Project Planning Documentation

Overview of Project

Project funding will be used to complete necessary preliminary engineering and NEPA for a new 250 mile high-speed core express service between Dallas-Fort Worth and Houston. Based on the preliminary planning summarized in this document, the Dallas-Fort Worth to Houston route could utilize one of three routes analyzed, consisting of a BNSF route through Teague, a UPRR route through College Station, or a new green field route that parallels I-45. Additionally, all three of the routes include segments of the UPRR Terminal and West Belt Subdivisions in order to connect to the existing passenger rail station in downtown Houston and a small portion of the UPRR Dallas Subdivision to connect to the existing passenger rail station (Union Station) in Dallas.

Purpose and Need

The purpose of the Dallas/Fort Worth to Houston core express service preliminary engineering and NEPA documentation is to prepare the project for the next stage of final design and construction. The Dallas/Fort Worth to Houston corridor has been included in the Texas Rail Plan as well as a research study performed by the Texas Transportation Institute (TTI), and the America 2050 report as a key corridor with need for high speed rail service.

Texas Rail Plan

TxDOT completed and published the Texas Rail Plan in November 2010, which included a short term and long term program for passenger rail. The Dallas to Houston corridor was included in the short term program for preliminary planning and in the long term program for further development of the project.

TxDOT Research Project 0-5930: Potential for Development of an Intercity Passenger Transit System in Texas

TTI completed TxDOT Research Project 0-5930 *Potential for Development of an Intercity Passenger Transit System in Texas* which examined 18 intercity corridors within the state to determine current capacity for intercity travel by road, air, and rail. Project 0-5930 examined only long-distance, intercity corridors connecting regions of the state and provided

data on estimated travel times for each corridor at a variety of potential high speed rail speeds. The study evaluated current employment and population as well as projected population growth for the state to 2040 based on figures developed by the Texas State Demographer. Researchers used the 2035 FHWA Freight Analysis Framework projected traffic levels to estimate segment-by-segment volume-to-capacity (V/C) ratios along existing roadways in each of the corridors. The existing bus and rail transit systems connecting to each potential corridor were documented as were a variety of demographic data along each route. The corridors were then ranked as to their need for future expansion in intercity passenger transportation capacity. The Houston to Dallas corridor was ranked 1st in Texas in terms of need for intercity passenger rail.

Over the past several decades, Texas has passed New York in population to become the second most populous state in the U.S. behind only California. While much larger than the other two states, the population of Texas is concentrated largely within the eastern half of the state—along and east of the I-35 corridor. Texas contains two of the U. S.'s top metropolitan areas - Dallas-Fort Worth-Arlington and Houston-Sugar Land-Baytown—each located within 200-300 miles of one another. Texas sits at the crossroads, in the middle of the continent, astride trade and travel corridors connecting both north and south NAFTA traffic and the east and west flow of goods from Asia to the eastern U.S.

The State of Texas has long been a leader in the provision of quality transportation infrastructure for its citizens. Along with its federal funding partners, the state has built the most expansive highway system of any state with over 79,000 lane-miles. Texas has also benefitted from an excellent air transportation system that has steadily grown in use as urban airports in Dallas-Fort Worth and Houston have become national and international hubs. Airports in other Texas urban areas have grown to meet the intercity and regional travel demand that is not met by the highway system and as feeders to the hub airports for interstate travel. Additionally, the Texas rail network includes nearly 11,000 miles of railroad and three existing Amtrak routes. Over time, Texans' urban and suburban work and travel patterns have shifted, becoming longer and more frequent. Interconnectivity between urban areas throughout the state has grown in importance as centers of both housing and commercial activity have spread along existing transportation routes.

The State's burgeoning population and its rapid transition from a rural state to an urban one have strained elements of the existing transportation system. Meeting the need for new intercity transportation capacity will require new financing and operational methods to provide

the required infrastructure for continued economic growth and quality of life. High-performance intercity passenger rail systems must be considered as a part of the solution to meeting this challenge. A well-designed intercity rail system with coordinated transit connections in urban areas served by it could improve performance of the existing highway and air transportation systems allowing each mode—highway, air, and rail—to operate more effectively.

Figure 1 demonstrates the relative size of and distances between Texas' population centers within the state of Texas along the corridors identified and studied by TTI during TxDOT Project 0-5930. The Dallas-Fort Worth, Houston, San Antonio, and Austin areas make up the Texas Triangle megaregion as identified by the America 2050. The Dallas-Fort Worth to Houston corridor connects the two largest Texas metropolitan areas, both of which are rapidly growing. In 2010 Census data, these two metropolitan areas accounted for almost half of the population in the State of Texas, and over half of the population growth between 2000 and 2010. The Dallas-Fort Worth to Houston corridor is one of the most heavily travelled air corridors in the U.S. at over 130 flights daily in 2006. In the past two decades, high-speed passenger rail studies along the proposed study corridor have been undertaken; however, opposition from airline interests proved successful in blocking implementation of such plans. More recent efforts have indicated that airlines may now be ready to consider how the air and rail modes could cooperate to serve this corridor.

Although not mentioned in the TxDOT research project, even with over 100 flights daily, air travel between Dallas and Houston has experienced a decline in passengers of over 36% since 1990, according to a published report by the Dallas Morning News on January 9, 2011. The major contributing reasons for this decline were heightened security at the airports, rising cost in airfares, and a change in marketing geared toward an emphasis on longer flights, which may make core express service more appealing. Southwest Airlines, once an opponent of a HSR project, has seen a decline in annual passengers between Dallas Love Field and Houston Hobby Airport from 1.5M passengers in 1990 to 1.0M in 2009.

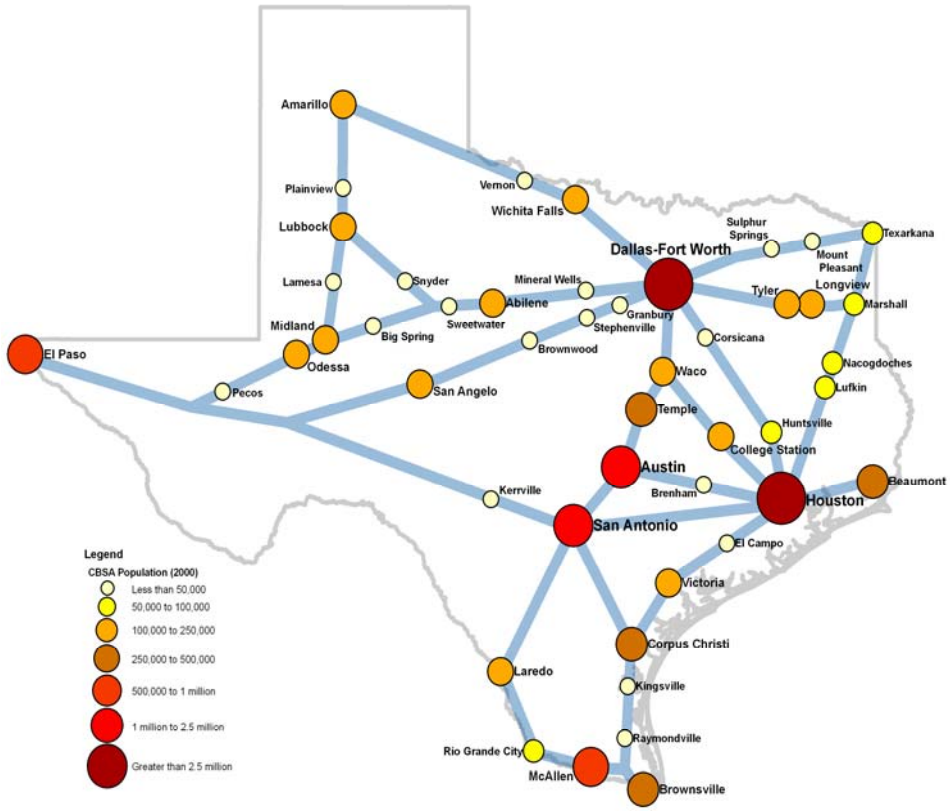

Figure 1. Relative Size and Distance of Texas Population Centers along 0-5930 Study Corridors.

America 2050: Where High Speed Rail Works Best

The America 2050 report *Where High Speed Rail Works Best* published in September 2009 defines and ranks the corridors most appropriate for high-speed rail based on the greatest ridership demand between city pairs. The city pairs were evaluated based on metropolitan size, distance between the cities, available transit connectivity, economic productivity, and congestion. The Dallas to Houston corridor was ranked 10th in city pairs in the U.S. in terms of the greatest demand for a high speed rail system based on the following factors.

