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16. Abstract

This product summarizes the preliminary concept and priority corridors for development of a potential statewide intercity bus and rail network. The concept is based upon the results of Tasks 1 through 5 of Texas Department of Transportation Project 0-5930, "Potential Development of an Intercity Passenger Transit System in Texas." Rather than focus on any regional commuter or light rail systems within or radiating from individual urban areas, this concept looks at longer intercity corridors to determine where the state of Texas could most appropriately invest its resources to connect different regions of the state to create an interregional, statewide transit system. The underlying analysis is based upon several factors related to:

- current and future population and demographic projections along 18 intercity corridors in the state;
- projected future demand based upon forecasts by the Texas State Demographer and other state agencies; and
- current network capacity and routes for intercity highway, bus, air, and rail travel.

This concept plan will be further explored in the remaining months of the project to determine potential costs and benefits of implementing the concept plan or individual components.

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PRELIMINARY CONCEPT FOR STATEWIDE INTERCITY BUS AND RAIL TRANSIT SYSTEM: PRIORITY CORRIDOR RANKING AND ANALYSIS

by

Curtis A. Morgan
Program Manager/
Assistant Research Scientist
Texas Transportation Institute

Benjamin R. Sperry
Graduate Research Assistant
Texas Transportation Institute

Jeffery E. Warner
Assistant Transportation Researcher
Texas Transportation Institute

Jeffrey D. Borowiec, Ph.D.
Associate Research Scientist
Texas Transportation Institute

Laura L. Higgins
Associate Research Scientist
Texas Transportation Institute

Annie Protopapas, Ph.D.
Assistant Research Scientist
Texas Transportation Institute

and

Todd B. Carlson
Associate Transportation Researcher
Texas Transportation Institute

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TEXAS TRANSPORTATION INSTITUTE
The Texas A&M University System
College Station, Texas 77845-3135

DISCLAIMER

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The guidance of the Project Monitoring Committee (PMC) is gratefully acknowledged and appreciated. The PMC consists of the following individuals:

- Duncan Stewart, P.E., TxDOT Research and Technology Implementation Office (RTI);
- Loretta Brown, TxDOT RTI;
- Sylvia Medina, TxDOT RTI;
- Pat Bittner, TxDOT Public Transportation Division;
- Deanne Simmons, P.E., TxDOT Atlanta District;
- Catherine McCreight, TxDOT Houston District;
- Gracie Cantu, TxDOT Pharr District;
- Ken Zigrang, TxDOT San Antonio District;
- Jacques Fontenot, P.E., TxDOT Tyler District;
- Terry Frick, TxDOT Tyler District;
- Norma Zamora, Brownsville Urban System, Director
- Capitol Metro;
- Steve Salin, AICP, Dallas Area Rapid Transit, Assistant Vice President;
- Tim Geeslin, East Texas Corridor Council, Strategy Chairman;
- Randy Isaacs, Greyhound Bus Lines, Government Affairs Representative;
- Earl Washington, Houston-Galveston Area Council, Senior Transportation Planner;
- Chad Edwards, North Central Texas Council of Governments, Principal Transportation Planner;
- Christina Castano, VIA Metropolitan Transit, Strategic Planner
- Jerry Prestridge, Texas Bus Association.

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CHAPTER 1: PROJECT DESCRIPTION AND BACKGROUND

INTRODUCTION

This product summarizes the preliminary concept and priority corridors for development of a potential statewide intercity bus and rail network. The concept plan is based upon the results of Tasks 1 through 5 of Texas Department of Transportation (TxDOT) Project 0-5930, "Potential Development of an Intercity Passenger Transit System in Texas." Rather than focus on any regional commuter or light rail systems within or radiating from individual urban areas, this concept looks at longer intercity corridors to determine where the state of Texas could most appropriately invest its resources to connect different regions of the state to create an interregional, statewide transit system. The underlying analysis is based upon several factors related to:

- current and future population and demographic projections along 18 intercity corridors in the state;
- projected future demand based upon forecasts by the Texas State Demographer and other state agencies; and
- current network capacity and routes for intercity highway, bus, air, and rail travel.

This concept plan will be further explored in the remaining months of the project to determine potential costs and benefits of implementing the concept plan or individual components.

The following sections provide information on the extent and levels of intercity transit services by all modes within Texas available to the research team during the first year of the study (FY 2008). The data reflect ridership and operations from the most current previous year for which complete data were available at the time the research was completed.

EXISTING PASSENGER TRANSIT SERVICES IN TEXAS

Currently, Texas residents and other travelers between major cities within Texas have several alternatives for intercity travel. Highway travel in private automobiles and commercial air travel have been the dominant modes for intercity travel for the past half-century; however, as the population of the state grows in the coming decades, additional intercity public transportation options such as the increased use of intercity bus and rail transit will need to be considered. A more expanded description and accompanying data and analysis related to the current Texas intercity passenger travel systems are included in the interim report on Year 1 activities (TxDOT Report 0-5930-1).

Existing Intercity Passenger Rail Service

Amtrak currently operates three routes through Texas—the Heartland Flyer, the Sunset Limited, and the Texas Eagle, as described in Table 1 and shown graphically in Figure 1. Amtrak also provides through ticketing and coordinated schedules for rail passengers to additional destinations via connecting bus service, known as Thruway Motorcoach service, which is also described in Table 1.

Table 1. Current Amtrak Routes and Connecting Bus Service in Texas.

Route Name	Description
Heartland Flyer	Operates between Fort Worth and Oklahoma City once daily in each direction, southbound in the morning, returning northbound in the evening.
Sunset Limited	Operates three days per week in each direction between New Orleans and Los Angeles. Westbound stops: Beaumont and Houston on Mon., Wed., and Fri.; San Antonio, Del Rio, Sanderson, Alpine, and El Paso on Tues., Thurs., and Sat. Eastbound stops: El Paso, Alpine, Sanderson, Del Rio, and San Antonio on Mon., Thurs., and Sat.; Houston and Beaumont on Tues., Fri., and Sun. Thruway Motorcoach connections are provided to Galveston via Houston; Brownsville and Laredo via San Antonio; and Albuquerque via El Paso.
Texas Eagle	Operates between Chicago and San Antonio daily and between Chicago and Los Angeles three days per week in conjunction with the Sunset Limited. Stations west of San Antonio are served on the same schedule as the Sunset Limited. Thruway Motorcoach connections are provided to Shreveport and Houston via Longview; Fort Hood and Killeen via Temple; Brownsville and Laredo via San Antonio; and Albuquerque via El Paso.

Existing Intercity Bus Service

Currently intercity bus service routes in Texas provide extensive coverage. The map presented in Figure 2 represents current intercity bus services provided in Texas, as indicated by the Texas Bus Association, Inc., an industry organization representing several major intercity bus service providers. The existing bus service travels over almost 8000 miles of Texas roadways and services an estimated 190 stations. In addition to these intercity bus carriers, there are currently 8 metropolitan transit systems in major urban areas, 30 urban transit systems in smaller urban areas, and 39 rural transit providers operating in Texas. Several Mexican-based companies also provide service to Texas cities. These are described in more detail in TxDOT Report 0-5930-1.

