



4.0 TRANSPORTATION IMPACTS

This chapter describes the anticipated transportation impacts of the No-Build and LRT Alternative. The evaluation is based upon the anticipated travel demand, transportation capacity, transportation performance measures, and impacts to the road network, parking, and freight delivery. The analysis was developed from 2030 travel demand forecasts for the project corridor using the NCTCOG's regional travel demand model. Where possible, quantitative and qualitative data are presented to show the relative performance measures and impacts of each alternative.

4.1 IMPACTS ON TRANSIT SERVICE AND RIDERSHIP

The proposed LRT Alternative would extend service from the existing LRT system in downtown Dallas through northwest Dallas and Irving to a terminus at Belt Line Road in DFW International Airport (See Chapter 2 for a detailed description). A DART bus network with 14 routes and one transfer station with park-and-ride lots currently serves the corridor (see Chapter 3, Existing Conditions). The DART bus service includes local, express, circulator and cross-town routes. These buses operate in mixed traffic on IH 35E and on local arterials. The proposed LRT Alternative would expand fixed guideway transit from downtown Dallas and increase the reliability of transit service in the corridor, particularly for commuters to downtown Dallas.

4.1.1 Transit Levels of Service

Current bus transit service in the project corridor operates in mixed traffic on city streets and on IH 35E, SH 114 and SH 161. The transit service currently carries approximately 1.1 percent of the total travel demand in the corridor.

While the bus system would evolve to better accommodate future travel demand patterns in the No-Build Alternative, buses would still operate under unpredictable, mixed traffic conditions on area roadways and highways. The proposed LRT Alternative would provide an exclusive guideway that would provide increased reliability and the potential for travel time savings. When connected to the existing DART LRT system, the proposed LRT Alternative would also provide increased transit mobility to origins and destinations throughout the DART Service Area. As shown by the performance measures in **Table 4-1**, the DART transit system would experience increased ridership, increased passenger miles, and increased passenger hours with the LRT Alternative compared to the No-Build Alternative. These levels of service measures are commonly used to assess transit system performance.

Table 4-1 shows that total system-wide rail ridership would increase by about 12,575 riders per day (an increase of eleven percent) and total system-wide transit usage would increase by about 33,670 unlinked trips daily (an increase of over nine percent as compared to the No-Build Alternative). Unlinked trips provide a measure of the number of persons using each route or mode of travel. **Table 4-1** also shows that total system-wide transit passenger miles are estimated to increase from 1.77 million in the No-Build Alternative to 1.94 million in the LRT Alternative (an increase of more than nine percent as compared to the No-Build Alternative). Total system-wide passenger hours, on the other hand, would increase only six percent in the LRT Alternative. These trends indicate an increased system-wide efficiency of travel time savings would result from the LRT Alternative because there would be more passengers traveling longer distances with reduced travel times.

Geographic Coverage

The No-Build Alternative would not expand the geographic coverage of transit service beyond the area traversed by the 14 bus routes currently operating in the project corridor. The level of bus service would increase as the employment and/or population of the corridor increases, particularly with the addition of HOV lanes on SH 114 and IH 35E south of IH 635. However, anticipated



increases in traffic congestion would make the bus transit service with the No-Build Alternative less reliable, regardless of capacity or route expansions.

**TABLE 4-1
2030 TRANSIT SYSTEM LEVEL OF SERVICE
PERFORMANCE MEASURES (DART SYSTEM-WIDE)**

Daily Performance Measure	Alternative	
	No Build ¹	LRT Alignment ²
Unlinked Transit Trips		
1) Local Bus	221,417	239,137
2) Express Bus	6,811	4,622
3) Fixed Guideway	139,960	158,103
4) Total	368,188	401,862
5) Added Trips		33,674
Rail Ridership		
1) Fixed Guideway	112,695	125,270
2) Added Transit Riders		12,575
Passenger Miles		
1) Total	1,775,144	1,938,114
2) Percent Change		9.18%
Passenger Hours		
1) Total	78,354	83,625
2) Percent Change		6.73%
¹ YR25MAR05_NWIRV_OPTA_NOSLC_RDWY, 2030 No Build model run, DART, December 2005		
² YR25MAR05_NWIRV_OPTA_NOSLC_RDWY, 2030 Build model run, DART, December 2005		