- Metropolitan size
    - High speed rail systems located in major metropolitan areas have higher travel demand.
    - Dallas-Fort Worth and Houston are ranked 4th and 6th, respectively, in terms of the largest metropolitan regions in the country according to the 2000 U.S. Census (and again in 2010). Additionally, the Houston and Dallas-Fort Worth metro

- Distance
    - The evaluation prioritized city pairs that were 200 to 300 miles apart based on the assumption that longer distances are more efficiently traveled by air and shorter distances are better travelled by automobile.
    - The length of the Dallas-Fort Worth to Houston corridor is approximately 250 miles.
- Transit Connections
    - "The report stated that high-speed rail systems will attract greater numbers of riders if they begin and end in central locations within the metro region and tie seamlessly into existing commuter rail and transit systems."
    - Dallas and Houston both have existing Amtrak stations located at the terminus points of the potential core express high speed passenger rail corridor. Dallas' Amtrak station provides connectivity to both the Trinity Rail Express (TRE) a commuter line connecting Dallas to Fort Worth, and Dallas Area Rapid Transit's (DART) light rail lines. Houston's Amtrak Station provides connectivity to METRO's University Line which connects the University of Houston to the Downtown CBD.
- Economic Productivity
    - "High-speed rail systems depend heavily on business travel to sustain ridership and business travel is highest in places with more productive economies."
    - Houston and Dallas-Fort Worth are ranked 4th and 8th, respectively, in terms of metropolitan regions in the country with the largest Gross Domestic Product according to the Bureau of Economic Analysis (2006).
- Congestion
    - Congestion reduction at airports and on highways is a goal for building high speed rail lines.
    - The Texas Transportation Institute (TTI) Travel Time Index for metropolitan areas lists Houston and Dallas-Fort Worth as the 8th and 9th most congested metropolitan regions in the U.S., respectively in 2005.

Dallas-Fort Worth to Houston Passenger Rail History

Until Amtrak's Lone Star passenger train discontinued operating in October 1979, travelers between Houston and Dallas had been given the option of taking a passenger train since 1925. Currently, in order to reach Dallas from Houston via passenger train, a traveler would need to board Amtrak's Sunset Limited (currently only runs three days per week), travel to San Antonio, then transfer to Amtrak's Texas Eagle – at, according to Amtrak and an estimated trip time of 17 hours and 30 minutes. Per Amtrak, incidentally, the shortest trip time between Dallas to Houston is estimated to take 16 hours and 50 minutes, however with the Sunset Limited operating only 3 days per week, an overnight stay in San Antonio may be required due to the length of time connecting from the Texas Eagle.

In 1925, the Southern Pacific Railroad began operating their "Sunbeam" service between Dallas and Houston, which ran non-stop between Dallas Union Station and Houston's Grand Central Station on Union Pacific Railroad's predecessor T&NO tracks. The 264 mile trip was advertised as a "mile-per-minute" transportation alternative. In 1950, 'flag' stops were introduced at Ennis and Bryan/College Station. To accommodate more local travelers, SP also ran their "Hustler" service, which ran the same route, but made local stops. The Hustler service was discontinued in 1954, while the Sunbeam service was discontinued in 1955. Grand Central Station was razed in 1961, and is now the site of the US Post Office in Houston, within close proximity of today's Houston Amtrak Station.

To compete with the SP, the Burlington and Rock Island Railroad (BRI) began operations of the Sam Houston Zephyr passenger train in October, 1936 on what are now tracks owned and operated by the BNSF Railway Company. In 1950, the BRI partnered with the Fort Worth and Denver Railroad in order to lease the Teague to Houston segment of the route and continue operating the passenger service to the Houston Belt and Terminal Railroad's Union Station. These operations ceased in 1966.

The Texas Chief, which connected Galveston/Houston to Chicago via Fort Worth, began operations in 1948. In 1967 the leg to Galveston was removed from the schedule making the end points of the route Chicago and Houston. Subsequently renamed the Lone Star when Amtrak took over operations, in July 1974, the Houston station stop was transferred from the HB&T Depot to the site of the current Amtrak Station. The Lone Star service was discontinued in October, 1979, and the HB&T Station is now the site of the Houston Astro's baseball stadium, Minute Maid Park.

Rationale

Potential route alternatives in the study area shown in Figure 2 were analyzed and compared based on market demand potential; existing passenger rail, bus transit, intermodal services and freight rail operations in the corridor; route miles and travel times; and estimated costs.

Each of the potential routes were evaluated to determine the improvements necessary to implement high speed rail along the existing rail lines. Improvements included additional mainline track needed to add capacity to the routes, modifications to the track geometry (e.g., curve reductions and superelevation increases) to increase allowable speeds and travel times along the route, and signal upgrades (centralized train control with positive train control overlay). The improvements identified would increase allowable passenger rail speeds along the routes from maximum speeds of 60 mph to 150 mph, thereby reducing the travel times by vehicle between Dallas-Fort Worth and Houston.

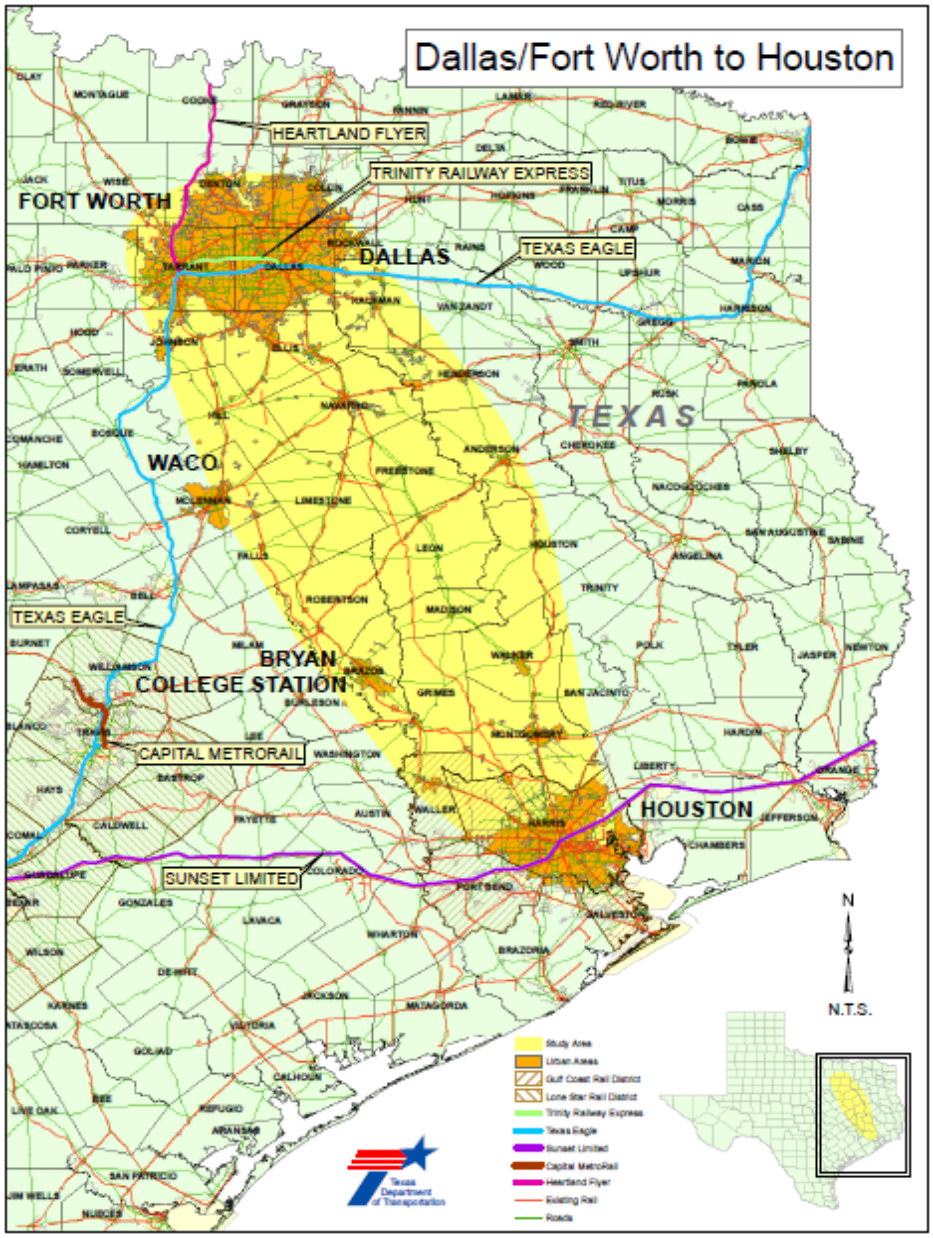

Figure 2: Dallas-Fort Worth to Houston Core Express High-Speed Passenger Rail Study Area

Identification and Analysis of Alternatives

Overview of Routes

Preliminary analysis of route miles and travel times narrowed down potential routes shown in Figure 2 to the BNSF, UPRR, and green field routes shown in Figure 3 and listed in Table 1. The routes chosen for further analysis consisted of the existing BNSF rail line that passes through the cities of Dobbin, Teague, Corsicana, and Waxahachie between Houston and

Dallas; the existing UPRR line that passes through Hempstead, Bryan/ College Station and Corsicana before terminating in Dallas; and a new green field route that would parallel I-45.