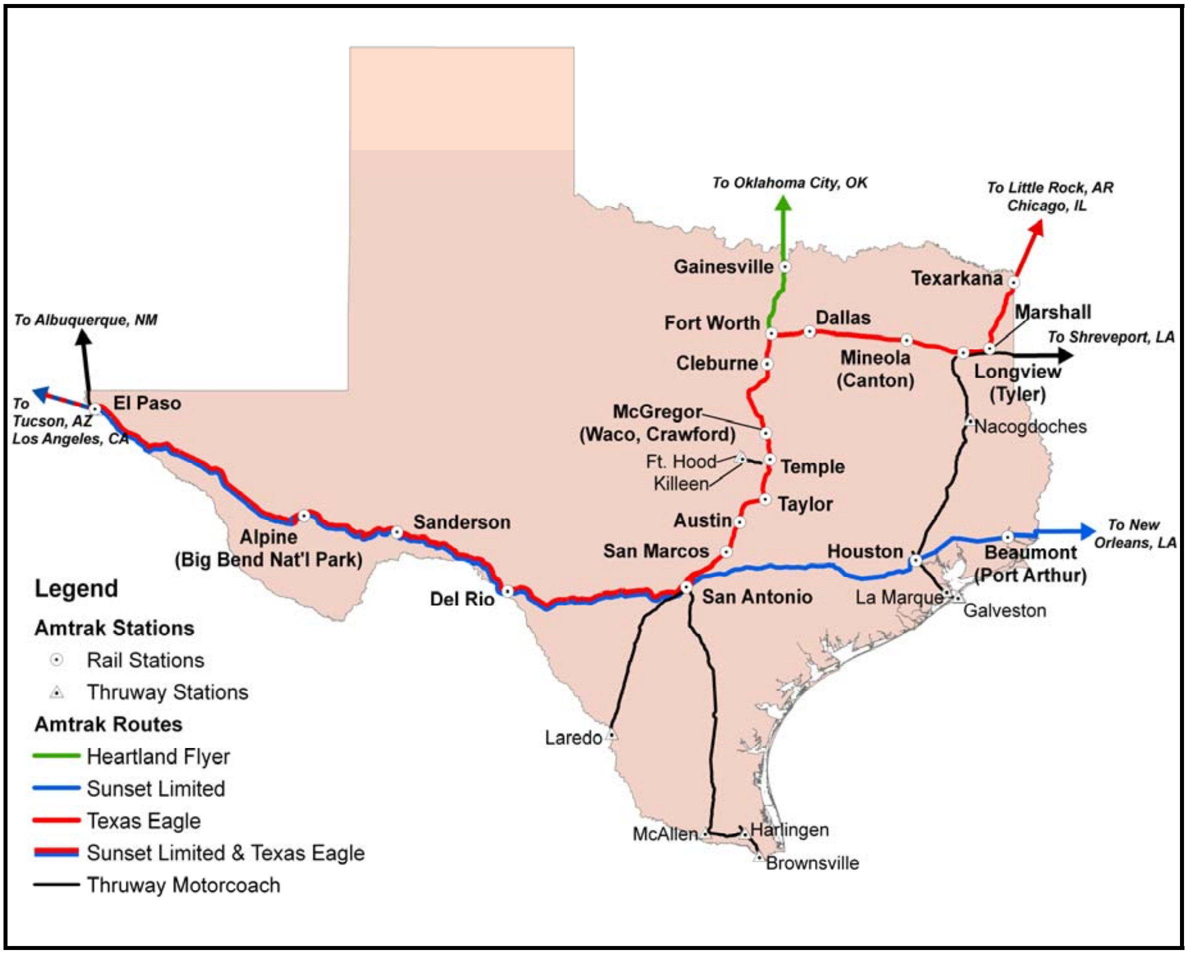
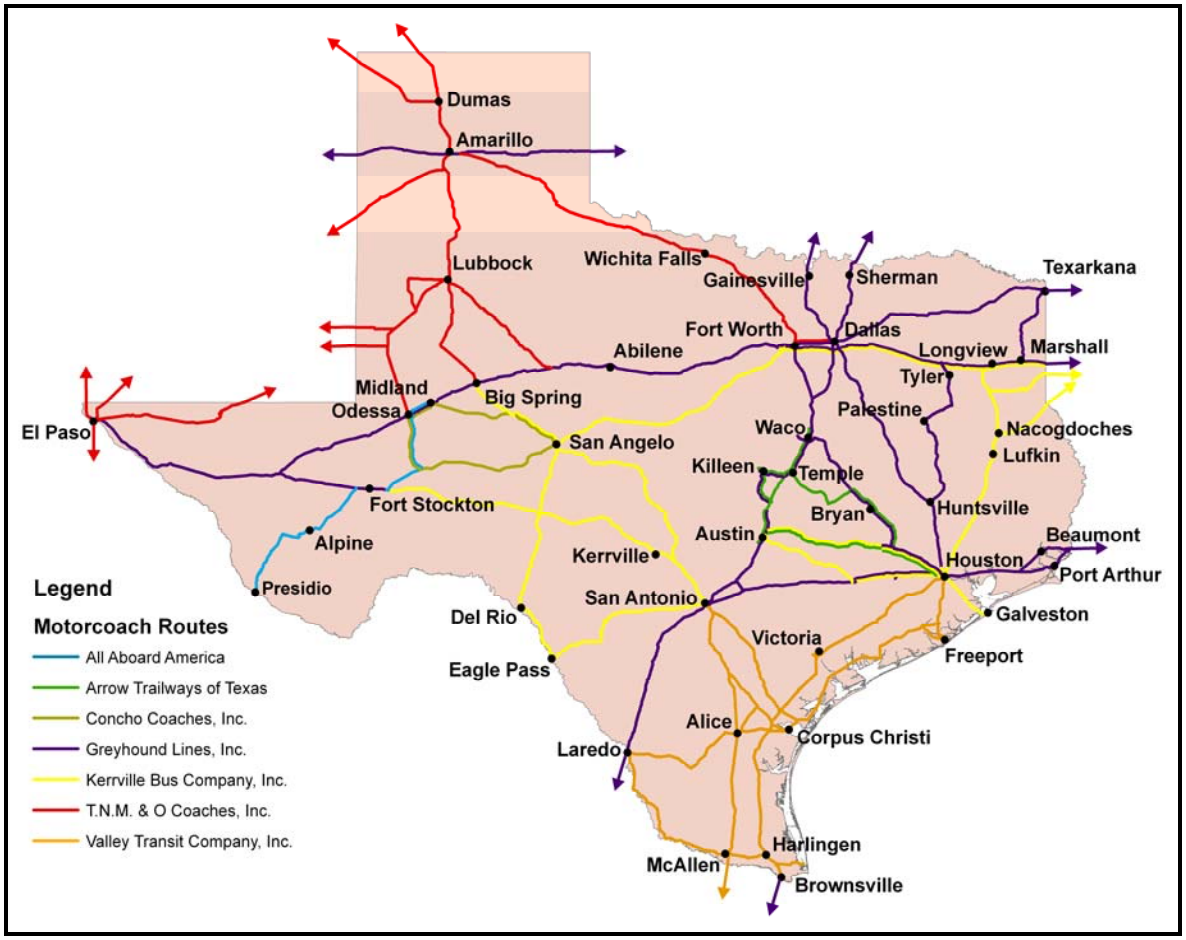


Figure 1. Texas Amtrak Passenger Rail and Thruway Motorcoach Service.

