, however, and in Texas no additional state funds are provided. The 20 percent local match, as well as the ongoing operating expenses, must come from local sources. TxDOT is responsible for administering this program.

As of 1998, 319 private non-profit organizations and transit agencies in Texas were operating 1,335 vehicles purchased through the Section 5310 Program. A wide range of agencies and organizations have received vehicles through this program. These include social service agencies, community organizations, elderly care facilities, and other groups. These groups provide the elderly and individuals with special needs with access to day activity centers, schools, jobs, medical facilities, recreation opportunities, and personal business needs (13).

The Section 5310 Program has been successful at meeting the needs of a wide range of groups and organizations. [Figure 7](#) illustrates the counties that are headquarters to organizations with at least one Section 5310-funded vehicle. As can be seen, this program supports transportation needs in large urban regions, smaller communities, and rural areas. Currently, there are 57 counties without a Section 5310 vehicle. Most of these are rural counties. Approximately half are in the Panhandle and West Texas regions, although counties without any Section 5310 vehicles are found throughout the state.

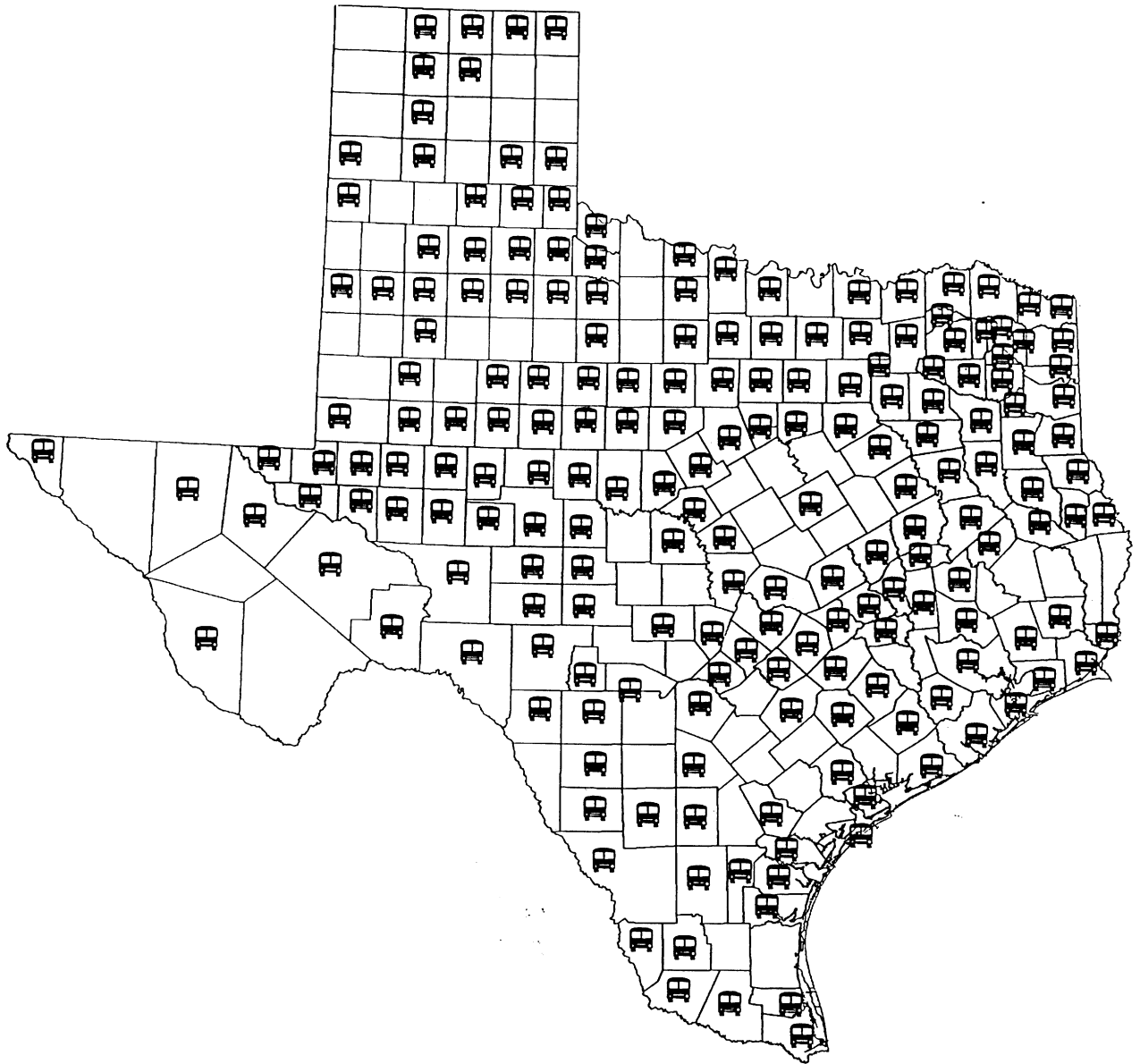


Figure 7. Counties with Section 5310 Vehicles.

(13)

Funding for the capital and operating needs of rural transit services in Texas comes from a mix of federal, state, and local sources. These sources include federal funds authorized through TEA-21 and obligated on an annual basis, state funds, and local sources. TxDOT acts as the administrator for federal funds and state funds.

Figure 8 illustrates the intercity bus routes operating in Texas. It is difficult to obtain exact information on all the intercity bus operators in the state. Intercity bus companies are required to register equipment and to file evidence of insurance with TxDOT, but they are not required to indicate the exact type of service—charter or fixed-route—or to file route maps or other service information. As of 1999, the following 11 intercity bus companies are listed by the Texas Bus Association and *Russell's Guide* as operating in the state (15, 16):

- All Aboard America (Odessa),
- Arrow Trailways of Texas (Killeen),
- Central Texas Trailways (Waco),
- Concho Coaches, Inc. (San Angelo),
- Greyhound Lines, Inc. (Dallas),
- Jefferson Lines, Inc. (National),
- Kerrville Bus Company, Inc. (San Antonio),
- Panhandle Trailways (Amarillo),
- Sun Set Stages, Inc. (Abilene),
- Texas, New Mexico & Oklahoma (T.N.M. & O.) Coaches, Inc. (Lubbock), and
- Valley Transit, Inc. (Harlingen).

In addition, a number of Mexico-based carriers operate in Texas. The exact number of Mexican companies currently providing service in the state is not known, although six carriers were operating service in Texas in the late 1980s (17).

Some intercity bus lines also operate rural transit service under contract to local agencies. Valley Transit, Inc. provides one example of this approach. Valley Transit, Inc. operates fixed route transit service in Hidalgo, Willacy, and Cameron Counties under contract to the Lower Rio Grande Valley Development Council.

The current intercity bus network covers much of the state, although there were 23 communities with populations over 5,000 that did not have intercity bus service in 1993. In 1999, scheduled intercity buses served approximately 424 locations in the state. The vast majority of these stops are in small communities and rural areas. Only about 60, or 14 percent, are in urban areas, with the remaining 364, or 86 percent, in small communities and rural areas (15, 17).