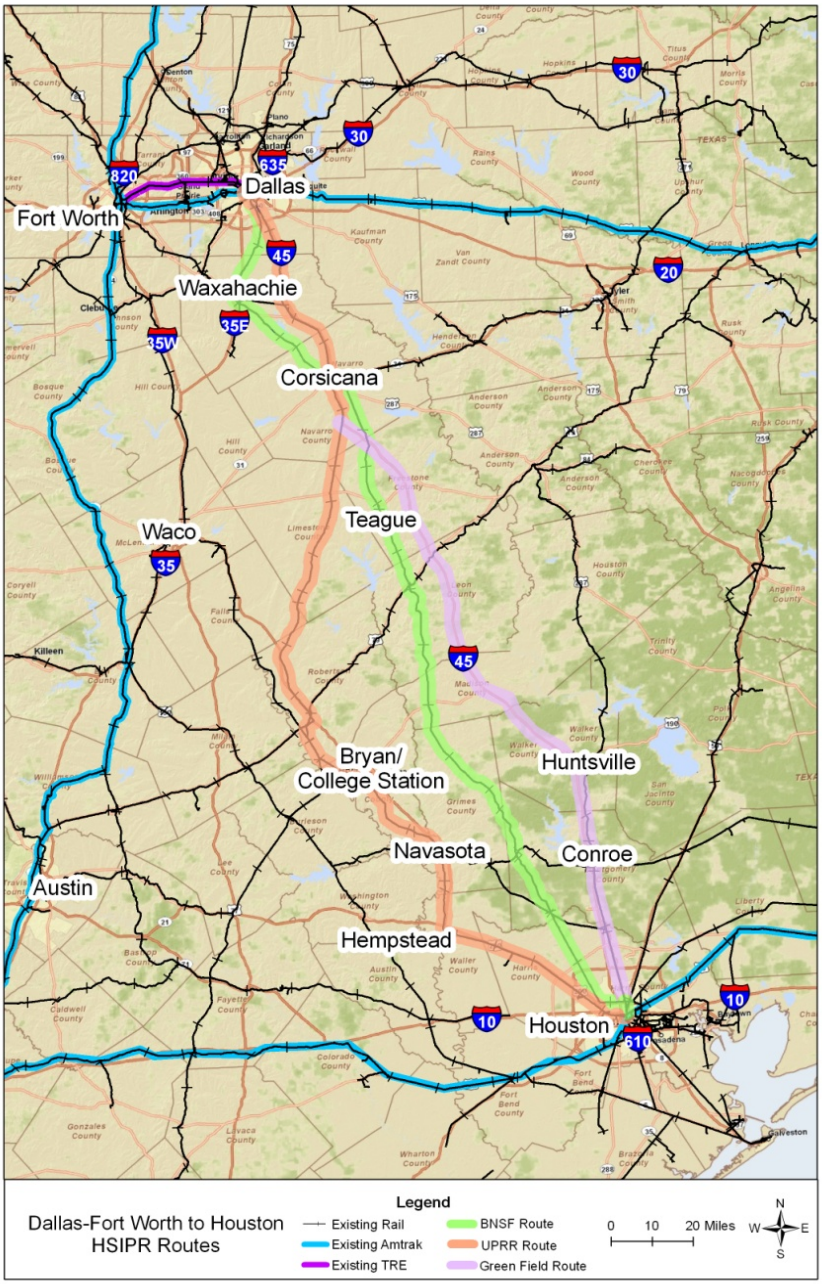

Figure 3: Dallas-Fort Worth to Houston Core Express High=Speed Passenger Rail Routes

Table 1. Freight Rail Lines Associated with Study Corridors – General Segment Description

Segment Detail	General Description of Rail Lines and/ or Adjacent Roadways	Segment RR
DFW to Houston, Option 1 (BNSF Route)		
Connection to Dallas Union Station	Dallas Subdivision	UP
Dallas to Teague	DFW Subdivision, Generally follows I-45 between Corsicana and Teague	BNSF
Teague to Houston	Houston Subdivision, Runs between TX 6 and I-45	BNSF
Connection to Downtown Houston	West Belt Subdivision, Parallels I-45	HBT
Connection to Houston Amtrak Station	Terminal Subdivision, Parallels I-10	UP
DFW to Houston, Option 2 (UPRR Route)		
Connection to Dallas Union Station	Dallas Subdivision	UP
Dallas to Hearne	Ennis Subdivision, Parallels I-45 to Corsicana and then splits west	UP
Hearne to Navasota	Navasota Subdivision, Parallels TX 6	UP
Navasota to Houston	Eureka Subdivision, Parallels US 290	UP
Connection to Houston Amtrak Station	Terminal Subdivision, Parallels I-10	UP
DFW to Houston, Option 3 (Green Field Route)		
Connection to Dallas Union Station	Dallas Subdivision	UP
Dallas to Richland	Ennis Subdivision, Generally follows I-45	UP
Richland to Conroe	Green Field route parallel to I-45	n/a
Conroe to Houston	Palestine Subdivision, Generally follows I-45	UP
Connection to Downtown Houston	West Belt Subdivision, Parallels I-45	HBT
Connection to Houston Amtrak Station	Terminal Subdivision, Parallels I-10	UP

BNSF Route Alternative

The BNSF Dallas-Fort Worth to Houston route through Teague as described for this project is approximately 250 miles in length with a total of two metropolitan statistical areas (MSAs) and one micropolitan statistical area as defined by the U.S. census. According to the 2000 federal census, over 5.1 million people resided in the Dallas-Fort Worth-Arlington metropolitan area, while the population of the Houston-Sugar Land-Baytown metropolitan area exceeded 4.7 million people. The micropolitan statistical area along the route is Corsicana, with a 2000 population of approximately 45,000.

Since the information obtained from various reports was published, the 2010 census data has been released. The Dallas-Fort Worth-Arlington metropolitan area experienced a growth of 23.4% to 6.37 million people, while the Houston-Sugar Land-Baytown metropolitan area grew by 26.1% to nearly 6 million people.

In addition to the 2000 population, Table 2 contains the 2008 census estimates and the expected 2040 population for all three MSA's in the corridor based on projections by the Texas State Demographer. The Dallas-Fort Worth-Arlington MSA is expected to almost double to over 10 million people by 2040. The Houston-Sugar Land-Baytown MSA is also expected to grow significantly, from 4.7 to 8.4 million in 2040. The Corsicana MicroSA is expected to reach 70,900 in 2040.

Table 2 shows the distance between the urban areas along the route and estimated travel time between urban areas for a variety of average rail operational speeds for an approximate 250 mile route.

Table 2. Dallas-Fort Worth to Houston MSA Population, Distances, and Estimated Travel Times

	Population			Distance		Travel Time (hours:minutes)				
MSA	2000	2008	2040	Segment	Cumulative	60 mph	80 mph	110 mph	150 mph	200 mph
DFW	5,161,500	6,265,000	10,106,800	0	0	0:00	0:00	0:00	0:00	0:00
Corsicana	45,100	49,300	70,900	60	60	1:00	0:45	0:32	0:24	0:18
Houston	4,715,400	5,718,700	8,400,100	190	250	4:10	3:07	2:16	1:40	1:15

Market Potential

This section exhibits several demographic and roadway travel statistics for the Dallas-Fort Worth to Houston corridor. Projected population numbers are presented by the Texas State

Demographer, while the roadway information comes from the TxDOT TxDOT's Road–Highway Inventory Network (RHiNo) database and FHWA Freight Analysis Framework database.