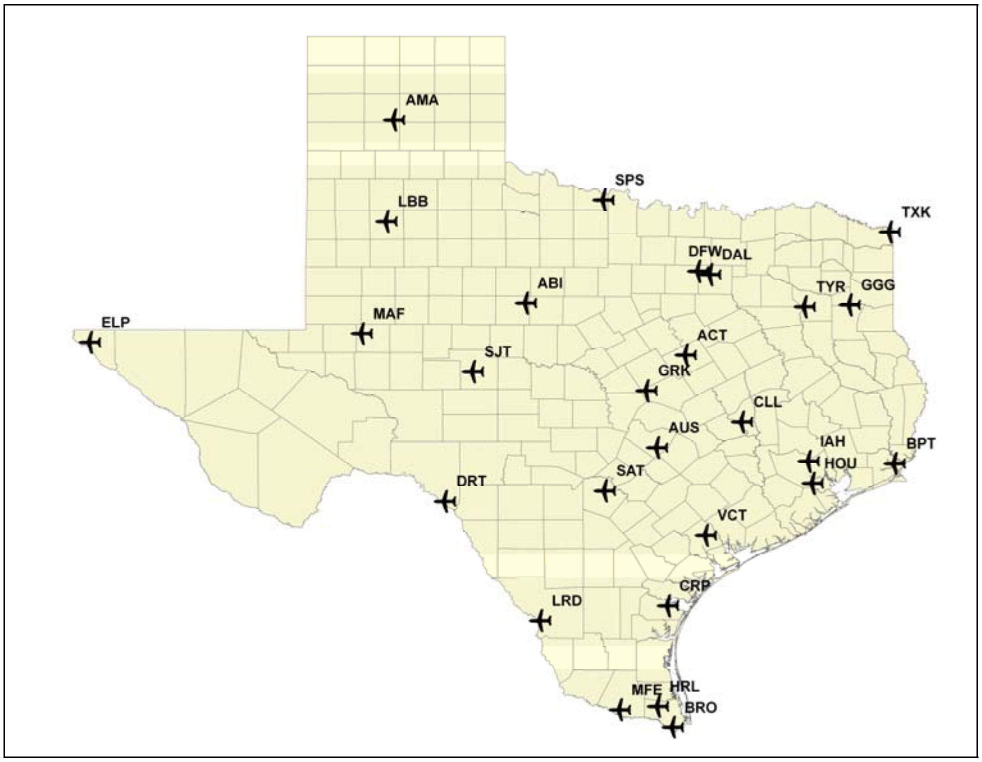


Source: Texas Transportation Institute map created in geographic information system based on information provided by Texas Bus Association, Inc.

Figure 2. Intercity Scheduled Motorcoach Service.

Existing Aviation System Passenger Service

The state of Texas is home to 27 commercial airports that serve the state's 23.8 million (*1*) citizens. (One of these airports, Texarkana Regional Airport, is physically located in Miller County, Ark.) The 27 commercial service airports serving Texas are shown in Figure 3.



Source: Texas Transportation Institute

Figure 3. Location of Texas Commercial Service Airports.

Texas residents make frequent use of commercial aviation services for both intrastate and interstate travel. In 2006, nearly 700 million passengers traveled by air domestically within the United States (*2*). This staggering number is expected to increase by an average annual rate of 3.4 percent through the year 2020, reaching 1.066 billion passengers per year through the national system. In Texas, nearly 66 million passengers were enplaned in 2005, and that number is expected to grow to more than 102 million per year by 2020 (*3*). Dallas/Fort Worth International, Dallas Love Field, Houston George Bush Intercontinental, and Houston's William P. Hobby together accounted for 81 percent of these enplanements in 2005. According to the Air Transport Association (ATA), the Houston-Dallas/Fort Worth market continues to be one of the most heavily traveled airline route segments in the nation, ranking 16th among domestic airline markets in 2006, while the Dallas-New York market ranked 18th (*4*). A total of 65 unique intercity routes are served in the state. As would be expected, the larger hubs serve the most routes since they are the focal point of airline hub-and-spoke operations that tend to allow service to smaller communities to occur. More information on the air passenger transportation system is included in TxDOT Report 0-5930-1.

IDENTIFICATION AND ANALYSIS OF TEXAS INTERCITY TRAVEL CORRIDORS

In 1976, the Texas Transportation Institute (TTI) completed a report entitled *An Evaluation of Intercity Travel in Major Texas Corridors.* The current project team began with the corridors from the 1976 study, added several additional corridors that have emerged in the state since the study was completed, and gathered input from the Project Monitoring Committee. They then selected a system of 19 intercity travel corridors to evaluate in this project, which are shown in Figure 4.

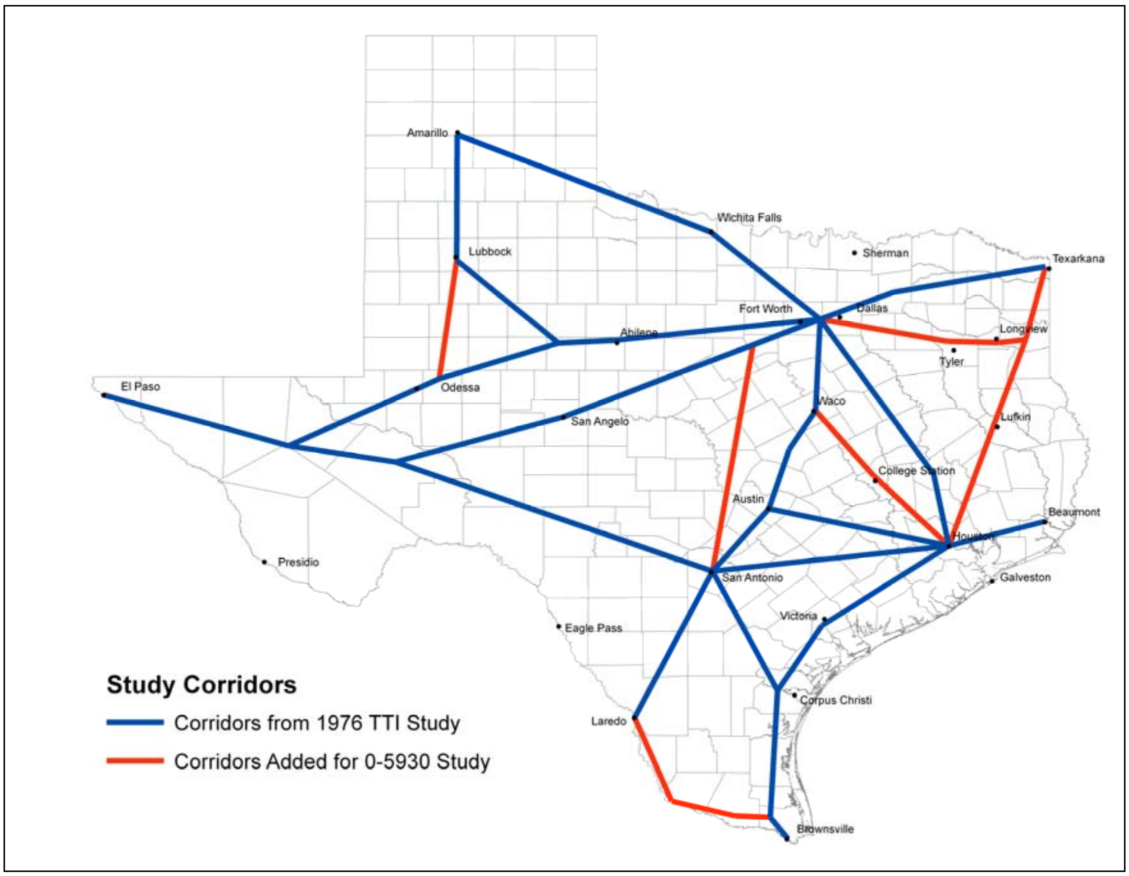


Figure 4. Map of Intercity Travel Evaluation Corridors for Project 0-5930.

The project-designated abbreviated name, full description, subject roadways, and length of each of the study corridors are provided in Table 2. The project-designated abbreviations were developed for the ease of reporting data on each corridor without requiring the full description for each. The subject roadways were selected based on the most direct route between the corridor endpoint cities along major roadways. The length of each corridor was measured in miles along the subject roadways between major roadway junctions or other interchanges in each of the corridor endpoint cities. For corridors with an endpoint in Dallas/Fort Worth (DFW), the length was computed as the average of the distance between Dallas and the opposite corridor endpoint and the distance between Fort Worth and the opposite corridor endpoint.

Table 2. Description of Project 0-5930 Intercity Travel Evaluation Corridors.