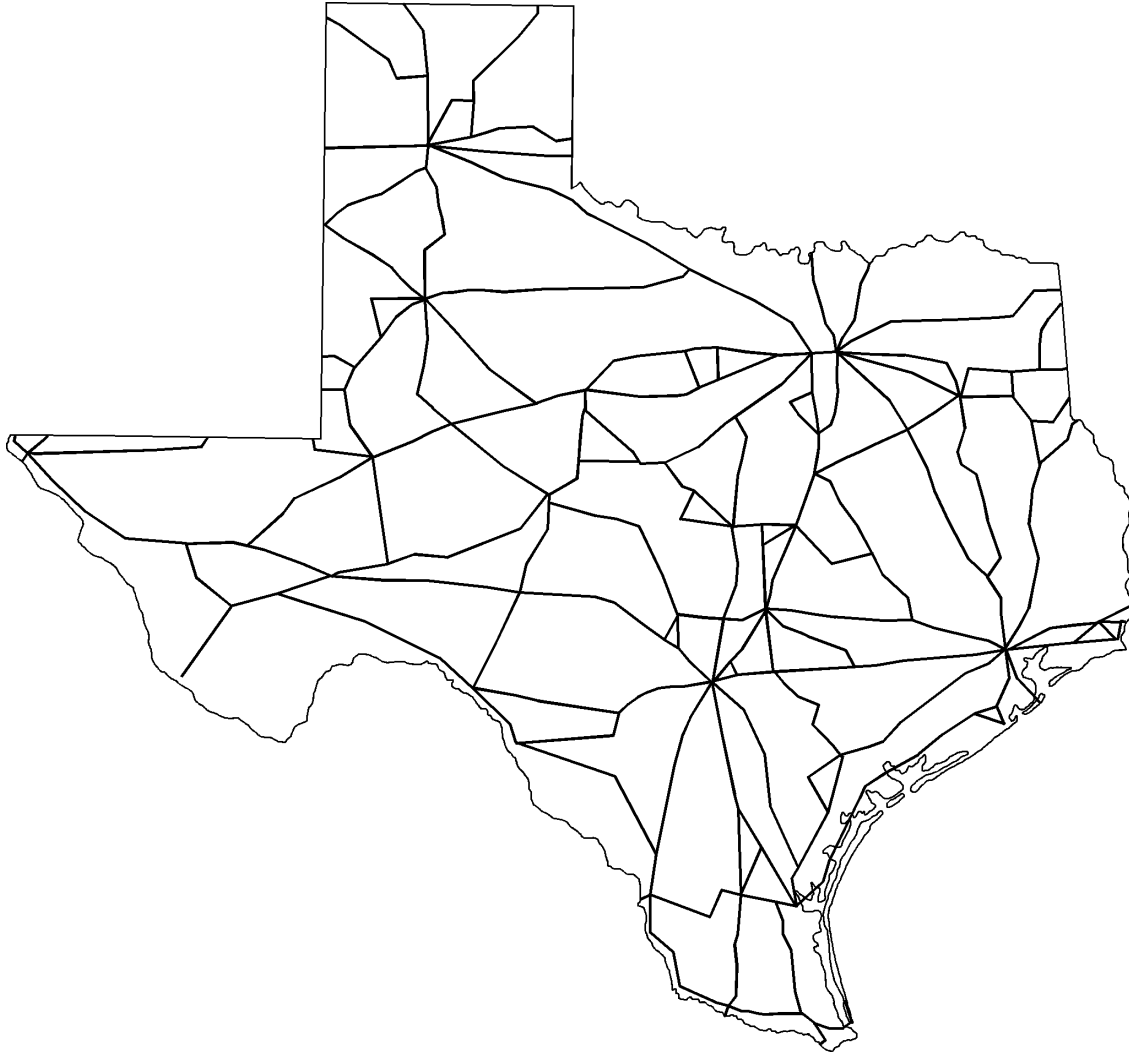


Figure 8. Intercity Bus Routes in Texas.

(16)

General Aviation System in Texas

Texas has the largest air transportation system in the continental U.S. The Texas Airport System Plan (TASP) uses four service levels to describe airports in Texas. These levels are primary and nonprimary commercial service airports, reliever airports, and general aviation airports. The characteristics associated with airports in each of these categories are summarized next (18).

Primary and Nonprimary Commercial Service Airports. Commercial service airports provide scheduled service by major, national, and regional airlines. Primary commercial service airports enplane at least 10,000 passengers annually, mostly by large and medium aircraft. Nonprimary commercial service airports enplane more than 2,500 but less than 10,000 annual passengers, mostly by medium and small aircraft. There are 27 primary commercial airports in the state. No airports currently fit into the nonprimary category. In addition, the airport in Brownwood has scheduled commercial air service but fewer than 2,500 annual enplanements. All of the commercial service airports also provide access to business jets and commercial jet transport aircraft. Although located in the state's major urban areas, commercial airports serve travelers with origins and destinations in rural parts of the state and transport goods to and from rural areas.

Reliever Airports. As the name implies, reliever airports provide general aviation users with alternatives to commercial service airports in major metropolitan areas. As a result, reliever airports help increase the capacity of commercial service airports. There are 23 reliever airports in the TASP: three in Austin, 11 in the Dallas-Fort Worth Metroplex, eight in Houston, and one in San Antonio.

General Aviation Airports. The term general aviation refers to all air travel that is not scheduled commercial service or military flying. There are 250 general aviation airports listed in the TASP. Three categories—transport, general utility, and basic utility—are used to further subdivide general aviation airports. Transport airports have moderate to high levels of business turboprop and turbojet service. General utility airports are smaller facilities accommodating single and light twin piston-engined aircraft. Basic utility airports are located within the service area of a commercial service, reliever, general aviation transport, or general utility airport and have relatively low use.

The 250 general aviation airports included in the TASP account for 83 percent of all the public airports in Texas. These facilities serve business travel, agricultural uses, medical needs, flight instruction, recreational flying, and tourist travel in small communities and rural areas throughout the state. The basic characteristics of the state's general aviation airports are summarized in this section.

The counties that are home to the 57 transport general aviation airports are illustrated in [Figure 9](#). Transport airports are located in areas with population levels and economic activities high enough to support at least moderate business jet traffic and/or provide additional airport capacity near metropolitan areas. Transport airports are designed and operated to serve turboprop and turbojet business aircraft. A benchmark of at least 500 annual business jet operations is typically associated with transport airports. Other common measures for transport airports are a service area population of at least 10,000 and a local economy generating \$100 million or more.

[Figure 10](#) highlights an example of a general utility airport in the state, and [Figure 11](#) illustrates the locations of the 126 general utility airports in Texas. These airports serve smaller community and rural areas, accommodating single engine and light twin piston-engine aircraft. General utility airports support agricultural, mineral, and other businesses, as well as recreational travel and local flight schools.

Basic utility airports are located within a half-hour drive of commercial, reliever, transport, or general utility airports, and/or support essential but low level air activity. The locations of the 67 basic utility airports in the state are shown in [Figure 12](#). These facilities provide alternatives for clear weather flying and flight training in areas with other large airports.

The vast majority of general aviation airports in the state are owned and operated by local governments. Cities or counties are responsible for 242 of the 250 general aviation airports in Texas. Five general utility airports, two basic utility airports, and one transport airport are in private ownership.

The number of enplanements at all airports in Texas increased significantly during the 1980s and 1990s. In 1980, there were approximately 26 million enplanements in the state. This figure had increased to almost 50 million by 1990 and has continued to grow in the 1990s. Greater fluctuation has been seen in general aviation in the state, partially reflecting general economic trends. The economic recessions in the 1980s saw a corresponding decline in general aviation activity ([18](#), [19](#)).