Population, Economic Activity, and Special Generators

The Dallas-Fort Worth to Houston corridor had a total population in the corridor MSA's of 9.9 million in 2000. The population level is expected to reach over 18.6 million people by 2040 as shown in Table 3. The average population per mile is expected to greatly increase from 39,618 in 2000 to 74,030 by 2040. Considerable growth is also expected in the segment of the population 65 years of age and older. Table 3 shows that in 2000 the percentage of the total corridor population over 65 years of age was 7.8 percent, while in 2040 that percentage is expected to increase to 17.8 percent of the total corridor population.

The corridor maintained in 2005 approximately 251,000 employer establishments that employed over 4.5 million persons in 2005. Finally, the total higher education enrollment in 2006 was over 233,000 students, as shown in Table 3.

Table 3. Dallas-Fort Worth to Houston Demographics

Data Element	DFW to Houston
Population	
2000	9,983,833
2040	18,655,657
Population per Mile*	
2000	39,618
2040	74,030
Population - Over 65	
2000	785,672
2040	3,321,769
Employment	
No. of Employees (2005)	4,503,956
No. of Employer Establishments (2005)	251,274
Total Public or Private University Enrollment (Fall 2006)	233,169

*Calculation using corridor length = 250 miles

Corridor Travel Patterns: Commercial Air Carrier Service

The existing commercial airports within the Dallas/Fort Worth to Houston corridor include Dallas/Fort Worth International (DFW), Dallas Love Field (DAL), Houston's William P. Hobby Airport (HOU), and Houston George Bush Intercontinental Airport (IAH). Table 4 represents the market distance between airport pairs within the corridor.

Table 4. Intrastate Passenger Air Service City-Pair Market Distance

Airport A	Airport B	Market Distance (Statute Miles)
DFW	HOU	247
DFW	IAH	224
DAL	HOU	239
DAL	IAH	217

In 2006, the total number of air trips between Dallas/Fort Worth airports and Houston airports was 1,643,640, which is a 2.45 percent decrease when compared to 1996. Between 1996 and 2008, specific indices for the air travel demand for Corridor Dallas/Fort Worth to Houston are shown in Table 5.

Table 5. Air Travel Demand for Corridor Dallas/Fort Worth to Houston from 1996 to 2008

Year	Number of Flights	Number of Passengers	Number of Seats	Load Factor
1996	68,265	4,328,035	6,822,809	0.63
2008	43,007	3,021,462	4,295,927	0.70
1996-2008 (Annual percent change)	-2.85%	-2.32%	-2.85%	0.84

In 2006, the average number of scheduled flights per day on the corridor between Dallas/Fort Worth and Houston is 130 flights per day. In Texas, nearly 71 million passengers were enplaned in 2007 and the number is expected to grow more than 104 million per year by 2025 according to FAA projected numbers. Houston George Bush Intercontinental (IAH), Houston's William P. Hobby (HOU), Dallas/Fort Worth International (DFW), and Dallas Love Field (DAL) airports are the four busiest airports in Texas and accounted for 81 percent of the total enplanements in the state in 2007.

Corridor Travel Patterns: Highway

The most direct highway route between the Houston area and Dallas-Fort Worth is along Interstate 45 (I-45). This corridor experienced a weighted corridor-average AADT increase of 4.57 percent each year between 1997 and 2006, with the 2006 AADT being 53,634 vehicles per day. The 10-year weighted AADT trend is shown in Figure 4. The projected average AADT levels are expected to reach over 106,000 vehicles per day over the corridor, as shown in

Table 6.

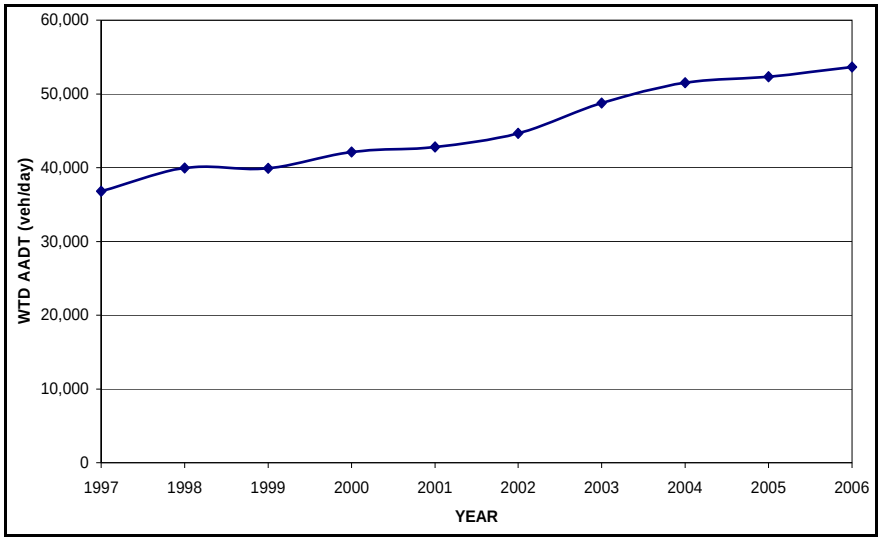

Figure 4. Dallas-Fort Worth to Houston 10-Year Weighted AADT, 1997-2006

The overall I-45 corridor volume-to-capacity ratio in 2002 was 0.60, with a 1.0 representing a roadway at capacity. The 2035 projected volume-to-capacity ratio worsens to an expected value of 1.28. This is shown in the 2002 and 2035 estimated average speed over the corridor dropping from 59 mph in 2002 to 39 mph in 2035. Finally, the number of trucks will increase along with the traffic growth in the corridor; however, the percentage of trucks along the corridor is expected to remain approximately the same at 19-20 percent in 2035. Table 6 shows the highway travel statistics.

Table 6. Dallas-Fort Worth to Houston Highway Travel Patterns

Data Element	DFW to Houston
% Annual Growth in Average Corridor AADT (1997-2006)	4.57%
Average Corridor AADT 2006 2035	 53,634 vehicles per day 106,475 vehicles per day
Average Volume-to-Capacity Ratio 2002 2035	 0.60 1.28
Average Speed 2002 2035	 59 mph 39 mph
Average % Trucks 2002 2035	 19.29% 20.12%

Potential Ridership

Approximately 3.3 million airline passengers and 4.0 million passenger automobiles travel between Dallas-Fort Worth and Houston each year. Based on an assumption of diversion rates to high speed rail of 70 percent from airline and 20 percent automobile travel, a potential ridership for the Dallas-Fort Worth to Houston core express high speed rail service may be approximately 3.1 million riders.

Existing Passenger Rail, Bus Transit, Intermodal Services, and Freight Rail

The following sections summarize the existing transit and freight rail services along the BNSF route between Dallas-Fort Worth and Houston. .

Existing Passenger Rail Service

No direct existing passenger rail service is available on the BNSF Dallas-Fort Worth to Houston route through Teague despite the heavy travel between the Dallas-Fort Worth and Houston. Amtrak service between the two regions was discontinued when Amtrak's Lone Star ceased operations, however connectivity does exist via Amtrak's Sunset Limited from Houston to San Antonio, then via Amtrak's Texas Eagle from San Antonio to Dallas, a trip that typically takes more than 17 hours.

Existing Bus Service

Greyhound provides intercity bus service nine times daily in both directions between Dallas and Houston, six times daily from Fort Worth to Houston, and eight times daily from Houston to Fort Worth.

Intermodal Facilities

Intermodal facilities include passenger train stations, bus stops/stations, transit centers and other facilities that could potentially become intermodal facilities if market demands and development allows. On the Dallas/Fort Worth to Houston Corridor, specific facilities are as follows:

- Dallas Union Station
- Fort Worth Intermodal Transportation Center
- Corsicana Greyhound Station
- Houston Amtrak Station
- Houston Greyhound Stations

Transit Agencies

- Dallas Area Rapid Transit (DART)
- The T (Fort Worth)
- Denton County Transportation Authority
- Collin County Area Regional Transit
- The District (Brazos Transit)
- METRO (Harris County)
- METRORail
- Connect Transportation (Texas City)
- Fort Bend County Transit

Existing Freight Rail Operations

Based on information obtained from the Class I freight railroads, as well as freight rail mobility studies conducted by TxDOT, the existing rail line segments between Dallas-Fort Worth and Houston along the BNSF route experience an average of 5 to 15 trains per day as shown in Table 7. Additionally, Table 7 provides expected train volumes on select rail segments based on a projected annualized growth rate of 3%.