Corridor Reference Number	Name	Corridor Description	Roadway(s)	Length
1	AMALBB	Amarillo to Midland-Odessa via Lubbock	I-27, US 87, TX 349	245
2	DFWABI	Dallas/Fort Worth to El Paso via Abilene	I-20, I-10	621
3	DFWAMA	Dallas/Fort Worth to Amarillo via Wichita Falls	US 287	362
4	DFWHOU	Dallas/Fort Worth to Houston	I-45	252
5	DFWLBB	Dallas/Fort Worth to Lubbock via Abilene	I-20, US 84	331
6	DFWLOU	Dallas/Fort Worth to Louisiana Border	I-20	183
7	DFWSAT	Dallas/Fort Worth to San Antonio	I-35	267
8	DFWSATb	Dallas/Fort Worth to San Antonio via US 281	US 281, US 377	294
9	DFWSNA	Dallas/Fort Worth to El Paso via San Angelo	US 377, US 67, I-10	648
10	DFWTXK	Dallas/Fort Worth to Texarkana	I-30	190
11	HOUAUS	Houston to Austin	US 290	163
12	HOUBMT	Houston to Beaumont	I-10	87
13	HOUBVN	Houston to Brownsville via Corpus Christi	US 59, US 77	364
14	HOUSAT	Houston to San Antonio	I-10	199
15	HOUTXK	Houston to Texarkana	US 59	307
16	HOUWAC	Houston to Waco via Bryan/College Station	US 290, TX 6	184
17	SATBVN	San Antonio to Brownsville via Corpus Christi	I-37, US 77	280
18	SATELP	San Antonio to El Paso	I-10	636
19	SATLRD	San Antonio to Brownsville via Laredo	I-35, US 83	349

Each of the study highway corridors described in Table 2 as the major intercity travel corridors in the state is surrounded by additional facilities that could be used in the development of an improved intercity transit network. Figure 5 shows the study highway corridors along with the location of Texas' commercial airports, bus stations, Amtrak passenger rail and Thruway bus connector stations, and significant freight rail lines. For the purposes of this study, the term "significant rail lines" includes all of the state's Class I and certain secondary railroads that are parallel to or adjacent to sections of the identified intercity travel corridors that were evaluated.

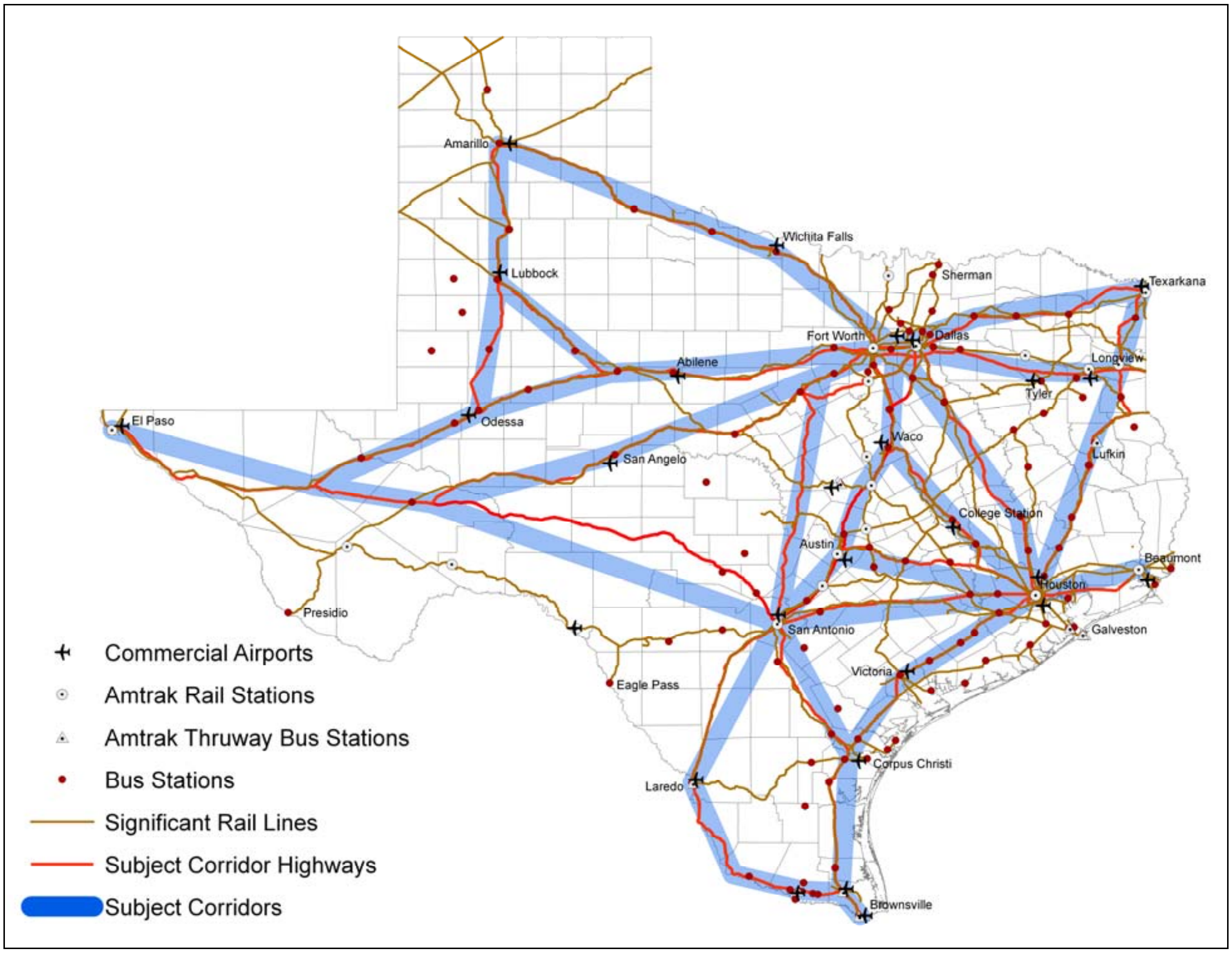


Figure 5. Study Corridors Map Showing Alternative Modal Facilities.

Corridor Population and Demographics

Some of the key factors influencing the success or impact of planned transit improvements in a particular travel corridor include elements related to the current population size, projected growth, and other demographic characteristics of the travel market. When evaluating the population and other demographic characteristics of the intercity travel corridors, the research team explored many different alternatives for the geographic scale (i.e., city, county, or other unit) by which to measure the population and demographic characteristics on the corridor level. The challenge faced by the research team when selecting the geographic scale for the measurement of population and demographics was selecting a scale that reflected, as accurately as possible, the geographic areas that would be served by a proposed intercity corridor transit system. A full discussion of several of the options the research team considered is included in TxDOT Report 0-5930-1.

As a result of its investigation of several possible methods, the research team determined that the federal Office of Management and Budget (OMB) standards for defining core-based statistical areas (CBSAs) provided the ideal geographic unit to estimate the population and demographic characteristics of the intercity travel corridors in this study. In its *Federal Register* notice on December 27, 2000, OMB defined a CBSA as a "geographic entity associated with at least one core of 10,000 or more population, plus adjacent territory that has a high degree of social and economic integration with the core as measured by commuting ties" (*5*).

There are two classifications of CBSAs: metropolitan statistical areas (MSAs), which are defined as CBSAs with a population core of 50,000 or greater, and micropolitan statistical areas (μSAs), which are CBSAs with a population core between 10,000 and 49,999. In Texas, the "geographic entity" used to define a CBSA is the county, or a combination of counties. A map of the CBSAs in Texas with the intercity travel corridors being studied in this research project is shown in Figure 6. Using CBSAs as the basic geographic unit from which to analyze population and demographic characteristics for each of the intercity travel corridors in this study allowed the research team to utilize county-level data, while only including populations that are expected to generate a significant amount of intercity travel (that is, population cores greater than 10,000 and the surrounding area with a high degree of interaction with those cores).

It was later determined that two of the original evaluation corridors, Corridor 7, DFW to San Antonio along I-35, and Corridor 8, DFW to San Antonio along US 377 and US 281, should be combined for the purposes of evaluating intercity rail and express bus needs. These two corridors serve the same endpoints and pass through primarily the same CBSAs. As a result, 18 corridors were ultimately taken into final analysis during this stage of the project.