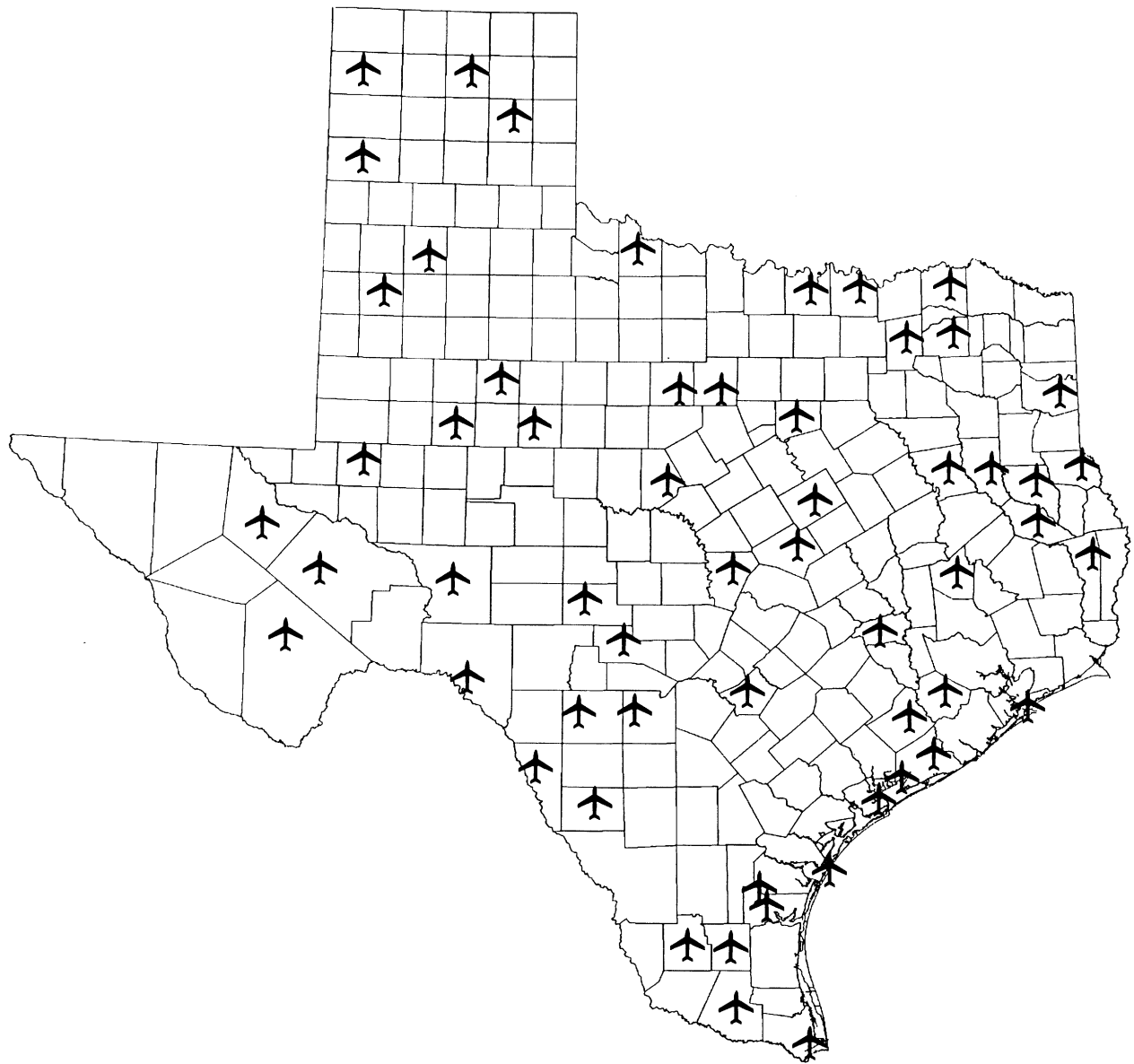


Figure 9. Transport Airports in Texas.

(18)



Figure 10. Example of General Utility Airport in Texas.

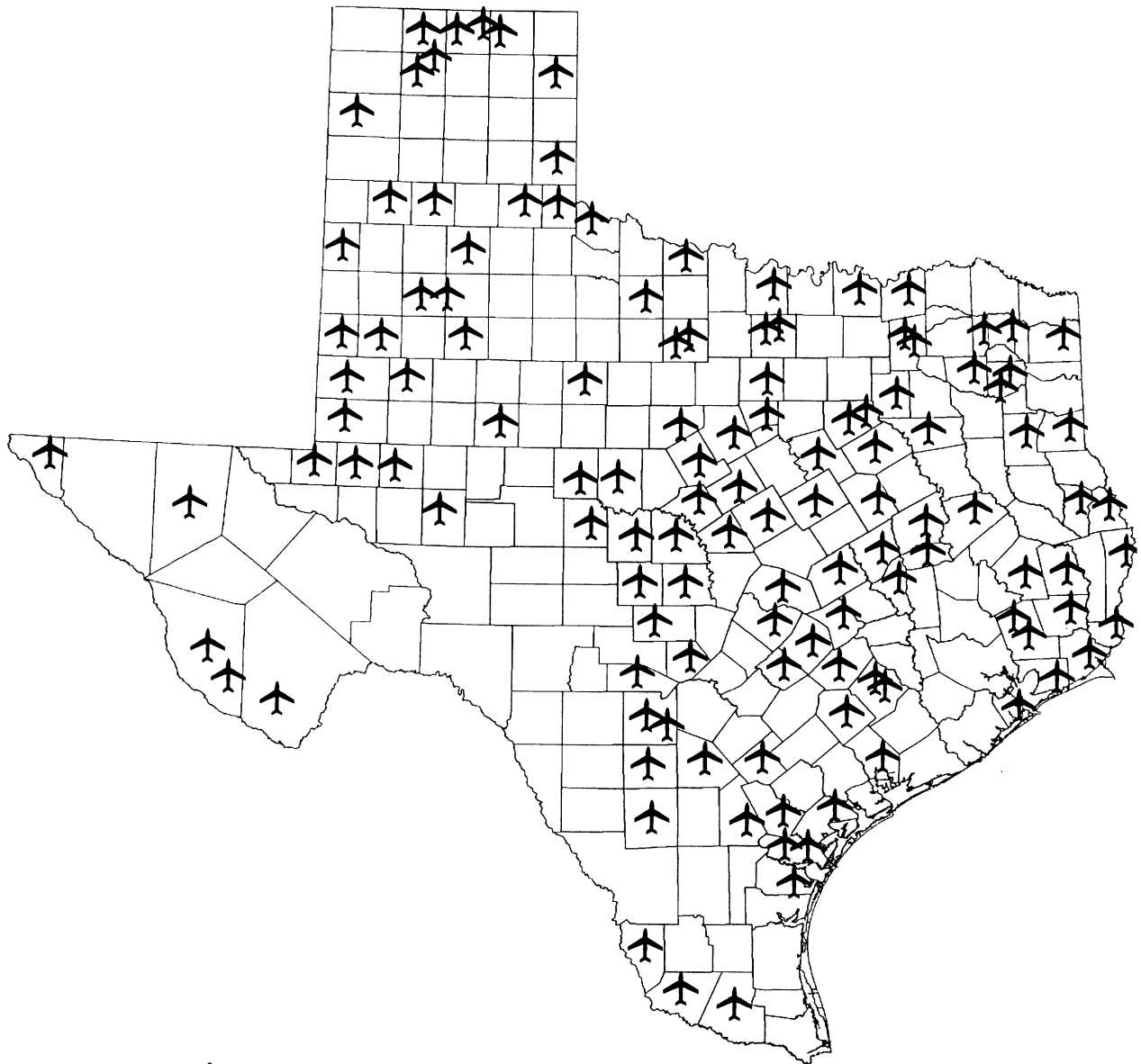


Figure 11. General Utility Airports in Texas.

(18)

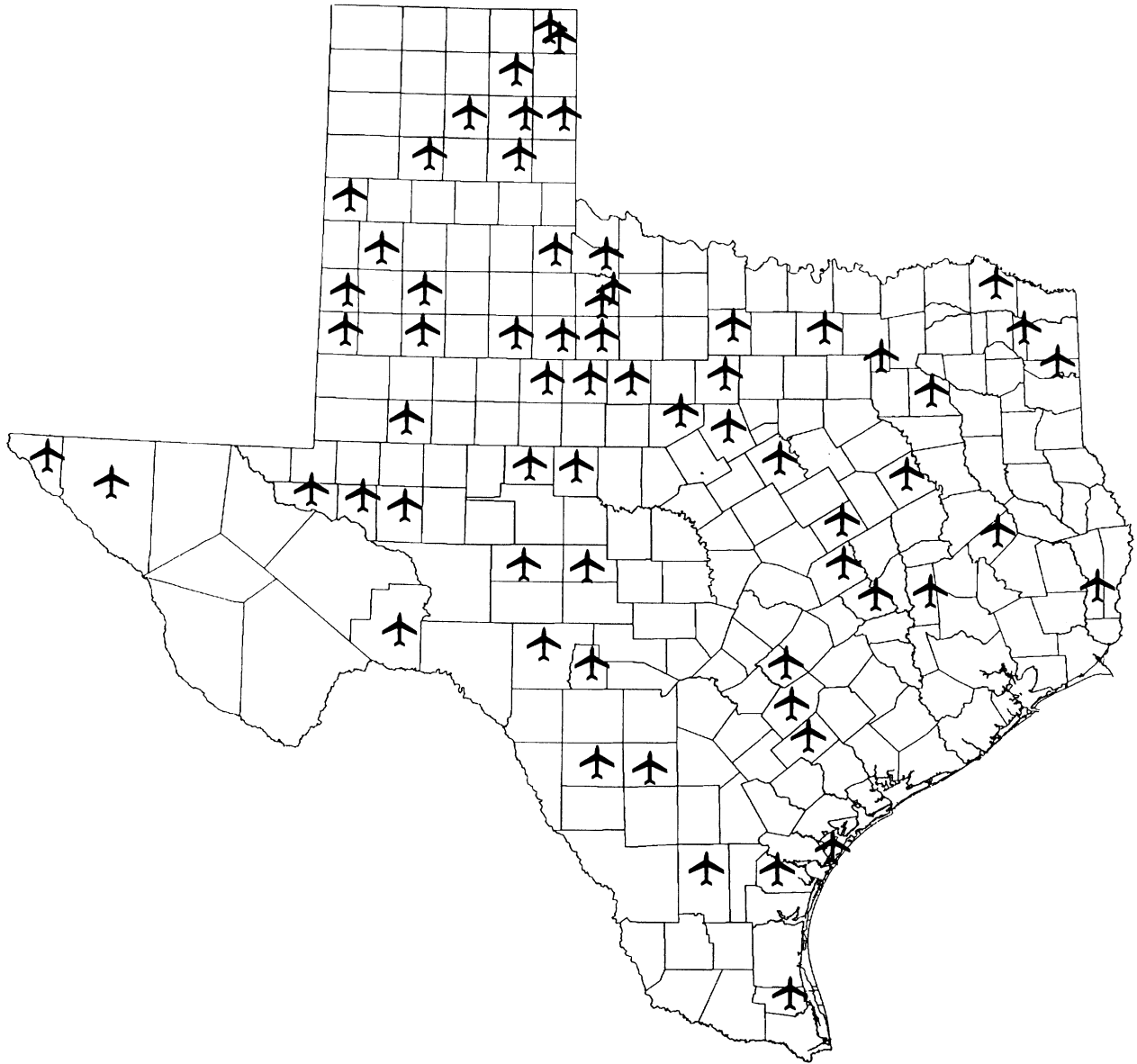


Figure 12. Basic Utility Airports in Texas.