Table 7. Freight Rail Lines Associated with Study Corridors – Segment Density and Volumes

Segment Detail	Segment Density (MGTM/Mi)	Current Volume (trains per day)	Future Volume* (trains per day)	Growth (trains per day)	Percent Growth
DFW to Houston (DFW and Houston Subdivisions)	10-20	5	20	15	200

*by the year 2035, excluding passenger trains.

UPRR Route Alternative

The historic and projected growth of the Bryan/ College Station metropolitan statistical area in-between Dallas-Fort Worth and Houston and its importance as a center for higher education and premier bio-medical and other services make it an attractive area for inclusion in the overall study corridor. The approximately 265 mile long Dallas-Fort Worth to Houston route through Bryan/ College Station traverses US 290 between Houston and Hempstead, then Texas Highway 6 (TX 6) from Hempstead through Bryan/ College Station, where it turns north to Corsicana.

Market Potential

This section demonstrates several demographic and roadway travel statistics for the Houston to Dallas-Fort Worth via College Station/Bryan route. Projected population numbers are presented by the Texas State Demographer, while the roadway information comes from the TxDOT Road–Highway Inventory Network (RHiNo) database and FHWA Freight Analysis Framework database.

Population, Economic Activity, and Special Generators

The Houston-Sugar Land-Baytown MSA population exceeded 4.7 million people in 2000, increased to 5.7 million in 2008 and to nearly 6 million in 2010 (according to the 2010 Census) and is expected to grow to 8.4 million people by 2040. The College Station-Bryan MSA is expected to grow from 185,000 in 2000 to 268,000 in 2040 and due to its historic educational and medical facilities, is likely to generate further development potential than the intermediate urban areas along the I-45 corridor between Dallas-Fort Worth and Houston. The Dallas-Fort Worth-Arlington MSA population exceeded 5.16 million people in 2000, increased to 6.27

million in 2008 and to 6.37 million in 2010 (according to eth 2010 Census) and is expected to grow to 8.4 million people by 2040.

Table 8 shows the distance between the urban areas along the corridor and estimated travel time along the entire corridor.

Table 8. Houston to College Station to Dallas-Fort Worth MSA Population, Distances, and Estimated Travel Times

	Population			Distance		Travel Time (hours:minutes)				
MSA	2000	2008	2040	Segment	Cumulative	60 mph	80 mph	110 mph	150 mph	200 mph
Houston	4,715,400	5,718,700	8,400,100	0	0	0:00	0:00	0:00	0:00	0:00
College Station	184,900	208,400	267,700	95	95	1:35	1:11	0:51	0:38	0:28
DFW	5,161,500	6,265,000	10,106,800	190	285	4:45	3:33	2:35	1:54	1:25

The Houston to Dallas-Fort Worth via College Station/Bryan route maintained a total population in the corridor MSA's of 10.1 million in 2000. The population level is expected to reach over 18.8 million people in 2040 as shown in Table 8.

Corridor Travel Patterns: Commercial Air Carrier Service

The existing commercial airports within the Houston to Dallas/Fort Worth via College Station corridor include Dallas/Fort Worth International (DFW), Dallas Love Field (DAL), College Station's Easterwood Field Airport (CLL), Houston's William P. Hobby Airport (HOU), and Houston George Bush Intercontinental Airport (IAH). Table 9 represents the market distance between airport pairs within the corridor.

Table 9. Intrastate Passenger Air Service City-Pair Market Distance

Airport A	Airport B	Market Distance (Statute Miles)
DFW	HOU	247
DFW	IAH	224
DAL	HOU	239
DAL	IAH	217
DFW	CLL	164
IAH	CLL	74

Corridor Travel Patterns: Highway

The projected AADT levels for the Houston to College Station segment of the corridor are expected to reach over 92,000 vehicles per day, as shown in Table 10.

The Houston to College Station segment weighted corridor volume-to-capacity ratio in 2002 was 0.65, with a 1.0 representing a roadway at capacity. The 2035 projected ratio worsens to an expected value of 1.71. This is shown in the 2002 and 2035 average speed over the corridor dropping from 44 mph in 2002 to 27 mph in 2035. Finally, the percent of trucks along the corridor is expected to remain consistent at 11-12 percent of overall traffic to 2035. Table 13 shows the highway travel statistics for the Houston to College Station segment prior to intersecting with the I-35 corridor as studied in 0-5930.

Table 10. Houston to College Station Highway Travel Patterns

Data Element	Houston to College Station
% Annual Growth in Average Corridor AADT (1997-2006)	3.85%
Average Corridor AADT	
2006	33,112 vehicles per day
2035	92,762 vehicles per day
Average Volume-to-Capacity Ratio	
2002	0.65
2035	1.71
Average Speed	
2002	44 mph
2035	27 mph
Average % Trucks	
2002	11.5%
2035	11.9%

Existing Passenger Rail, Bus Transit, Air Services, and Freight Rail

The following sections summarize the existing transit and freight rail services and routes in the Houston to Dallas Fort Worth via College Station route. These services overlap in several cases with those described previously for the BNSF route.

Existing Passenger Rail Service

No existing passenger rail service is available on this route. Previous Amtrak routes between Dallas-Fort Worth and Houston served the College Station area before being discontinued.

Existing Bus Service

In this corridor, Greyhound provides intercity bus service two times daily between Dallas and Houston via Waco and Bryan/College Station, one time daily between Fort Worth and Houston via Waco and Bryan/College Station.

Intermodal Facilities

Intermodal faculties include passenger train stations, bus stops/stations, transit centers and other facilities that could potentially become intermodal facilities if market demands and development allows. In the Houston to Dallas/Fort Worth via College Station Corridor, specific facilities are as follows:

- Arlington Greyhound Station
- Bryan Greyhound Station
- Corsicana Greyhound Station
- Dallas AAU Westmoreland Greyhound Station
- Dallas Union Station
- Dallas South Park Greyhound Station
- Fort Worth AAU
- Fort Worth Greyhound Station
- Fort Worth Intermodal Transportation Center
- Hearne Greyhound Station
- Hillsboro Greyhound Bus Stop
- Houston Amtrak Station
- Houston Greyhound Stations
- Navasota Greyhound Station
- Prairie View Greyhound Station
- Waxahachie Greyhound Station

A new Houston Northern Intermodal Facility has been planned/ proposed to be established in the corridor.

Transit Agencies

The corridor of Houston to Dallas/Fort Worth via College Station goes through four planning regions. There are seven existing transit agencies along the corridor, namely:

- Connect Transportation (Texas City)
- Dallas Area Rapid Transit (DART)
- Fort Bend County Transit
- Heart of Texas Council of Governments (HOTCOG) Rural Transit
- The District (Brazos Transit)
- The T (Fort Worth)
- Metropolitan Transit Authority of Harris County Houston Texas (METRO)

Existing Freight Rail Operations

The existing Union Pacific-owned freight rail lines within the Dallas-Fort Worth to Houston via College Station route consist of the Ennis Subdivision (Dallas to College Station), the Navasota Subdivision (College Station to Navasota), and the Eureka Subdivision (Navasota to Houston). In addition, the route includes short segments of the Terminal Subdivision in Houston and the Dallas Subdivision in downtown Dallas to connect to existing Amtrak stations. The Ennis Subdivision parallels I-45 from Dallas to Corsicana and then turns south toward College Station. The Navasota Subdivision parallels TX 6 to Navasota and the Eureka Subdivision parallels US 290 from Navasota to Houston. Table 11 represents the current train volumes as obtained from the freight railroad operators and various freight movement mobility studies conducted by TxDOT, and future train volumes per rail line segment based on an annualized growth rate of 3%. One item to note is that the UP utilizes relatively parallel routes to maintain specific directional operations. So based on operations, UP may use one route for northbound traffic, while utilizing a different route for southbound traffic. This would need to be taken into account in studying potential addition of passenger rail along these lines.