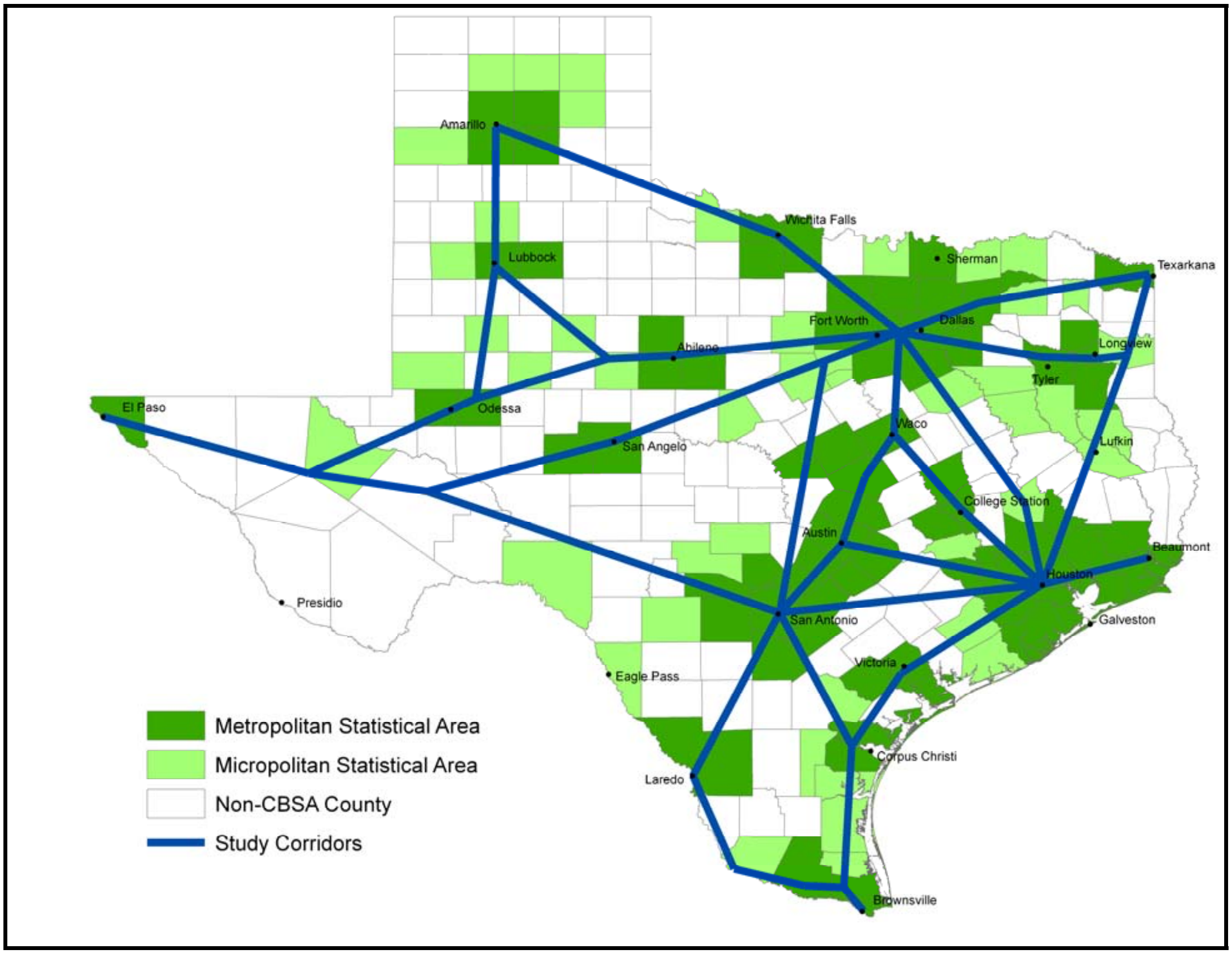


Figure 6. Map of Core-Based Statistical Areas in Texas.

CHAPTER 2:
ANALYSIS OF TEXAS INTERCITY TRAVEL DEMAND

This chapter describes the criteria that the research team developed in conjunction with, and with input and approval from, the TxDOT Project Monitoring Committee (PMC). The PMC for Project 0-5930 is made up of both TxDOT division and district personnel and stakeholders from transit agencies and metropolitan planning organizations (MPOs) from throughout the state. Through this process, the research team and the PMC developed evaluation criteria in three categories upon which to rank the intercity corridors described in Chapter 1. Those categories are:

- population and demographics,
- intercity travel demand, and
- intercity travel capacity.

A description of each of these categories, definitions of the individual criteria developed under each category, and the ranking of each of the 18 corridors under each criterion follow.

POPULATION AND DEMOGRAPHICS

Travel Corridor Evaluation

The first category of criteria used in the evaluation of Texas intercity travel corridors is an evaluation of the market for intercity rail or express bus service based on measures of population and demographics. The seven criteria (numbered P.1 through P.7) selected to measure population and demographics and the units of measurement for each are shown in Table 3.

Table 3. Population and Demographics Criteria for Project 0-5930 Evaluation.

Ref.	Criteria	Units
P.1	Number of CBSAs along corridor	Number
P.2	Total population of CBSA counties along corridor, 2000	Persons
P.3	Growth in total population of CBSA counties along corridor, 2000-2040	Percent
P.4	Total population per mile of the corridor, 2000	Persons/mile
P.5	Percent of total corridor population age 65 and older, 2040	Persons
P.6	Total employees, 2005	Employees
P.7	Total enrollment at public or private universities along corridor, fall 2006	Students

Definitions of Population and Demographics Criteria

The first population and demographics evaluation criterion is the number of CBSAs through which the route of each intercity travel corridor under study passes, shown for each corridor under column P.1 in Table 4. This criterion was selected because the research team believes that CBSAs are the primary generators of intercity travel. As such, an intercity travel corridor with a larger number of CBSA-designated areas increases the potential for intercity travel in that corridor, which would then indicate a greater need for the provision of intercity rail or express bus service.

Table 4. Population and Demographics Evaluation Data for Project 0-5930 Study Corridors.

Corridor	P.1*	P.2*	P.3*	P.4*	P.5*	P.6*	P.7*
AMALBB	5	643,818	0.77%	2627.8	18.10%	252,192	41,922
DFWABI	9	6,328,135	2.18%	10190.2	17.83%	2,849,134	163,141
DFWAMA	4	5,554,266	2.28%	15343.3	18.07%	2,622,788	144,352
DFWHOU	4	9,983,833	2.17%	39618.4	17.81%	4,503,956	233,169
DFWLBB	7	5,663,679	2.23%	17110.8	18.04%	2,659,182	179,230
DFWLOU	4	5,592,402	2.28%	30559.6	18.08%	2,654,034	137,752
DFWSAT	5	8,667,241	2.15%	32461.6	18.62%	3,908,853	280,359
DFWSNA	6	6,065,531	2.26%	9360.4	17.86%	2,748,544	168,053
DFWTXK	4	5,310,928	2.34%	27952.3	18.09%	2,534,325	132,428
HOUAUS	3	5,995,543	2.13%	36782.5	18.30%	2,593,949	173,438
HOUBMT	2	5,100,497	1.84%	58626.4	17.62%	2,127,555	105,779
HOUBVN	7	5,658,810	1.90%	15546.2	17.30%	2,287,155	109,511
HOUSAT	2	6,427,110	1.74%	32297.0	18.01%	2,667,813	131,021
HOUTXK	6	5,200,198	1.83%	16938.8	17.70%	2,173,525	105,258
HOUWAC	3	5,113,809	1.88%	27792.4	17.46%	2,145,207	146,702
SATBVN	5	2,502,255	1.37%	8936.6	18.17%	904,126	65,965
SATELP	3	2,434,978	1.32%	3828.6	18.42%	879,606	66,266
SATLRD	5	2,863,107	2.11%	8203.7	16.25%	975,101	73,451

* Criteria P.1-P.7 are defined in Table 3 and in the text.