Source: NCTCOG, DART; December 2005 and March 2006

The LRT Alternative would expand the geographic coverage of fixed guideway transit service from Dallas along Spur 482 into Irving following SH 114 (John W. Carpenter Freeway) to the Las Colinas Urban Center, then crossing the President George Bush Turnpike onto Dallas/Fort Worth International Airport (DFW Airport) property. This would allow continuous, high-speed transit service along an exclusive guideway with 8 transit stations. A feeder bus system would bring transit riders to the LRT stations. The feeder bus service would expand the geographic coverage of the LRT system far beyond the effective range of the No-Build Alternative through the corridor as a whole.

Hours and Frequency of Service

The LRT Alternative would have a peak-hour headway of 10 minutes and an off-peak (mid-day, evening, and weekend) headway of 20 minutes. The LRT vehicles are capable of a maximum operating speed of 65 miles per hour; however, average speeds are much lower. The vehicles would have an average station dwell time of 20 seconds. **Table 4-2** shows the preliminary operating plan and station-to-station travel times for the LRT Alternative.

Generally, two-vehicle trains would operate most of the day, with three-vehicle trains operating during the peak period, and single-vehicle trains operating during evening hours of low usage. The operating hours for the LRT Alternative would be from about 5:00 AM until 12:30 AM, seven days a week. Peak hour service would be provided Monday through Friday between 6:00 AM and 9:00 AM in the morning, and between 3:00 PM and 6:00 PM in the afternoon. This schedule is the same as that for DART's existing LRT system.

The fares would be based on DART's current fare structure for the existing LRT system (\$1.25 per one-way trip for light rail riders). Transfers to and from the LRT system from the feeder buses would require a second fare (\$1.25 for the bus trip and \$1.25 for the light rail trip). LRT riders



transferring to or form an express bus route (i.e., premium service) would pay a one-way fare of \$2.50. Senior citizens, the mobility impaired, and students would have reduced fares of \$0.50.

**TABLE 4-2
PRELIMINARY OPERATING PLAN FOR THE LRT ALTERNATIVE**

LRT Alternative		
6 Stations	Distance from Station to Station (Miles)	Travel Time between Stations (Minutes)
Bachman Station to University of Dallas	2.8	4.09
to Lake Carolyn	1.9	3.45
to North Las Colinas	0.7	1.83
to Carpenter Ranch	1.0	2.14
to North Lake College	1.0	2.00
to Belt Line Road	1.6	2.28
TOTAL *	9.0	15.79

* Total Project length is 9.3 miles, including 0.3 miles of tail track extending beyond the Belt Line station platform.

Source: DART; January 2006

Parking in park-and-ride lots would be free. These fares are similar to the No-Build Alternative bus service fares. A variety of annual passes, monthly passes and day passes would also be offered for trips throughout the DART LRT and Commuter Rail system.

Travel Times

Ideally, transit alternatives should provide reduced travel times to downtown Dallas when compared to automobile travel (the No-Build Alternative). Due to longer routes and dwell times at each stop and/or station, transit alternatives can take more time to reach their destination than passenger cars, particularly during off-peak hours. However, the benefits of ease of travel, consistent travel time due to an exclusive guideway that is not subject to incidents or accidents, and elimination of the inconvenience and expense of parking in downtown can outweigh the lack of a travel time savings. During peak periods, transit can provide considerable travel time savings, particularly when roadway incidents are present.