Table 11. Segment Density and Rail Volumes

Segment	Segment Density (MGTM/Mi)	Current Volume (trains per day)	Future Volume* (trains per day)	Growth (trains per day)	Percent Growth
Houston to Navasota (Eureka Subdivision)	5 - 10	5-10	20-30	15-20	100-200
Navasota to College Station	30-35	15-20	40-50	25-30	100-150

(Navasota Subdivision)					
College Station to Dallas (Ennis Subdivision)	50-70	20-30	40-75	20-45	100-150

*by year of 2035, excludes passenger rail

Green Field Route

A new 262 mile long green field route that parallels I-45 between Dallas and Houston was analyzed as a third alternative route. The green field route would utilize the existing UP Terminal Subdivision, HB&T West Belt Subdivision, and the UP Palestine Subdivision corridors to connect the green field portion of the route from Conroe to the Houston Amtrak Station. Additionally, the route would utilize the UP Ennis and Dallas Subdivisions to connect the green field segment from Richland (just south of Corsicana) to Dallas Union Station.

Market Potential

The demographic, air travel and roadway travel statistics for the DFW to Houston corridor along the I-45 green field route are the same as the BNSF route previously discussed.

Existing Passenger Rail, Bus Transit, Intermodal Services, and Freight Rail

The existing passenger rail and bus transit operations; intermodal facilities; and transit agencies are the same as the BNSF route previously discussed.

Existing Freight Rail Operations

The existing Union Pacific-owned freight rail lines within the green field route alternative consist of the Ennis Subdivision (Dallas to Richland) and the Palestine Subdivision (Conroe to Houston. In addition, the route includes short segments of the Terminal Subdivision in Houston and the Dallas Subdivision in downtown Dallas to connect to existing Amtrak stations. Table 12 represents the current train volumes as obtained from the freight railroad operators and various freight movement mobility studies conducted by TxDOT, and future train volumes per rail line segment based on an annualized growth rate of 3%.

Table 11. Segment Density and Rail Volumes

Segment	Current Volume (trains	Future Volume* (trains per day)	Growth (trains per day)	Percent Growth	Segment Density (MGTM/Mi)

	per day)				
Houston to Conroe (Palestine Subdivision)	30-35	75-85	45-50	150	60-90
Conroe to Richland	Green Field – no existing rail operations				
Richland to Dallas (Ennis Subdivision)	20-30	40-75	20-45	100-150	50-70

*by year of 2035, excludes passenger rail

Route Comparison

The route miles, one-way trip travel times, and estimated costs are shown in Table 12 for each route. As shown in Table 12, the Green Field route is the shortest in terms of route miles and trip times, though it is the most expensive.

Table 12. Route Comparison

Route Alternative	One-Way Trip Time (min)	Route Miles	Construction Cost	Existing Speed (mph)		Potential Speed (mph)	
				Maximum	Average	Maximum	Average
BNSF	194	250	$3,636,000,000	60	51	150	77
UPRR	200	265	$3,778,000,000	79	48	150	80
Green Field	190	240	$3,959,000,000	79	n/a	150	74

Travel Times

The top existing speeds, which range from 30 mph to 79 mph, and route miles along each route are listed in Table 13. Table 14 breaks down the maximum speeds for core express high speed passenger rail service along the alternative routes, with speeds up to 150 mph, that could feasibly be achieved by reducing curvature along the routes (assuming a maximum of 8 inch superelevation) and the corresponding length of the routes limited to those speeds. Table 14 also lists the average speed along each route as well as the estimated one-way trip travel time.

The one-way travel time, accounting for deceleration and acceleration, range from 190 to 200 minutes, with the green field route having the shortest trip time. The speeds could potentially be increased in order to reduce the trip time by further reducing degrees of curvature

at some locations. However, such modifications would likely have significant right-of-way impacts.

Table 13. Existing Rail Line Speeds and Operations

Route Alternative	Type of Service	Name of Operator	Top Existing Speeds		Number of Route Miles	Average Number of Daily One-Way Train Operations
			Passenger	Freight		
BNSF	Freight	BNSF (DFW Subdivision)	60	40	95	10
BNSF	Freight	BNSF (Houston Subdivision)	60	40	143	15
BNSF	Freight	HBT (West Belt Subdivision)	30	20	3.3	35
BNSF	Freight	UPRR (Terminal Subdivision)	30	20	2.1	20
BNSF	Freight	UPRR (Dallas Subdivision)	40	40	2.2	29
BNSF	Intercity Passenger	Amtrak (Sunset Limited on Terminal Subdivision)	30	20	2.1	2
BNSF	Intercity Passenger	Amtrak (Texas Eagle on Dallas Subdivision)	40	40	2.2	2
BNSF	Commuter	TRE (at Dallas Union Station)	40	40	0	22
UPRR	Freight	UPRR (Dallas Subdivision)	40	40	3.6	29
UPRR	Intercity Passenger	Amtrak (Texas Eagle on Dallas Subdivision)	40	40	3.6	2
UPRR	Commuter	TRE (at Dallas Union Station)	40	40	0	22
UPRR	Freight	UPRR (Ennis Subdivision)	79	60	140.5	25
UPRR	Freight	UPRR (Navasota Subdivision)	60	60	52.6	17
UPRR	Freight	UPRR (Eureka Subdivision)	45	40	65.2	8
UPRR	Freight	UPRR (Terminal Subdivision)	30	30	4	20
UPRR	Intercity Passenger	Amtrak (Sunset Limited on Terminal Subdivision)	30	30	4	20

Table 13 (Continued). Existing Rail Line Speeds and Operations

Route Alternative	Type of Service	Name of Operator	Top Existing Speeds		Number of Route Miles	Average Number of Daily One-Way Train Operations
			Passenger	Freight		
Green Field	Freight	UPRR (Dallas Subdivision)	40	40	3.6	29
Green Field	Intercity Passenger	Amtrak (Texas Eagle on Dallas Subdivision)	40	40	3.6	2
Green Field	Commuter	TRE (at Dallas Union Station)	40	40	0	22
Green Field	Freight	UPRR (Ennis Subdivision)	79	60	62.9	25
Green Field	None	None	0	0	128	0
Green Field	Freight	UPRR (Palestine Subdivision)	70	60	40.1	35
Green Field	Freight	HBT (West Belt Subdivision)	30	20	3.3	35
Green Field	Freight	UPRR (Terminal Subdivision)	30	20	2.1	20
Green Field	Intercity Passenger	Amtrak (Sunset Limited on Terminal Subdivision)	30	20	2.1	2

Table 14. Allowable Speeds and Travel Times

BNSF Route		UPRR Route		Green Field Route	
Distance (mi)	Allowable Speed (mph)	Distance (mi)	Allowable Speed (mph)	Distance (mi)	Allowable Speed (mph)
48	150	68	150	113	150
58	125	54	125	16	125
31	110	0	110	0	110
7	100	10	100	1	100
78	85	121	85	0	85
2	80	0	80	48	80
4	70	3	70	0	70
1	65	0	65	0	65
13	60	2	60	53	60
2.2	40	3.6	40	3.6	40
5.4	30	4	30	5.4	30
Average Speed w/o A&D*= 107		Average Speed w/o A&D*= 109		Average Speed w/o A&D*= 110	
Average Speed w/ A&D*= 77		Average Speed w/ A&D*= 80		Average Speed w/ A&D*= 74	
Trip Time = 194 minutes (3.25 hours)		Trip Time = 200 minutes (3.33 hours)		Trip Time = 190 minutes (3.17 hours)	

Estimated Costs

Infrastructure improvements such as curve reductions, signal improvements, grade separations and additional mainline tracks have been identified along with estimated costs that

would be required for core express high speed rail service with maximum speeds of up to 150 mph. The estimated costs shown for each route in Table 12 include the following items:

- Track work – upgrades to existing mainline track and new mainline track and track bed where needed to create a double track, new power switches at all turnout locations, new crossovers between the mainline tracks, modifications to curves to allow higher speeds
- Signal work – Upgrades to active warning devices at at-grade crossings (4-quad gates at public crossings, 2-quad gates at private crossings), hot box detectors, CTC signal systems in all locations they do not currently exist, PTC overlay for the full length of the route
- Structures – railroad bridges for the new mainline track, grade separations at railroad crossings, miscellaneous drainage structures, and grade separations at public at-grade crossings with high vehicular traffic volumes (ADT > 10,000)
- Earthwork – cut and fill
- Right-of-way acquisition – assumed new right-of-way will be required at locations of curve modifications. Costs associated with the purchase or lease of existing freight right-of-way are not included.
- Miscellaneous
    - Site Work – clearing, grubbing, landscaping
    - Utilities
    - Storm Water Pollution Prevention
    - Contractor Mobilization
    - Design Engineering, Permitting and Construction Management
    - 20% Contingency
- Rolling Stock – train sets
- Support Facilities – storage, maintenance and cleaning facilities
- Station Improvements – improvements and upgrades will be required at the existing Dallas Union Station and the Houston Amtrak station. Further analysis of the stations and refinement of individual improvements needed will be determined during the preliminary engineering and NEPA process.
- Electric Traction and Power Supply Station

Conceptual Engineering

Conceptual level engineering efforts in addition to the planning efforts previously summarized in this document were performed by BNSF to determine if fatal flaws existed for the implementation of core express high speed intercity passenger service on the BNSF Dallas to Houston route through Teague. A detailed fatal flaw analysis has not yet been performed on the UPRR route or the new green field route, although preliminary planning efforts identified improvements and associated costs required to implement high speed intercity passenger rail service along the routes.