The second population and demographics criterion is the total population of CBSA-designated areas through which the route of each study corridor passes, shown for each corridor under column P.2 in Table 4. Population data from the 2000 decennial census were used in the computation of the total corridor populations. This criterion was selected because the total corridor population is a measure of the market size from which ridership on a statewide rail or express bus network will be drawn. A larger total corridor population indicates a greater need for the provision of intercity rail or express bus service in that corridor.

The third population and demographics evaluation criterion, P.3, is the annual percentage growth in total corridor population between the 2000 census and projections of total corridor population for the year 2040. Population projections for the year 2040 for each study corridor were computed using projections developed by the Population Estimates and Projections Program of the Texas State Data Center at the Office of the Texas State Demographer. For the projected corridor populations, the research team used data from the one-half 1990-2000 migration scenario (also known as the 0.5 scenario), which was the scenario recommended by the Texas State Demographer for long-term planning applications. Just as the total corridor population is a measure of the current market for intercity travel, the growth in total corridor population was selected as a criterion to measure the potential for growth in size of each study corridor's market for intercity travel. Higher annual percentage growth in total corridor population indicates a greater need for the provision of intercity rail or express bus service in a particular corridor.

The fourth population and demographics evaluation criterion is the total corridor population per mile of corridor, shown for each corridor under column P.4 in Table 4. The population per mile of the corridor is computed by dividing the total corridor population from measure P.2 by the total route-miles for each travel corridor from Table 2. As an evaluation criterion, including the total corridor population per mile adds a measure to the evaluation process that considers the total population but also incorporates the impact of corridor length in determining the need for intercity rail or express bus service. A higher total corridor population per mile indicates a greater need for the provision of intercity rail or express bus service in that corridor.

The fifth population and demographics evaluation criterion, P.5, is the percentage of the total corridor population that, in the year 2040, will be aged 65 and older. Projections of population by age group from the Texas State Demographer, utilizing the 0.5 migration scenario, were used to compute these percentages. This criterion was included in the evaluation methodology based on the findings of Task 1 of the project, which found that persons aged 65 and older were a target market for transit ridership. However, the percentage of population aged 65 and older is essentially the same for each of the study corridors; as such, the research team determined that this criterion cannot be used to conclude that a particular corridor has a greater need for improved intercity transit on the basis that it has more persons 65 and older than another. Thus, the research team later removed this criterion from the overall evaluation methodology.

The sixth population and demographics evaluation criterion, P.6, is the total number of persons employed by business establishments located in the CBSA-designated areas along each corridor. These data were obtained from the U.S. Census Bureau's survey of county business patterns, 2005 update. This criterion was included in the evaluation because it is assumed that as the number of persons employed along a corridor increases, the potential for intercity business travel (and the need for improved intercity connections) will increase as well. Therefore, a higher total number of persons employed along a corridor indicates a greater need for intercity rail or express bus service in that corridor.

The seventh population and demographics evaluation criterion is the total enrollment of public or private universities in CBSA-designated areas along each corridor, shown for each corridor under column P.7 in Table 4. Enrollment data were obtained from the Texas Higher Education Coordinating Board's certified fall 2006 enrollment counts for two classes of higher education institutions: Texas public universities and Texas independent senior colleges and universities. This criterion was included in the evaluation because intercity travel by students was identified in Task 1 of this project as a target market for transit ridership. Enrollments from other classes of higher educational institutions, such as junior colleges, community colleges, or medical centers, were not included since it was assumed that these types of institutions would not generate a significant amount of intercity traffic. A higher total student enrollment at public or private universities along the corridor indicates a greater need for intercity rail or express bus service in a corridor.

INTERCITY TRAVEL DEMAND

Travel Corridor Evaluation

The second category of criteria used in the evaluation of Texas intercity travel corridors is an estimation of the demand for intercity travel along each of the study corridors. The research team selected four criteria to evaluate the demand for travel along the project's study corridors, shown in Table 5. The criteria selected to evaluate the demand for intercity travel along the study corridors (numbered D.1 to D.4) focus on the demand for automobile travel and air travel. While other modes are available in the form of intercity passenger rail and bus, travel by these modes comprises only a small portion of all intercity travel in Texas. Data for the intercity travel demand criteria for each study corridor can be found in Table 6.

Table 5. Intercity Travel Demand Criteria for Project 0-5930 Evaluation.

Ref.	Criteria	Units
D.1	Corridor average annual daily traffic (AADT), 2006	Vehicles/day
D.2	Annual growth in average corridor AADT, 1997-2006	Percent
D.3	Air passenger travel between corridor airports, 2006	Persons
D.4	Annual growth in air passenger travel between corridor airports, 1996-2006	Persons/mile

Table 6. Intercity Travel Demand Evaluation Data for Project 0-5930 Study Corridors.

Corridor	D.1	D.2	D.3	D.4
AMALBB	8,684	1.68%	20	–95.45%
DFWABI	20,777	2.96%	606,870	–2.75%
DFWAMA	15,252	2.91%	260,240	–1.46%
DFWHOU	53,634	4.57%	1,643,640	–2.45%
DFWLBB	16,434	2.36%	336,520	–1.28%
DFWLOU	32,713	2.70%	4,170	–22.65%
DFWSAT	88,153	2.91%	1,407,110	–1.24%
DFWSNA	12,884	3.41%	364,710	–2.94%
DFWTXK	29,070	2.30%	3,590	–12.38%
HOUAUS	36,441	3.44%	217,520	–6.90%
HOUBMT	72,525	2.27%	800	–14.77%
HOUBVN	32,689	2.47%	342,680	–3.59%
HOUSAT	54,071	2.91%	265,760	–4.64%
HOUTXK	28,616	2.94%	1,300	–23.08%
HOUWAC	33,112	3.85%	2,070	–21.56%
SATBVN	24,829	2.65%	74,620	–2.61%
SATELP	20,222	3.14%	132,890	–0.58%
SATLRD	28,689	5.10%	77,410	–3.24%

* Criteria D.1-D.4 are defined in Table 5 and in the text.

Definitions of Intercity Travel Demand Criteria

Two of the intercity travel demand criteria are measures of intercity automobile travel along the subject highways. They are related to the AADT along each intercity travel corridor in this study. The first criterion (D.1) is the AADT for each study corridor for the year 2006, which is included to evaluate existing highway traffic conditions on each travel corridor. The second criterion (D.2) is the percentage annual growth in the travel corridor AADT between 1997 and

2006, which is included with the purpose of being an estimate of the growth in demand for highway travel in each travel corridor. AADT data for this project were obtained from the 2006 TxDOT Roadway Highway Inventory Network (RHiNo) database. For each of the two AADT-based criteria, a higher value indicates a greater demand for travel in an intercity corridor and thus indicates a greater need for investment in intercity rail or express bus service in that corridor. These AADT values include traffic internal to the study corridors (i.e., vehicles that are not traveling between the corridor endpoint cities). Despite this, the research team determined that these two AADT-based measures were appropriate early planning-level surrogate measures of travel demand in an intercity corridor acceptable for transit analysis since shorter distance, intra-corridor trips would be taken by either by intercity rail or express bus passengers. Later detailed ridership studies can more accurately measure and isolate intercity travel demand between specific endpoint city pairs.

The other two intercity travel demand criteria are measures of the demand for intercity air travel in the study corridors. The first criterion (D.3) is the total number of airline trips between airport pairs within a travel corridor in 2006. The second criterion (D.4) is the growth in the total number of airline trips between airport pairs within a travel corridor between 1996 and 2006. These data were obtained from the research team's analysis of the Bureau of Transportation Statistics' Airline Origin and Destination Survey (DB1B), which is a 10 percent sample of airline tickets sold by reporting carriers. The raw number of tickets for each commercial airport pair in the state was identified, and the number of tickets for each airport pair in a corridor were added together to find the total air travel for a particular corridor. This value was multiplied by 10 to determine the actual number of air passengers for each corridor. As with the AADT-based intercity demand measures, a higher value for each of the air travel demand criteria indicates a greater need for the provision of intercity rail or express bus service in a corridor.