In addition, the LRT Alternative would provide travel time savings to existing transit riders destined to downtown Dallas from within the project corridor. **Table 4-3** shows the difference in average transit travel times from existing transit stops to downtown Dallas for the No-Build Alternative (bus transit) and for the LRT Alternative. Depending on the time of day, the LRT Alternative would save up to 67 minutes for transit riders from the Belt Line Station, up to 32 minutes from the North lake College Station, and up to 49 minutes from University of Dallas Station over the No-Build Alternative.

Transfers

The No-Build and LRT Alternatives would both use the DART bus network to transfer riders to and from the LRT system. With the No-Build Alternative, transit patrons would use the DART bus system to transfer to other bus routes at the North Irving Transit Center. A limited number of transit patrons within the corridor would also use the DART bus system to transfer to the existing LRT system at the current West CBD Transfer Center, which is close to the West End LRT Station. Transit patrons would also be able to use the bus system to access the future Carrollton-Farmers



Branch LRT Line at the Bachman Station. The No-Build Alternative would result in 64,700 system-wide transfers from buses to the LRT system daily.

TABLE 4-3 TRANSIT TRAVEL TIMES FROM SELECT ORIGINS AND DESTINATIONS		
To West Transfer Station from:	In-Vehicle Transit Travel Time (minutes)	
	No-Build (Bus) (AM/Off-peak/PM)	LRT Alternative
Belt Line Road	95 / 71 / 90	28
North Lake College	54 / 57 / 55	25
Carpenter Ranch	26 / 24 / 31	24
North Las Colinas	22 / 20 / 25	22
Lake Carolyn	20 / 16 / 21	20
University of Dallas	43 / 66 / 54	17

Source: Parsons Transportation Group, DART; December 2005

With the LRT Alternative, many transit riders would use the feeder bus network to transfer to the proposed LRT stations along the project corridor. For the LRT Alternative, there would actually be more transfers than the No-Build Alternative because more riders would be attracted to the system, the feeder bus network would supply a large number of the transit riders to the LRT extension, and several express bus routes to downtown would no longer exist within the corridor. The LRT Alternative would result in 72,850 system-wide transfers from buses to the LRT system daily, an increase of almost 13 percent compared to the No-Build Alternative.

The predominant mode of access to the LRT system will vary by each LRT station; however, most of the LRT riders would transfer from the feeder bus service. Approximately 16 percent of LRT riders would transfer to the new rail line from other rail lines, 3 percent would transfer from the Las Colinas Automated People Mover, 24 percent would drive to the LRT stations, 9 percent would access the system by walking, and 48 percent would use local bus service to access the LRT Alternative in 2030.

Reliability

The No-Build Alternative would use the DART bus transit system on the existing corridor roadways under mixed-traffic travel conditions. Therefore, the bus system in the No-Build Alternative would be subjected to similar travel speeds and delays resulting from peak hour congestion on the roadways within the corridor. Many of the major arterials and freeways within the corridor operate at Volume to Capacity ratios meeting or exceeding the upper limit of 0.9, an indication that traffic conditions are unacceptable during the peak hour. As a result, the buses operating in the mixed traffic environment would generally have decreased reliability and increased travel times.

The LRT Alternative would operate on an exclusive guideway and would not be subjected to traffic and traffic signal delays on the major thoroughfares within the corridor. The LRT vehicles would have preemption traffic signals at all grade crossings to insure few, if any, delays. Although the LRT may experience longer travel times compared to the No-Build Alternative during optimal traffic conditions, the LRT Alternative would provide transit riders with a more reliable transit service than the No-Build Alternative because it would not be susceptible to the occasional congestion created by traffic incidents. This is also reflected in the increased number of system-wide transit riders after implementation of the LRT Alternative.

Comfort and Convenience

The No-Build Alternative would provide few enhancements to the existing comfort and convenience of transit service in the corridor. In fact, the No-Build Alternative would be more



susceptible to the inconvenience of lower service reliability due to roadway congestion and incidents.