Conceptual level engineering efforts revealed that there are no fatal flaws for the implementation of high speed intercity passenger service on the BNSF Dallas to Houston route through Teague. A conceptual drawing showing a high speed rail alignment next to the existing freight tracks along the BNSF Dallas to Houston route through Teague along with potential typical sections of the rail route are attached and listed in section G.2 of Part 1 of this application.

Conceptual engineering identified locations in Dallas/ Waxahachie, Corsicana, Teague, and Tomball/ Houston that would require additional engineering to maintain service to existing or prospective freight customers along the potential high speed route. The constraints at these locations were determined not to be fatal flaws, but would require either impacts to speed and transit times or increased costs.

Public Benefits Analysis

Transportation Benefits

Travel between Dallas-Fort Worth and Houston, one of the most travelled intercity pairs in Texas, is completely fueled by gasoline and jet fuel, exposing the connectivity of the state's two largest commercial centers to the economic consequences of rising fuel prices. The Department of Energy has determined that, in the absence of a major shift in the use of alternative energy, world demand for oil will increase 25 percent by 2030 during a unique and defining period in world history when the rate of world oil production levels off, as described in its report, Peaking of World Oil Production: Impacts, Mitigation and Risk Management. The consequence of this imbalance between the rise in oil demand and plateau in oil supply will be to push fuel prices higher, an inevitability which has airline officials questioning the long-term

viability of the aviation industry and foreseeing as many as 1,000 planes grounded and 80,000 employees released in the event that oil prices are sustained at $135 per barrel. The development of a Core Express Service between Dallas-Fort Worth and Houston provides a mode of travel that does not need to rely on oil-based fuels, providing a long-term remedy to both environmental and energy problems while promoting the continued economic growth and interaction of these two immense commercial areas.

Cross Modal Benefits

Airport infrastructure is funded through airline revenues, revenue and general obligation bonds, public (federal, state, and local) grants, and passenger facility charges. Less than 20 percent of annual infrastructure costs are covered by airline users and the airlines themselves, whereas up to 65 percent are paid through taxes and fees. The public cost of airport infrastructure is evident in the funding of Runway 8L-26R at George Bush Intercontinental Airport in Houston, of which 60 percent of the $300 million cost was funded through the Federal Aviation Administration. As the environmental and energy costs of operating airlines continues to grow, the continued allocation of resources to this mode of transportation should become directed toward the most necessary forms of air travel (i.e., longer distances) while alternative energy-based transportation systems, such as the Dallas-Fort Worth to Houston core express high speed rail service, are allowed to develop to accommodate shorter distance travel. Through this optimization of infrastructure development there will come an increase in airport capacity and decrease in congestion at airports and the supporting roadways.

Intermodal Connectivity

The Dallas Area Rapid Transit light rail system has been a rapidly expanding passenger rail network connecting Union Station, the downtown Convention Center, the Medical Center, and the Central Business District with the suburbs of Dallas, and connects with the Trinity Railway Express commuter line to Fort Worth. Houston is in the preliminary stages of developing commuter rail lines that will extend 30 miles to the northwest and 45 miles south to Galveston, which will both connect to a multimodal center that serves a growing METRO light rail system, which is planned to include an additional 30 miles of track in the future. These local and regional systems will provide the infrastructure necessary to integrate the Dallas-Fort Worth to Houston core express high speed rail service with feeder rail lines that extend to residential and commercial areas. The Dallas-Fort Worth to Houston core express high speed rail service

will also be integrated with plans for the high speed rail corridors connecting the metropolitan areas of Austin, Houston, DFW, and San Antonio. Connectivity with these rail corridors and other transit systems will increase potential ridership for the Dallas-Fort Worth to Houston core express high speed rail service.

Private Investment Opportunities

Attempts to develop a high speed rail network in Texas during the early 1990s were met with considerable resistance by the airline industry at that time. However, energy prices throughout most of this period were approximately one-fifth of 2011 oil prices, and the amount of short-haul (400 miles or less) airline passenger travel between Houston and Dallas has diminished by 36% since 1990. The loss in short-haul airline business in Texas, as well as nationally, is attributable to the cost of fares and growth in airport inconveniences, as well as periodic downturns in the economy. For example, the Dallas-to-Houston route provided by Southwest Airlines is one of the company's original short-haul routes, yet passenger travel has decreased on this route by 33 percent since 1990 even though its long-haul service has increased. During this time, Southwest's average passenger trip length has increased by 72 percent, reflecting the fact that the airline industry now tends to cater more toward long-haul travel than business dominated short-haul trips.

Houston and Dallas-Fort Worth businesses will remain in need of passenger transportation between these commercial centers in order to support economic growth within the state, and the development of the high speed rail line itself will provide economic opportunities for investors that stand to gain from an unmet need for reliable, affordable, and efficient intercity travel. Also, as the long-term cost of jet fuel continues to grow and the economic viability of airline companies becomes even more fragile, high speed rail systems may offer companies active within the aviation industry a suitable investment alternative and means of diversification.

Other Benefits

Environmental and Energy Benefits

Approximately 3.3 million airline passengers and 4.0 million passenger automobiles travel between Dallas-Fort Worth and Houston each year. At a modest 14 percent growth in this travel by 2035 and diversion rates to high speed rail of 70 percent from airline and 20 percent automobile travel, respectively, would save approximately 1.0 million barrels of oil annually.

Assuming the same correlation for the reductions in CO2 emissions (580,000 gallons of fossil fuel with 5,100 metric tons in reduction of CO2 emissions for the first year, as used in the Florida HSR PE/NEPA application) based on gallons of oil saved annually (1.0 million barrels as mentioned) and assuming 1 barrel of oil is 42 US gallons (42 million gallons for the corridor), this project could assume a reduction of CO2 emissions of 369,310 metric tons. Reduction in fuel use also results in reduction of other pollutants. Based on output from the Mobile 6.2 model and projected changes in travel by mode as described in that application, the reductions are shown to be 3,250 metric tons for VOC, 47,000 metric tons for CO, and 4,200 metric tons for NOX annually.

Currently Designated Nonattainment Areas in Texas

As of January 06, 2010, the nine counties in the Dallas-Fort Worth area (Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant) are designated as moderate nonattainment for 8-Hr Ozone by the EPA. In addition the eight counties in the Houston area (Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller) are designated as severe nonattainment for 8-Hr Ozone by the EPA. Figure 4 is a map of these counties.

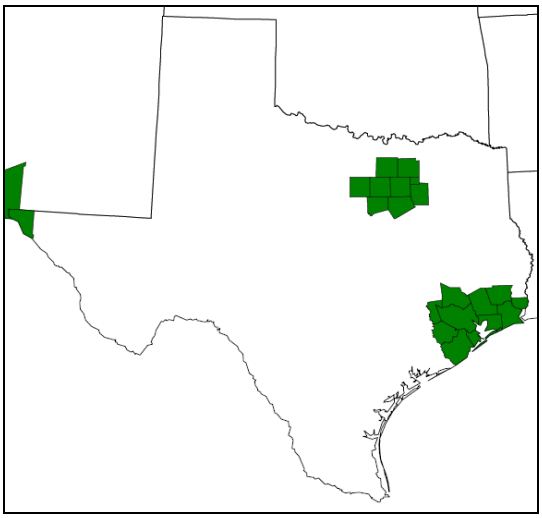

Figure 4. Texas Counties Designated "Nonattainment" for Clean Air Act's National Ambient Air Quality Standards (NAAQS).