(18)

Funding for developing, operating, maintaining, and upgrading general aviation airports comes from a mix of federal, state, and local sources. At the federal level, the Airport and Airway Development Act of 1970 created the Aviation and Airways Trust Fund. Aviation user fees support the Trust Fund, and improvements to airports and the airway system are financed through the fund. Taxes on passenger tickets, taxes on waybills, international departure fees, and aviation fuel taxes comprise the user fee revenues allocated to the Trust Fund.

The 1982 Airport and Airway Improvement Act established the Airport Improvement Program (AIP) to fund aviation needs throughout the country. The AIP provides grants to eligible airports through the FAA for various types of projects. An airport must be included in the National Plan of Integrated Airport Systems (NPIAS) to be eligible for AIP funds. All of the Texas primary commercial, reliever, and transport general aviation airports are included in the NPIAS and are eligible for AIP grants. Only 100 of the 126 general utility airports and 10 of the 67 basic utility airports in the state are included in the NPIAS. Being included in the NPIAS does not guarantee that an airport will receive AIP funds. From 1971 to 1992, two-thirds of the eligible general airports in the state received AIP grants, leaving one-third that did not receive grants. The amount of AIP funding available each year is determined by federal appropriations and FAA priorities.

Primary commercial airports receive the majority of AIP funds on both a national and state basis. For example, 68 percent of 1991 AIP funds allocated on a national basis and 64 percent of the grants to Texas went to primary commercial airports. Within Texas, reliever airports accounted for 20 percent of the available funds, and general aviation airports received 16 percent. These percentages equated to approximately \$60.8 million to primary commercial airports in the state, \$18.8 million for reliever airports, and \$14.6 million to general aviation airports.

Currently, the small amount of state funding designated for airports is appropriated by the Legislature on a biannual basis from the Highway Fund. Texas and Connecticut are the only two states in the country that do not receive some aviation funding from state sales and excise taxes on aviation fuels. Currently, 29 states dedicate all or part of their aviation fuel tax revenues toward airport needs, and 36 states have dedicated funding for aviation.

As the owners and operators of the vast majority of airports in Texas, local governments play an important role in funding needed improvements, as well as ongoing maintenance and operation. Commercial service airports generate revenues from airline user fees, terminal concessions, parking fees, property leases, and other programs. Revenues from these sources are used to match federal programs, to fund specific projects, and to back the issuance of revenue bonds for major improvements.

General aviation airports do not have the same revenue generation capabilities and opportunities as commercial service airports. The limited revenues generated by these airports

usually go to support ongoing operations and maintenance. City or county general funds or general obligation bonds are frequently used to match federal and state programs.

Rural Railroad System in Texas

Rail services in Texas can be divided into the two broad categories of freight railroads and passenger trains. The Surface Transportation Board (STB) and its predecessor agency, the Interstate Commerce Commission (ICC) apply three categories— Class I or large railroads, Class II or small railroads, and Class III or short line railroads—to classify freight lines based on annual operating revenues. The Association of American Railroads (AAR) currently uses the four categories of Class I Railroads, Regional Railroads, Local Railroads, and Switching and Terminal Railroads to classify rail systems.

[Table 4](#) highlights the number of railroads and miles of track in the state based on the three categories used by the STB. Information from both the TRC and AAR was used to compile the list in [Table 5 \(20, 21\)](#). [Figure 13](#) illustrates the railroad lines in the state. [Table 5](#) lists the individual railroads and the corresponding track mileage for each within these categories, with the Class III lines subdivided by local railroads and switching and terminal railroads.

Class I Railroads. Class I railroads are classified as having annual revenues of at least \$250 million for three consecutive years. The three Class I railroads currently operating in Texas are the Burlington Northern and Santa Fe Railway Company (BNSF), the Kansas City Southern Railway Company (KCS), and the Union Pacific Railroad Company (UP). [Figure 13](#) highlights the track systems operated by these railroads, which primarily serve major metropolitan areas, ports, and other key industrial and commercial locations. UP is the largest railroad in the state with some 6,339 miles of track, followed by BNSF with 4,689, and KCS with 381. Combined, the three railroads operate a total of 11,409 miles of track in the state. These railroads impact rural parts of the state through stops in some areas, links with Class II and Class III railroads, and the movement of commodities by truck to major rail terminals.

Class II Railroads. Class II railroads are usually characterized as having annual operating revenues of \$20 million to \$250 million. The Texas Mexican (Tex Mex) Railway and the South Orient Railroad Company, Inc. are both listed as Class II railroads. The South Orient has recently cut back service, however.

Class III Railroads. Class III railroads have annual system operating revenues of less than \$20 million for three consecutive years. Class III railroads include the subcategories of local railroads and switching and terminal railroads. There are 42 Class III railroads in the state, operating approximately 1,515 miles of track. These companies range in size from the Longhorn Railway Company, which operates 162 miles of track, to the Western

Railroad Company with one mile of line. These railroads are oriented toward rural parts of the state and provide links to Class I railroads.

The rail network in the state is further supported by truck and port intermodal facilities. Major truck/rail connections are located in Amarillo, Dallas/Fort Worth, El Paso, Harlingen, Houston, Laredo, Marshall, and San Antonio. Rail/port connections are located in Beaumont, Brownsville, Corpus Christi, Freeport, Galveston, Houston, Port Lavaca, Orange, and Port Arthur (22).

Table 4. Classification of Freight Railroads in Texas.

	Number of Freight Railroads	Miles of Railroad	
		Excluding Trackage Rights	Including Trackage Rights
Class I	3	8,765	11,409
Class II	2	711	1,098
Class III	42	1,427	1,515
(20, 21)	47	10,903	14,022

Table 5. Freight Railroads Operating in Texas.

Type	Name	Miles of Track¹
Class I Railroads	Burlington Northern and Santa Fe Railway Company	4,689
	Kansas City Southern Railway Company	381
	Union Pacific and Southern Pacific Railroad Company	6,339
Class II Railroads	Texas Mexican Railway	544
	South Orient Railroad Company, Ltd	554
Class III Railroads Local Railroads	Angelina & Neches River Railroad	15
	Blacklands Railroad	30
	Border Pacific Railroad	32
	Georgetown Railroad	30
	Gulf, Colorado & San Saba Railway	68
	Kiamichi Railroad Company, L.L.C.	13
	The Longhorn Railway Company	162
	Panhandle Northern Railroad	31
	Pecos Valley Southern Railway	34
	Point Comfort & Northern Railway	16
	Rockdale, Sandow & Southern Railroad	10
	Sabine River & Northern Railroad	40
	South Plains Lamesa Railroad, Ltd.	55
	Texas & New Mexico Railroad	34
	Texas & Northern Railway Company	8
	Texas North Western Railway	43
	Timber Rock Railroad, Inc.	44
West Texas & Lubbock Railroad Company	104	
Western Rail Road Company	1	

Table 5. Freight Railroads Operating in Texas - Continued.