INTERCITY TRAVEL CAPACITY

Travel Corridor Evaluation

The third category of criteria used in the evaluation of Texas intercity travel corridors is an approximation of the intercity travel capacity of each of the study corridors. The research team selected four criteria (numbered C.1 to C.4) to evaluate each study corridor's intercity travel capacity, shown in Table 7.

Table 7. Intercity Travel Capacity Criteria for Project 0-5930 Evaluation.

Ref.	Criteria	Units
C.1	Average volume-capacity ratio on subject highways in corridor, 2002	Ratio
C.2	Average percent trucks on subject highways in corridor, 2002	Percent
C.3	Load factor on corridor flights, weighted by boarding passengers, 2006	Ratio
C.4	Average number of corridor flights per day, 2006	Flights/day

As with the criteria for measuring intercity travel demand, the criteria selected for evaluating intercity travel capacity focus on the capacity of the highway and air modes. Data for the intercity travel capacity criteria are in Table 8.

Table 8. Intercity Travel Demand Evaluation Data for Project 0-5930 Study Corridors.

Corridor	C.1	C.2	C.3	C.4
AMALBB	0.174	10.44%	0.000	0
DFWABI	0.284	39.12%	0.663	67
DFWAMA	0.309	27.00%	0.620	45
DFWHOU	0.602	19.29%	0.710	130
DFWLBB	0.308	32.55%	0.686	47
DFWLOU	0.493	27.45%	0.685	15
DFWSAT	0.631	14.46%	0.755	155
DFWSNA	0.236	27.52%	0.689	36
DFWTXK	0.477	30.28%	0.555	12
HOUAUS	0.602	10.95%	0.717	35
HOUBMT	0.689	17.79%	0.621	9
HOUBVN	0.568	11.53%	0.706	73
HOUSAT	0.792	14.26%	0.712	38
HOUTXK	0.437	18.18%	0.480	7
HOUWAC	0.645	11.59%	0.572	20
SATBVN	0.462	13.63%	0.647	3
SATELP	0.249	28.86%	0.696	7
SATLRD	0.439	14.28%	0.647	3

* Criteria C.1-C.4 are defined in Table 7 and in the text.

Definitions of Intercity Travel Capacity Criteria

The first two intercity travel capacity criteria are measures of roadway travel capacity. The first intercity travel capacity criterion (C.1) is the average volume-capacity ratio on subject highways along each travel corridor. The second intercity travel capacity criterion (C.2) is the average percentage of trucks traveling on highway segments along each study corridor. Data for these measures were derived from the research team's analysis of the Freight Analysis Framework utilizing its most recent (2002) data. While the volume-capacity ratio is a traditional measure of highway capacity, the percentage trucks measure is included as more of a measure of "impedance" to intercity travel; that is, if more trucks are on an intercity corridor, it is more difficult to introduce additional intercity travelers into that mix. For each of these measures of intercity travel capacity, a high value for a corridor indicates a deficiency in travel capacity along that corridor and thus a greater need for the provision of intercity rail or express bus service in that corridor.

The other two measures that the research team selected to evaluate the travel capacity of statewide intercity corridors are measures of air travel capacity. The first air travel capacity criterion (C.3) is the load factor on all flights between airports located along a travel corridor. This is computed as the percentage of seats on an aircraft that are occupied for a particular segment of flight; for corridors with multiple airport pairs, the corridor average was weighted by the number of passengers on each route. A higher load factor for a corridor indicates that access to air service for intercity flights is more difficult and thus would indicate a greater need for investment in an intercity rail or express bus service in that corridor. The second air travel capacity criterion (C.4) is the average number of scheduled flights per day between airports in a corridor. Values for these air travel measures were computed from the research team's analysis of flight segment data obtained from the Bureau of Transportation Statistics' Air Carrier Statistics (T-100) form data for the year 2006. A higher average number of corridor flights per day shows that air travel is easily accessible on that corridor; therefore, corridors with fewer average flights per day are locations where improved intercity travel options are needed.

CHAPTER 3: PRELIMINARY CONCEPT PLAN AND ALTERNATIVES

INTRODUCTION

Task 5 of the project work plan calls for the research team to present a preliminary concept configuration for an improved intercity rail and express bus transit system based upon the analysis completed in Tasks 1-4. At the time the project was conceived, it was thought that, at this point in the work, some determination could be made regarding the proposed bus/rail system configuration based on intercity travel demand patterns and demographic projections. While this remains somewhat true, the answers to the question are not as clear as originally hoped. The research team has found that political and geographic interest factors, as well as population and demographics, intercity travel demand, and the capacity of alternative intercity modes for travel, that they conceived and included in the analysis will ultimately determine the configuration of the future intercity rail system in Texas.

The results of the research thus far provide only a tool for TxDOT to use in making decisions related to the state's future role in that development. Other factors not included in the analysis (such as air quality nonattainment) may also have an impact on which routes and in which order a rail system may be developed. The conceptual plan presented here is the result of the analysis in earlier tasks completed during this project and is made with the following assumptions, as outlined in previous technical memoranda and reports:

- The purpose of this work is to determine the most likely intercity travel corridors within the state needing to be connected by an intercity rail/express bus system.
- Factors included in the analysis were based on the development of statewide travel needs and not on local/regional travel demand within any one region of the state.
- The concept of this project was based on previous studies carried out by TTI on the conventional intercity passenger rail system (Amtrak service of up to 79 miles per hour [mph] and in some places up to 110 mph) in California, Pennsylvania, and other states throughout the United States within existing rail rights of way. This does not preclude the consideration of higher speed rail systems to meet the travel demand identified in existing highway and rail corridors, but these systems would require new, fully grade-separated corridors to operate above 125 mph in almost all cases.

- Local and regional development of improved bus, light rail, and commuter rail systems would continue within the major urban areas of the state to allow for distribution of travel from the statewide transit system conceptualized here.

INTERCITY TRAVEL DEMAND BY CORRIDOR RANKING RESULTS

The result of the ranking of the 18 intercity travel corridors is shown in Figure 7. As can be seen from the chart, two corridors—Dallas/Fort Worth to San Antonio and Dallas/Fort Worth to Houston—ranked highest in need for intercity passenger or express bus service according to the factors and equal weighting of each of those factors, as directed by the PMC.

The next two highest ranking corridors link West Texas and the Panhandle to the DFW area and would converge to the same corridor between Abilene and the DFW Metroplex. The next two link Houston to San Antonio and Houston to Austin. Most of the other interregional corridors ranked basically equally beyond those few corridors. This allows them to be weighed in future work to determine how additional corridors might be added. Figure 8 is a graduated, graphical representation of corridor ranking based on this analysis.