There are tangible air quality and congestion management benefits that accrue to the public from the existence of the rail services and to the highway users in the form of improved traffic flow on the existing roadway system. Intercity passenger rail service is shown to have an

impact on congestion, and thus pollution, when targeted to areas where roads are at or near their design capacity. As more traffic uses these roads, travel time increases sharply and the delays are felt by all travelers. An intercity rail line that parallels IH-45 would potentially alleviate highway traffic. Rail adds capacity to the regional transportation system without the disruption and expense of highway expansion. Moreover, increasing rail capacity is as simple as adding another rail car or providing more frequent service.

According to Will Kempton, Director of the California Department of Transportation, in testimony provided to the House Committee on Transportation and Infrastructure, "Intercity passenger rail is estimated to use at least 15 percent less energy on a per passenger mile basis than the airlines and 21 percent less than the automobile." Mr. Kempton also noted that "the average intercity train produces 60 percent fewer CO2 emissions on a per passenger mile basis than the average auto and about half the green house gas emissions of an airplane."

A viable intercity rail system would also benefit the environment by limiting urban sprawl and concentrating development in close proximity to the rail lines.

Vehicles are a primary source of ozone-forming and greenhouse gas emissions in both Houston and Dallas-Fort Worth, both regions struggling to comply with federal air quality standards. Intercity high speed passenger rail will benefit air quality in the region by providing a viable, fuel efficient option to automobile or air travel, thereby reducing vehicle congestion, fuel consumption and emissions on interregional highways, as well as air traffic congestion and related emissions at airports. There is considerable passenger travel between Dallas-Fort Worth and Houston. While alternatives to single occupant vehicle travel are available in the major cities, there are little to no viable alternatives available between cities, leading to increased congestion and air pollution. Intercity passenger rail would remove vehicles from the road, reducing emissions and improving travel conditions for the vehicle trips that remain. Improvements in technology have had a considerable effect on the reduction of air pollution (emissions from new vehicles have declined over time as emission controls and fuel efficiency have improved). Further improvements in fossil-fuel burning vehicle emissions will, however, have less significant impacts.

According to the Competitive Enterprise Institute, throughout the metro areas in the nation, vehicle miles of travel are predicted to increase at a much higher rate than population growth. Therefore, in order to reduce criteria pollutants, even though we have cleaner vehicles, we must reduce vehicle miles of travel. Reduction in the growth of vehicle miles of travel

requires behavioral changes rather than solely relying on improvements in technology. The challenge is to reduce the length of most trips and to identify and implement strategies to encourage walking, bicycling and transit use, including intercity passenger rail.

The following reference the reality of the environmental benefits noted by intercity passenger rail on a local level and nationally:

According to the California based Sonoma – Marin Area Rail Transit's (SMART) Environmental Impact Report, SMART will prevent at least 30 million pounds of greenhouse gases from entering the atmosphere each year by removing 5,300 car trips daily from North Bay roads.

Nationally, The Center for Clean Air Policy and the Center for Neighborhood Technology estimate that completion of a national high-speed rail network would reduce car travel by 29 million trips and air travel by nearly 500,000 flights annually. Additionally, they estimate that a national high-speed rail network would reduce global warming pollution by 6 billion pounds, the equivalent of taking almost 500,000 cars off the road.

Concerning energy savings, intercity passenger rail could reduce our dependence on oil. According to a February 9, 2010 article by U.S. PIRG, the federation of state Public Interest Research Groups (PIRGs), "On average, an Amtrak passenger uses 23 percent less energy per mile than an airplane passenger, 40 percent less than a car passenger, and 57 percent less than a passenger in an SUV or pickup truck."

Job Creation/Economic Growth

Performing preliminary engineering and NEPA tasks are intermediate steps to creating large numbers of jobs in the construction and manufacturing industries. Based on the level of effort for engineering design, environmental clearance, and construction, the following table depicts the number of jobs which may be created to sustain this project:

Table 15. Schedule of Jobs Created (in Job-Years)

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Preliminary Engineering & NEPA Documentation	10	20	25	20					
Construction					2,000	3,500	6,000	3,500	2,000

Concurrently, recent redevelopment of Washington D.C's Union Station has demonstrated that train terminals can become the focal point for commercial redevelopment and promote substantial new development in the surrounding area. Recently, a study for the City of Chicago

estimated that revitalizing Chicago's Union Station along with High Speed Rail would bring $8 – 10 billion of new economic activity to Chicago. For the City of Chicago, a high speed rail hub will have the equivalent economic impact of a medium-sized airport located in the heart of the central business district – without having to displace a single office.

The same is applicable for both Houston and Dallas, at the sites of the current or previous train stations. Houston's Amtrak station is within close proximity to Houston METRO's light rail line, the University of Houston, and the downtown CBD. It is also a potential focal point for commuter rail trains that would enter the CBD from either the northwest, or southeast. Houston's METRO Solutions also is investigating connectivity to George Bush Intercontinental Airport from the Downtown CBD via a light rail line as well.

Revitalization of this area, currently populated with many abandoned warehouses, with Transit Oriented Development could create Class A office spaces, densely populated livable centers, and retail facilities. A September, 2009 analysis performed by the City of Houston indicated that in this economically disadvantaged area of Houston, revitalization of the existing train station locale would create a Brownfield site, and create 2,500 new jobs, and an estimated 20 NPV public benefit of nearly $30 million

Livable Communities

The benefits of urban commuter and light rail networks in Houston and Dallas will be more fully realized following construction of the high speed rail line connecting these metropolitan areas. No longer will the high volume of business travelers dispersed throughout these cities be faced with the inconveniences of airport screenings, delays, and processing that might be more tolerable for less frequent long-distance flights. Since most flights are currently accompanied by a commute to the airport by automobile, the interconnectedness of high speed rail and the local rail systems that link the urban core to the suburbs will greatly enhance transportation options in the two metropolitan areas that by far lead Texas in measures of gross domestic product.

The linkages provided to suburbs by planned and constructed light rail lines of Houston's METRO and Dallas' DART systems, as well as commuter rail for these cities, provide access between lower cost homes in the suburbs and job opportunities at commercial centers within the urban core. Connection of these lines to the Houston-DFW high speed rail line will enhance mobility between regions of affordable housing and intercity travel options, providing residents

of modest wealth the same opportunities to form business alliances and achieve personal growth as those who are more economically advantaged. In complement to this alternative mode of transportation comes a localized reduction in highway use that improves the livability of communities affected by highway infrastructure and increases the lifespan of public works investments. These reductions in highway use not only ease congestion and create a safer environment within local communities, but generate economic benefits through reductions in gasoline consumption as well.

Revitalization of the property around Houston's Amtrak Station, according to a September, 2009 City of Houston analysis, will also leverage nearly $400 million in private investment to create a Livable Community adjacent to the CBD with light rail access to the Texas Medical Center.

Incidentally, studies for the Chicagoland area, which may be comparable to Dallas-Fort Worth and Houston in terms of highway congestion and airport size, have also shown that high speed rail will provide $1.3 billion in highway congestion relief and $700 million in airport congestion relief.

Next Steps

Preliminary engineering and NEPA documentation for the Dallas-Fort Worth to Houston Core Express Service is needed to evaluate further the potential alternative routes and their potential impacts on the human and natural environment in order to determine a preferred route that meets the required service levels. Preliminary engineering will build on the previously-completed conceptual design and result in schematic level plans of the preferred alignment including track geometry, at-grade roadway-rail crossings, stations and maintenance and yard facilities. Preliminary engineering will also include probable cost estimates, project schedule, and construction phasing. The NEPA process will include an extensive public outreach effort, which will include identification of stakeholders, one-on-one meetings with affected railroads and property owners, and public meetings along the corridor. The NEPA documentation will establish the purpose and need for the Dallas/Fort Worth to Houston Core Express Service and evaluate potential social, economic and environmental impacts of various alternative routes. The analysis of impacts will follow FRA guidelines and regulations and include project level evaluations of each of the alternatives to air quality, water quality, noise and vibration, solid waste disposal, ecological systems, wetlands, threatened and endangered species, flood hazards

and floodplain management, coastal zone management, use of energy resources, use of natural resources, aesthetic and design quality impacts, impacts on other modes of transportation, barriers to the elderly and handicapped, land use, impacts on the socioeconomic environment, environmental justice, public health, public safety, recreational opportunities, historical and cultural resources, use of 4(f) protected properties, and construction period impacts. It is TxDOT's intent to select a preferred alignment, complete the preliminary engineering and NEPA documents in preparation for submittal of a future Final Design and Construction application(s) contemplating a public-private partnership.