Type	Name	Miles of Track ¹
Switching & Terminal Railroads	Alamo Gulf Coast Railroad Company	10
	Brownsville & Rio Grande Intl. Railroad	41
	CMC Railroad, Inc.	5
	Corpus Christi Terminal Railroad, Inc.	23
	Dallas, Garland & Northeastern Railroad	98
	East Texas Central Railroad	38
	Fort Worth & Western Railroad Company	41
	Galveston Railway, L.P.	43
	Houston Belt & Terminal Railway	54
	Moscow, Camden & San Augustine Railroad	7
	Orange Port Terminal Railway	1
	Port Terminal Railroad Assoc.	37
	Rio Valley Switching Company	78
	South Plains Switching Ltd. Company	5
	Southern Switching Company	15
	Southwestern RR Company, Texas Division	76
	Texas City Terminal Railway	5
	Texas Northeastern Railroad	117
	Texas South-Eastern Railroad	12
	Texas Transportation Company	1
Texas, Gonzales & Northern Railway Company	12	
Texas Rock Crusher Railway Company	6	
Wichita, Tillman & Jackson Railway Company	20	

¹ Includes trackage rights.

(20, 21)

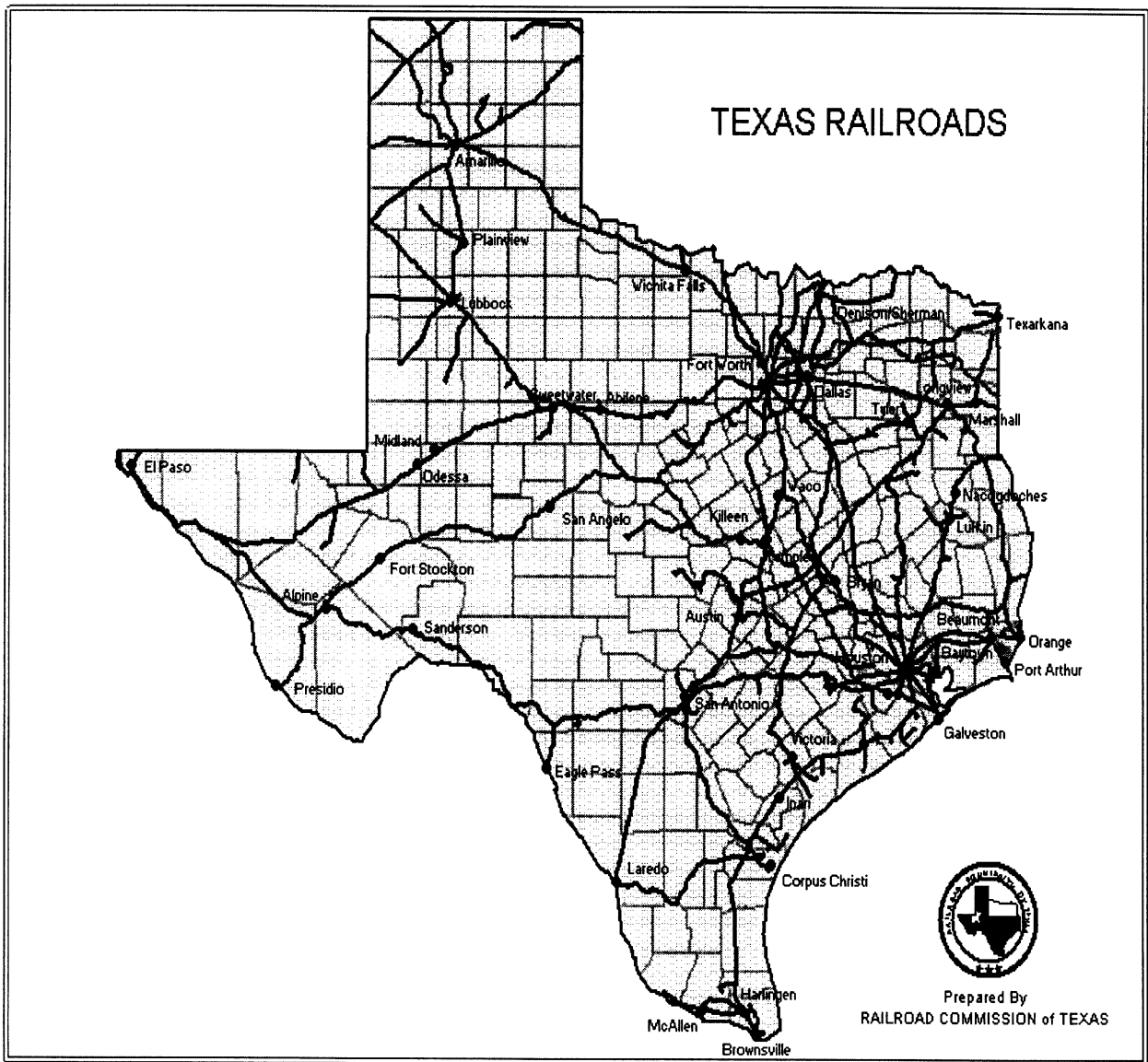


Figure 13. Railroads in Texas.

(21)

State legislation passed in 1981 and amended in 1997 allows for the creation of Rural Rail Transportation Districts (RRTD) by a single county or multiple counties acting together. The initial legislation was adopted in response to concerns over the negative economic impacts of railroad abandonments in rural portions of the state. The laws authorized one or more eligible counties to form a district. To be eligible, a rail line within the counties must have been abandoned or be in the process of being abandoned through a bankruptcy court or STB proceeding. Counties with any rail line carrying three million gross tons per mile per year or less were also eligible.

A district may be established based on approval of the commissioners' court in the county or counties. The legislation grants RRTDs relatively broad powers to purchase existing railroads, to develop new rail systems, and to finance, maintain, and operate these services. Districts may acquire needed property through eminent domain, may enter into agreements with other public and private entities, and may perform a variety of other functions. A board appointed by the county commissioners is responsible for overseeing the activities of the district.

As of July 1999, 11 RRTDs had been established in the state. [Table 6](#) highlights the name and county or counties included in each of the districts, and [Figure 14](#) illustrates the location of these districts. A telephone survey was conducted to obtain current information on the status of RRTDs in the state. Researchers were able to reach representatives at eight of the 11 districts by telephone and discussed past actions, current activities, and anticipated future efforts. The following summarizes the results from the telephone survey and recent information from the Texas Railroad Commission ([21](#)).

Three RRTDs — Centex, Northeast Texas, and South Orient — have purchased rail lines. In all three cases, the track is leased to shortline railroads. Thus, three RRTDs have been able to maintain rail service that would otherwise have been abandoned. Ellis County RRTD is assisting with the development of an industrial park served by a shortline railroad with connections to UP and BNSF lines. Other districts continue to monitor the status of railroads in their areas and may purchase any that are abandoned. The development of new rail lines is also being considered by a few districts.

Table 6. Rural Rail Transportation Districts in Texas.

Name of District	Counties Included in District
Centex Rural Rail Transportation District	Brown, Commanche, Erath, Hood, and Johnson
Deep East Texas Rural Rail District	Angelina, Houston, Jasper, Nacogdoches, Newton, Polk, Sabine, San Augustine, San Jacinto, Shelby, Trinity, and Tyler
Ellis County Rural Rail Transportation District	Ellis
Gulf Coast Rural Rail Transportation District	Jackson and Wharton
Gulf Link Rail District	Brazoria and Fort Bend
North Central Rural Rail District	Collin and Grayson
North Texas Rural Rail Transportation District	Archer and Wichita
Northeast Texas Rural Rail District	Hunt, Hopkins, Franklin, and Titus
Northwest Texas Rural Rail Authority	Hardeman, Foard, Knox, Fisher, Stonewall, Haskell, and Jones
South Texas Rural Rail Transportation District	Bexar, Karnes, and Wilson
South Orient Rural Rail Transportation District	Brewster, Coleman, Crane, Crockett, Irion, Pecos, Presidio, Reagan, Runnels, Tom Green, and Upton

(21)