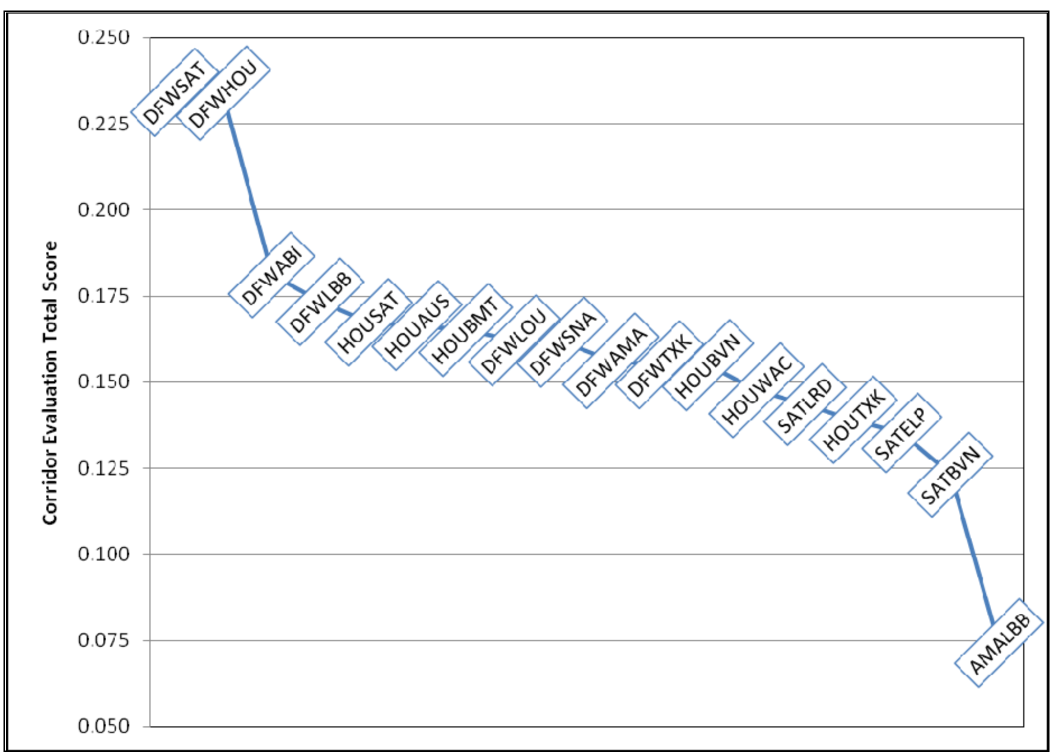


Figure 7. Corridor Ranking Chart with All Evaluation Factors Equally Weighted.

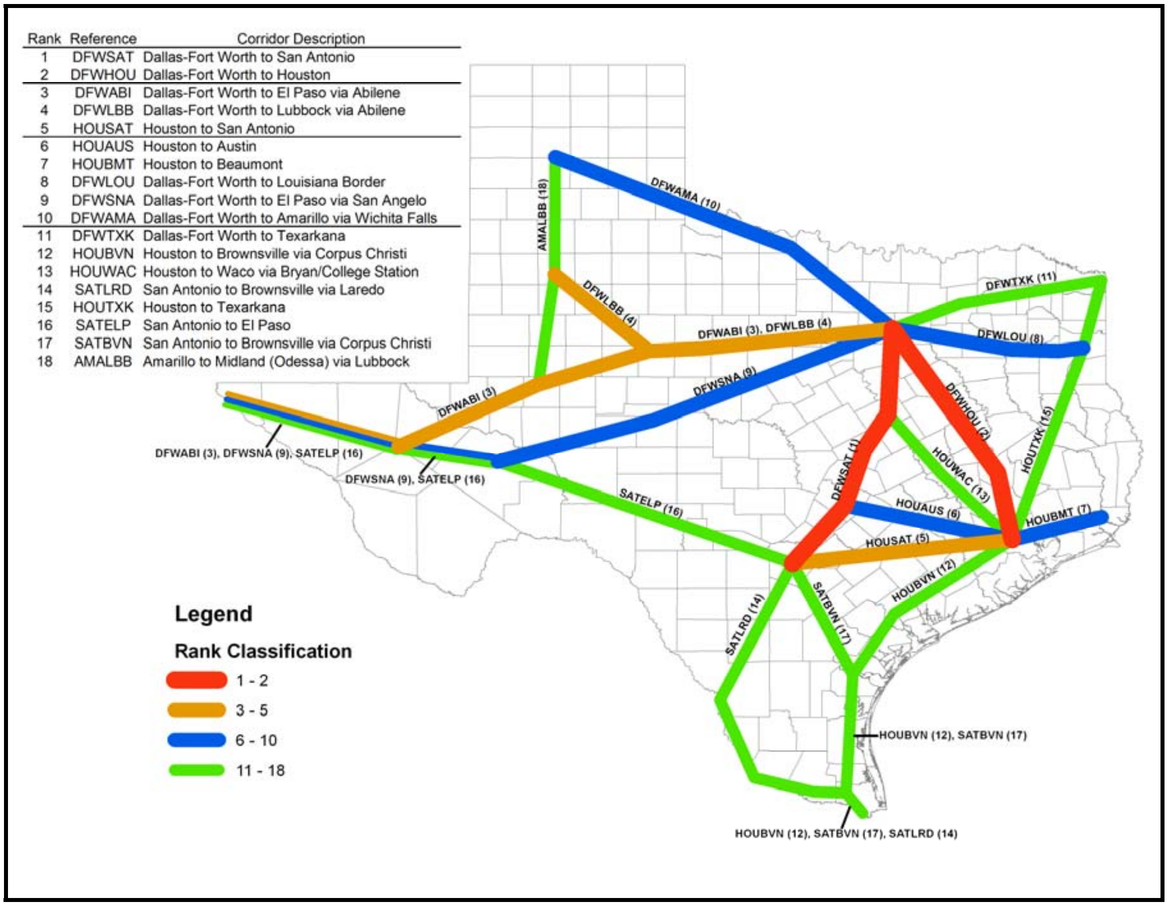


Figure 8. Graphical Representation of Grouped Corridor Rankings.

DISCUSSION OF RESULTS

Initial analysis of these results indicates that an improved rail system connecting DFW with San Antonio and DFW with Houston are the priority corridors for TxDOT to consider in developing a statewide transit system. This result is consistent with previous intercity passenger rail studies within Texas, which identified these as the two major growth corridors. Questions still remain: Is it best to have rail service in an "inverted V" configuration (or the Greek letter lambda, "Λ")—directly linking the 4 major urban areas of the state via two lines from DFW as I-35 and I-45 do at present—or would a "T-shaped" configuration linking Houston to the DFW-San Antonio corridor somewhere between Austin and Waco serve an even larger constituency by bringing the Bryan/College Station urban area into the proposed alignment? Another alternative configuration would be to build Houston to Austin or Houston to San Antonio routes as well as the "inverted V" to create a "triangle-shaped" service that more directly serves the state's four largest urban areas. The answer to which of these is more effective would largely be a tradeoff between the higher ridership generated by improved direct service and the cost to construct the additional infrastructure mileage that such a system would require.

Differences of opinion have also been expressed as to where the connection to Houston should be along the I-35 corridor, should a T-shaped system be selected. While many in San Antonio and on the southern end of the corridor would like to see the connection point to Houston in a two-corridor system be no further north than the Austin area, the results of this study, thus far, indicate that a more northern connection point in Waco or Hillsboro would more fully address the two highest ranked corridor intercity demand routes and better serve the growing DFW population base. Further study is needed to determine the most efficient connection point between the two corridors for a T-shaped system.

The addition of an improved intercity bus service from El Paso to DFW is also indicated from the research results, until ridership grows to the point that rail service along all or some of the route could be supported. For example, rail service from DFW to Abilene could be added with feeder express bus services to and from Abilene to El Paso, San Angelo, Lubbock, and Amarillo in order to serve West Texas.

Further analysis planned for Year 2, regarding project phasing and interconnections with existing and planned rail systems, will refine and determine which segments of this conceptual intercity system might be economically feasible to undertake first. For example, the completion of the Austin-San Antonio commuter rail service planned by the Austin-San Antonio Intermunicipal Commuter Rail District might suggest building the segments north of Austin prior to implementing service on the statewide system between those two cities. Likewise, if the efforts of the East Texas Corridor Council and the North Central Texas Council of Governments are successful in developing an intercity rail link in East Texas, the statewide system could instead focus on connections between the major urban areas, leaving regional rail systems to connect internal destinations. Alternatively, the same East Texas corridor to Louisiana and the one from Houston to Beaumont might be determined to be more vital since they can potentially connect the statewide system to improved interstate rail corridors being planned in the southeastern United States.

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