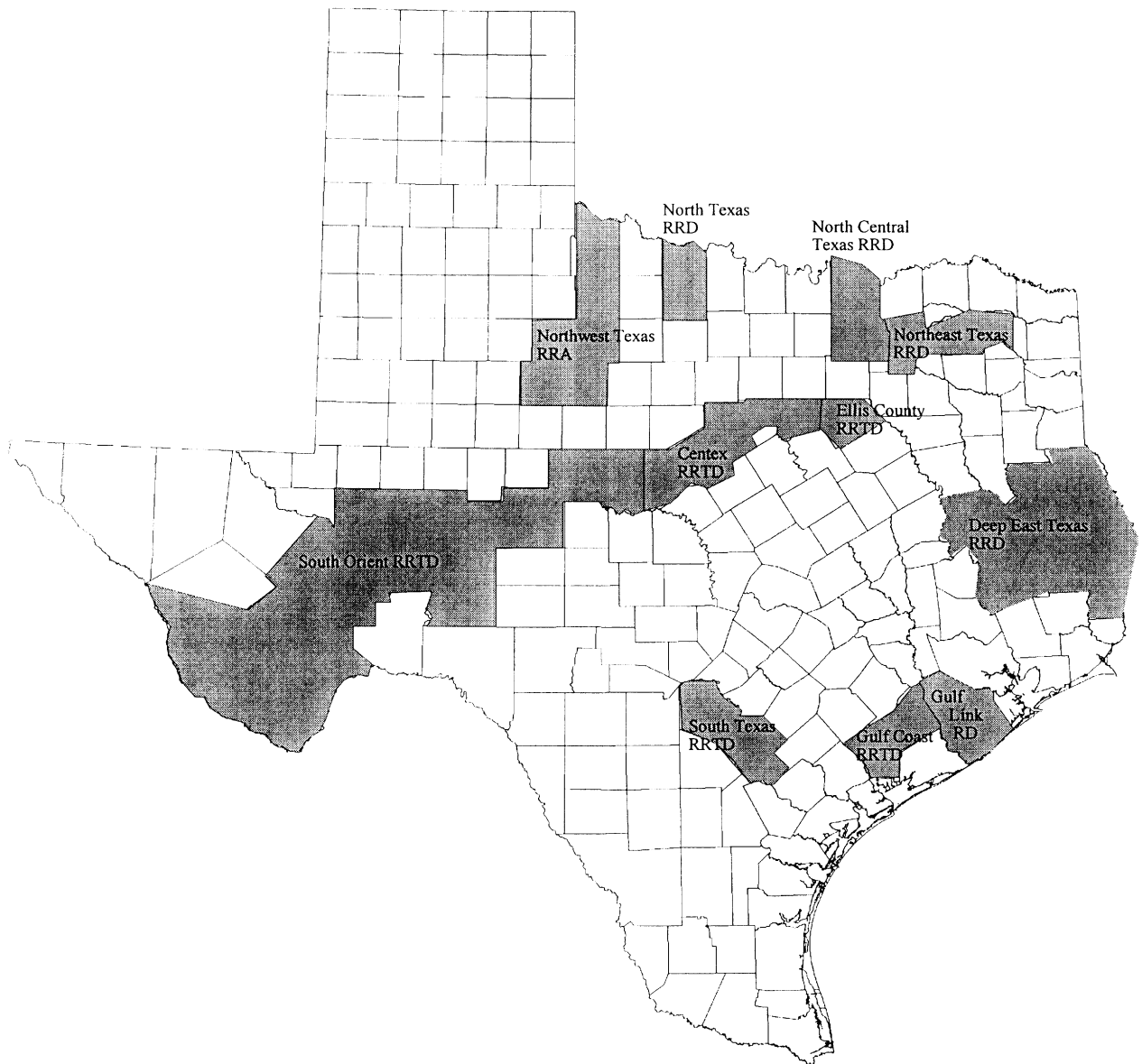


Figure 14. Rural Rail Transportation Districts.

(21)

In addition to these RRTDs, at least one other district was formed and disbanded. The South Plains RRTD was formed in the late 1980s by eight counties in the Lubbock area. This RRTD was established to address possible rail abandonments in the region. The district examined options for purchasing and operating railroads in the eight counties but disbanded after some of the lines were purchased by shortline railroads.

AMTRAK operates rail passenger service in the state. AMTRAK service in Texas has changed over the years. During the 1970s through the early 1990s, three routes were operated in the state. Rail service between San Antonio and Laredo was stopped in the 1980s, and service between Dallas/Fort Worth and Houston was discontinued in the 1990s. Motor coach connections are now provided to Houston and Laredo. A new route between Fort Worth and Oklahoma City was started in 1999. As highlighted in [Figure 15](#), three AMTRAK lines—Texas Eagle, the Sunset Limited, and the Heartland Flyer—currently serve portions of the state (23).

AMTRAK's Texas Eagle provides service from Chicago to Los Angeles via St. Louis, Little Rock, Dallas, San Antonio, El Paso, and Tucson. Four trains a week operate in both directions. Service through Texas to Los Angeles operates on Wednesday, Friday, Saturday, and Sunday; trains from Los Angeles to Chicago are available on Tuesday, Wednesday, Thursday, and Sunday.

The Texas Eagle makes 16 stops in the state in addition to Texarkana. These stops include Marshall, Longview, Mineola, Dallas, Fort Worth, Cleburne, McGregor, Temple, Taylor, Austin, San Marcos, San Antonio, Del Rio, Sanderson, Alpine, and El Paso. In addition, thruway motorcoach connections are provided to Houston, Laredo, and Brownsville. Motorcoach links are operated from Bossier City, Louisiana, through Shreveport, Longview, and Nacogdoches to Houston; from San Antonio to Laredo; and from San Antonio through Alice and McAllen to Brownsville.

The Sunset Limited provides service between Los Angeles and Orlando. Three trips a week are provided in each direction. The Sunset Limited makes stops in Beaumont, Houston, San Antonio, Del Rio, Sanderson, Alpine, and El Paso. Motor coach connections are provided from Houston to Dallas and from San Antonio to Laredo.

Initiated in 1999, the Heartland Flyer links Oklahoma City and Fort Worth, with connecting service to Chicago and Los Angeles. Trains operate daily in both directions. In addition to Fort Worth, trains also stop in Gainesville on the almost five-hour trip.

In addition to AMTRAK, there are three excursion trains operating in Texas. These are the Tarantula Railroad in the Fort Worth area, the Texas State Railroad State Historical Park in Anderson and Cherokee Counties, and the Austin and Central Texas Railroad. These trains are oriented toward visitors and tourists, and are important elements of the local economy. The two historical railroads in rural areas are briefly described here. The Tarantula Railroad, which operates from Grapevine to the historical stockyard area of Fort Worth, is not included.

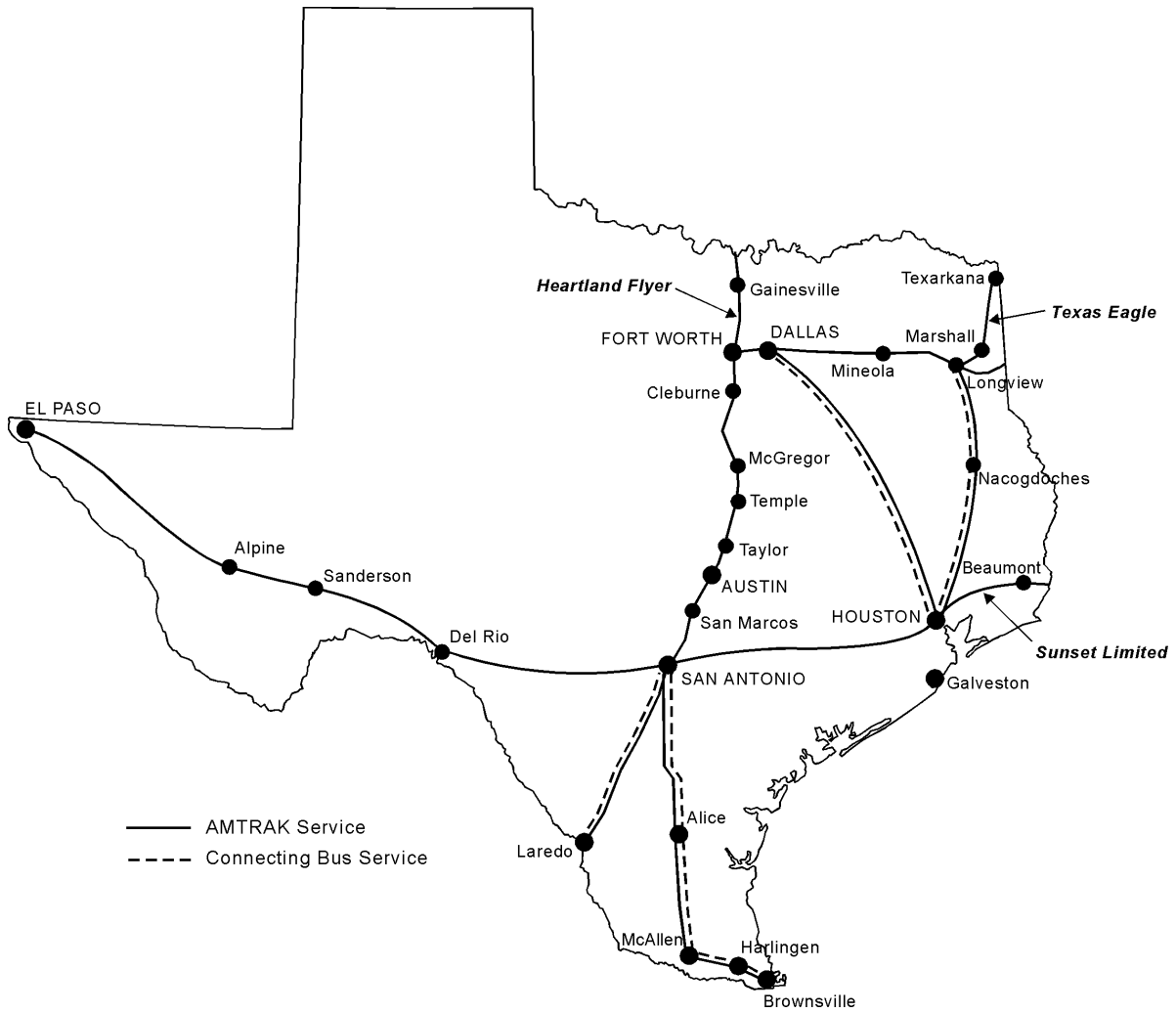


Figure 15. AMTRAK Services in Texas.

(23)

The 500 acre Texas State Railroad State Historical Park is located between Palestine and Rusk. The Texas State Railroad was acquired through state legislation in 1971. The railroad was restored by the Texas Parks and Wildlife Department, with assistance from the Texas Department of Corrections, and opened to the public in 1976. [Figure 16](#) illustrates the locomotive operated by the Texas State Railroad. Today, the Texas State Railroad is comprised of four steam engines, four antique diesel locomotives, 25 miles of track, 24 bridges, two train stations, and a steam engine restoration shop. Trains operate between the train stations in Rusk and Palestine ([24](#)).



Figure 16. Texas State Railroad.
Photo Credit – Bill Reaves, TxDOT

In 1985, the city of Austin acquired 163 miles of track being abandoned by the Southern Pacific. The line runs from Giddings through Elgin and Manor to Austin and then west to Burnet, Llano, and Marble Falls. The city purchased the rail line primarily to preserve it for potential future mass transportation use. To help further this objective, the city sold the line to the Capital Metropolitan Transit Authority (Capital Metro) in 1997.

The line is currently being used for both freight and passenger service. After the city purchased the line, freight service was initially operated by RailTex, Inc., under the Austin & Northwestern Railroad name. In 1996, Longhorn Railway took over operation. The volume of freight has increased since this change.

The Austin Steam Train Association (ASTA), a community-based, non-profit group established in 1989, operates the Hill Country Flyer Weekend Excursion train on the 33-mile Cedar Park to Burnet route. The ASTA also operates the Twilight Flyer, an occasional Saturday evening train, and a train in downtown Austin called the River City Flyer.

Service is provided using a restored 1916 Southern Pacific steam locomotive and renovated period passenger cars. Restoration of the locomotive and cars was accomplished through the voluntary efforts of ASTA, with supervision from a professional firm. The ongoing operation of the excursion trains is also a voluntary effort.

The Hill Country Flyer and other excursion trains currently attract some 22,000 passengers a year. The steam train has enhanced the economy of Burnet, where a depot, yard trackage, and other facilities have been provided. Passengers making the trip also visit local businesses before returning to Cedar Park (25).

CHAPTER FOUR—ASSESSMENT

Economic Impact of Rural Transportation Network

The multimodal transportation system in Texas contributes to the mobility of residents in rural areas and to the economic health and vitality of these regions. The benefits from a sound rural transportation system are highlighted in this section. Examples of the direct, indirect, induced, and community benefits are summarized.

The direct benefits include employment related to the various modes. In 1997, rural transit operators in the state employed approximately 1,220 workers. This number includes 770 full-time employees, 50 part-time workers, and 155 volunteers (14). Approximately 16,000 individuals in the state were employed by the freight rail companies in 1997, accounting for \$800 million in total wages. In addition, some \$400 million in retirement benefits were paid to the 38,800 retired railroad employees residing in the state (20).

It is estimated that general aviation airports are responsible for creating between 5,350 and 7,000 jobs on a statewide basis. This employment generates an annual payroll of some \$166 million to \$218 million. Further, the statewide impact from the sale of general aviation products and services is estimated to be in the range of \$1.4 billion to \$1.8 billion a year (26). Business access to general aviation airports continues to grow in importance to both corporations and local communities.

A good roadway system is critical for maintaining the economic viability of rural portions of the state. Adequate and well-maintained roadways are important to support the wide range of rural economic activities—from transporting agricultural products, manufactured goods, and other commodities to moving residents, visitors, tourists, and business travelers.

The presence of four-lane roadways connecting to the 36 economic development centers in Texas was identified as an important factor in a recent study examining techniques to promote economic diversification in the state. Currently, 30 of these 36 centers are served by four-lane divided highways. TxDOT's Phase I Trunk Corridor program, which has been adopted by the Commission, should provide four-lane access to all 36 economic development centers by 2010 (27).

Rural transit services in the state provide individuals with access to jobs, education, medical needs, shopping, recreation, and other activities. In providing these services, transit operators help maintain the economic health and vitality of small communities and rural areas. Some rural transit agencies have initiated new programs to help individuals obtain and/or retain jobs with funding from the Texas Workforce Commission's Local Innovations/Job Retention and Reemployment Grants.

Although it is difficult to place specific dollar values on many of these elements, El Aquila Rural Transportation provides one example of the benefits of rural transit services in the state. El Aquila operates fixed-route and demand responsive transit services in Webb County and the town of Encinal in LaSalle County, which have some of the lowest per capita income levels in the state. Providing low income residents with transportation to jobs is one of the major economic benefits realized by El Aquila. Estimates indicate that at least 150 individuals are able to access jobs due to the service, contributing some \$17 million in wages to the local economy (28).

General aviation airports in Texas support a wide range of economic activities. Rural airports play important roles in agriculture, oil exploration and production, mining, and fishing. Corporations use general aviation airports for business travel. Rural airports provide critical links for medical emergencies. General aviation airports also support tourist travel and recreational flying. Finally, airport employees, construction activities, and revenues generated from various functions add to local economies. There are numerous examples of the economic benefits of general aviation airports in the state.

The Fayette Regional Air Center is used daily by employees of J Bar B Foods, International Muffler Company, and Double B Foods. Lengthening the runway at the Palestine Municipal Airport helped attract two major Walmart Distribution Centers to the area, as well as a fiberglass manufacturing firm and a beef processing facility. Brownwood Municipal Airport serves employees and clients of the 3M and Kohler companies, is home to two Federal Express planes and eight employees, is served by Lone Star Airlines, and provides fuel for helicopters based at Fort Hood. At least 10 of the major corporations in the Plainview area all have planes at the Plainview/Hale County Airport. It is estimated that the presence of the airport contributes \$10 million annually to the local economy. What started as a small one person business at Garner Field in Uvalde is now Sierra Industries, a company that refurbishes aircraft. The airport was also a key factor in attracting South Star Interiors and Jim Miller Aircraft Painting. In 1980, two people were employed at the airport. In 1995, 200 people worked at Garner Field, providing a one-stop aircraft repair and repaint center and serving clients throughout the world.

General aviation airports play important roles in the agricultural, mining, and oil and gas industries in the state. Crop dusting, aerial surveying, and business travel are just a few services operated out of some airports. Arledge Field Airport in Jones County has three aerial applicator planes based at the facility year round. The planes are used for pesticide and fertilizer applications, and training is provided on the use of the planes. A multi-year boll weevil eradication program was operated out of the airport, involving 20 aircraft flying on a daily basis over a three-month period. Arledge Field is also used by companies that check petroleum pipelines. The Dell City Municipal Airport is used to bring in farm and ranching equipment and parts from Odessa and Lubbock. Farmers also use it to fly produce, such as chili peppers, to market.

General aviation airports support recreation, tourism, and visitor travel throughout the state. For example, Panhandle Eastern has a hunting and fishing lodge near Ingleside. The company typically makes four weekly flights in and out of T.P. McCampbell Airport to bring staff and clients to the lodge. Hillsboro Municipal Airport sponsors an annual air show every October. The Saturday event attracts 2,000 to 3,000 visitors. Other airports also sponsor fly-ins, fly markets, air shows, and other events that contribute to the vitality of the airport and the local economy. Athens Municipal Airport serves visitors to the Texas Freshwater Fisheries and Visitors Center, which includes a museum, the Texas large-mouth bass display, and a casting pond.

Railroads play a vital role in transporting commodities between destinations within the state and into and out of Texas. In addition, Texas is the gateway for rail freight traffic into and out of Mexico, with five of the seven rail crossings located in the state. Currently, approximately 70 percent of rail freight traffic into Mexico goes through Texas. The major international gateways are located at El Paso, Eagle Pass, Laredo, and Brownsville, with Presidio providing a fifth rail port of entry. Railroads operating in the state link Mexico and Canada, as well as both the east and west coasts of the U.S.

In 1997, approximately 6 million carloads were transported by rail into and out of the state, accounting for some 277 million tons. Chemicals and nonmetallic minerals, which include sand, gravel, crushed stone, and cement, accounted for the largest share of commodities originating in the state, while coal accounted for the single largest product transported into Texas. UP is the nation's largest hauler of chemicals, with most originating from the industries southeast of Houston. UP also transports coal from the Powder River Basin in Wyoming and other locations to power plants in Corpus Christi and other Texas cities. Non-metallic minerals and farm products are also shipped into the state by rail.

In addition, railroads reduce the demand on the roadway system in the state. Truck volumes on highways, roads, and bridges would increase significantly without the railroad network, placing additional demands on the infrastructure and increasing traffic congestion.

Assessment and Future Needs

Researchers examined available information on the future needs associated with the various modes. This assessment examined factors related to the current conditions and coverage of the modes, and future funding needed to maintain and expand the systems. Information on the future needs associated with individual modes is summarized in this section.

Data available from HPMS provide an indication of the condition of rural roadways in the state. HPMS is maintained by the Federal Highway Administration (FHWA) based on data provided by the states. Although HPMS data are based on a sample, the roadways included do provide a representative mix of those found in the state. Pavement conditions on Interstate highways, principle arterials, minor arterials, and major collectors in rural portions of the state

are in relatively good condition. The volume to capacity (VC) ratio for the rural highway system indicates that reoccurring traffic congestion is not a major problem in most areas. Certainly, some rural roadways experience significant congestion during special events or certain times of the year, and even on a regular basis in some areas, but not to the level of urban areas (9).

The HPMS analysis package was used to estimate the 20 year state-maintained roadway needs in rural counties. The model estimated \$23.2 billion in new projects, along with \$9 billion in backlogged projects, for a total 20-year funding need of \$32.2 billion. The model was rerun based on current funding levels to determine the impact on the roadway system if this level of investment were not possible. The results from this analysis indicated a dramatic deterioration in pavement conditions and an increase in congestion levels. The analysis indicated that the current funding level met only about 36 percent of the estimated needs. The results of this analysis are in line with periodic forecasts made by TxDOT, which estimate that available funding would cover only 30 percent of the total transportation needs in the state. Funding for rural mobility roadway projects was anticipated to cover only 28 percent of the identified needs (27).

The current combination of metropolitan, small city, and rural operators provide service to all but 13 counties in the state. When the Section 5310 Program vehicles are added, only four counties lack some type of service. Although the existing network covers the majority of the state, there are still pockets without service. Options for servicing these areas were examined and suggestions made on potential approaches. Maintaining the current level of funding is important for the rural transit systems.

The 1992 study of the intercity bus industry in the state included an assessment of areas without service. Twenty-three communities with populations of over 5,000 did not have intercity bus service in 1993. These communities are served by some type of rural public transportation service or agency with Section 5310 vehicles, however. Residents in 15 of the 23 unserved cities have to travel between 10 and 20 miles to reach the nearest intercity bus route, while individuals in eight cities live 21 to 38 miles from the nearest service. Although unserved communities are found throughout Texas, most are located in the northeast portion of the state.

The Texas Bus Association (TBA), under contract to TxDOT, is conducting a statewide assessment of intercity bus services and facilities. The study is being funded by TxDOT through the FTA Section 5311(f) Program, with TBA providing the local match. The project will document current intercity bus services and facilities in the state, identify future needs and opportunities for new intermodal facilities, and develop a long-range 20-year plan for addressing these needs.

Researchers examined the factors that appear to contribute to the success of rural airports. Level of aircraft activity, operating characteristics, location and role, and physical condition of the airport were all examined, along with community demographic and economic conditions. The results of this analysis identified four attributes that were highly correlated with the success of

rural airports in the state. The four factors that appear to have the greatest influence on the vitality of rural general aviation airports are the number of registered aircraft in the county, that the facility is developed to general utility or transport standards, the availability of services at the airport, and the presence of on-site personnel. Transport and general utility airports are more likely to meet some or all of these measures and thus offer the potential for greater economic viability and influence than basic utility airports.

Estimates by TxDOT and other studies conducted by TTI indicate that current funding levels from all sources are not adequate to meet the identified future needs for general aviation airports in the state. For example, approximately 25 percent of the runways at general aviation airports are in fair or poor condition. Current projections by TxDOT indicate that general aviation airports in the TASP need \$600 million in development funds for the five-year period from 1999 through 2008. This estimate equals annual funding of some \$120 million (19).

Current federal and state funding levels provide approximately \$37 million annually for these airports. If funding continues at this rate, an annual shortfall of \$83 million can be expected. The inability to provide needed funding may result in deteriorating runways and infrastructure, closing airports, and losing business and recreational travel. All of these possible outcomes will negatively impact the economy of local communities and the state.

Identifying and addressing the future needs of the railroad system in Texas is difficult. Unlike the roadway system, most railroads in the state are privately owned and operated. Given the highly competitive nature of the railroad industry, it is hard to obtain information from these companies on current needs, future plans, and other issues. Institutional concerns relating to the movement of goods across the Texas/Mexico border, the role of TxDOT and the Railroad Commission in rail planning, and available funding also contribute to the difficulty in determining and addressing future improvements in the railroad system.

Elements that have been identified in other studies include addressing railroad grade crossing safety concerns, examining the impact of recent railroad mergers, enhancing intermodal connections, simplifying procedures at the Texas/Mexico border to reduce delays in rail shipments, infrastructure improvements, and preserving rail corridors for future rail or alternative uses (27, 29). It is not possible to put a dollar figure on these needs. Many issues will require institutional changes, while funding for infrastructure improvements will be needed to address other problems. Maintaining an ongoing open dialog with the railroads, industries and shippers, local communities, the RRTDs, and other agencies will be important to future efforts.

Implementation Recommendations

This report summarizes the results of a research project examining the rural transportation network in Texas. Researchers analyzed available information on the current status, condition, and funding of roadways, transit and intercity bus services, airports, and railroads in rural areas

of the state. The future needs associated with these modes were also reviewed. Researchers presented a multimodal transportation system to enhance mobility and economic development in rural areas.

The project results provide a snapshot of the current rural transportation system in the state and future needs associated with this network. The project results can be used by TxDOT in a number of ways. First, the research report and this summary report can be used to raise the awareness of staff, policy makers, and other groups about the rural transportation system. Second, TxDOT can utilize the information to develop a proactive approach to funding and operating a diverse multimodal rural transportation system. The following steps are recommended to help raise awareness and to promote the multimodal transportation needs in rural areas of the state.

1. An ongoing information program should be developed and implemented with TxDOT Districts and Divisions to promote a multimodal approach to the rural transportation system. Elements of this program should include the distribution of the research and summary reports from this project, the development of training modules on the multimodal rural transportation network, and the development and implementation of an ongoing monitoring program to help document the benefits of all modes to rural portions of the state.
2. TxDOT staff should continue to pursue a multimodal transportation system in the state, from the planning process through design, construction, and operation. The project summary and final reports should be distributed to policy makers and other groups to help promote this multimodal approach.
3. TxDOT staff should continue to pursue funding to address future capital and operating needs of the various modes, as well as intermodal facilities, through appropriate sources.
4. TxDOT staff should continue to work with private transportation providers, local jurisdictions, and other groups to further enhance the multimodal transportation system in rural areas. These groups include the railroads, the Rural Rail Transportation Districts, transit agencies, intercity bus operators, local governments, and other groups.

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