The proposed LRT Alternative would provide enhanced comfort and convenience for transit riders on the DART system as compared to the No-Build Alternative. The LRT system would provide transit service to passengers with conveniently located stations and air-conditioned light rail vehicles. The LRT Alternative would be fully accessible for mobility-impaired patrons and would enhance regional mobility for transit dependent populations much more than the No-Build Alternative. Additionally, the LRT Alternative would operate within an exclusive guideway on continuously welded rail with fewer of the stop-and-go movements associated with conventional bus transit service. Since LRT service would replace the existing Irving express bus routes to downtown Dallas, bus patrons currently utilizing these routes would be required to use the LRT. Compared to the express bus routes, the LRT Alternative would provide improved service reliability to downtown Dallas, increased passenger capacity, a comparable level of comfort, and a lower fare (i.e., a \$1.25 one-way LRT fare compared to a \$2.50 one-way premium express bus service fare).

4.1.2 Transit Ridership

The transit ridership anticipated for each alternative was estimated in terms of both “linked” and “unlinked” passenger trips. The forecast of linked passenger trips includes all travel from the point of origin to the point of final destination as a single trip, regardless of whether or not there was a transfer from one mode to another (e.g., bus to rail). Therefore, the linked trip counts all of the individual segments of travel as one trip. The forecast of unlinked trips counts each segment of a trip on an individual mode as a separate trip, regardless of transfer (e.g., a bus ride and transfer to the rail system to reach a given destination equals two individual trips). Linked trips provide an estimate of the number of people who use the transit system, while unlinked trips provide a measure of the number of people using each route or mode of travel. Thus, for the following analysis of transit patronage, both linked and unlinked passenger trips are used to describe estimated 2030 ridership characteristics for each alternative.

Total Transit Riders

To determine the total system-wide daily transit ridership for each alternative, the forecast of unlinked transit trips in 2030 was developed using the North Central Texas Council of Governments (NCTCOG) travel demand model. These unlinked transit trips include ridership by mode including local bus, express bus, and LRT. As shown in **Table 4-1**, the total daily unlinked transit trips range from 368,200 for the No-Build Alternative to 401,900 for the LRT Alternative. Therefore, the LRT Alternative would result in an increased daily ridership of about 33,700 unlinked transit trips system-wide in 2030.

Rail Ridership by Alternative

The forecast of daily ridership for the LRT Alternative includes passengers who would access the passenger rail system at stations from automobiles, walking, and from bus transfers. This estimate was developed using linked trips to count only those riders using the rail system and to prevent double counting. This is done by eliminating the effect of transfers on the total number of system riders to account for the net increase in system ridership. The resulting forecast of 2030 daily linked trips produced by DART’s model indicates that the system-wide rail ridership would increase from 112,695 for the No-Build Alternative to 125,270 for the LRT Alternative, as shown in **Table 4-1**. This indicates that 12,575 more passengers would use the proposed LRT service daily in 2030.

Special Generator Ridership

Special generators, such as large sporting events, do not produce trips on a regular weekday basis throughout the year. For that reason, these types of special generator trips are not addressed in the NCTCOG regional travel demand model. However, understanding the potential for special generator ridership can enhance the accuracy of travel demand forecasts. The proposed LRT



alignment has one potential special events venue along the corridor: the Las Colinas Urban Center, which includes the Irving Convention Center.

Station Volumes and Boardings/Alightings

The stations proposed for the LRT Alternative were selected due to their proximity to population and employment centers, major existing transportation facilities, and ease of access by bus, car, or walking. **Table 4-4** shows the anticipated 2030 daily volumes of transit passengers at each of the stations in the LRT Alternative. As shown in the table, most stations can be categorized as primarily an origin station or a destination station. A few stations serve both functions roughly equally. The two deferred stations (Loop 12 and South Las Colinas) are not included in the ridership projection. These stations may be implemented as development warrants.

TABLE 4-4 DAILY LRT ALTERNATIVE STATION PASSENGER VOLUMES IN 2030				
Station	Boardings ¹	Alightings ²	Total Station Volume	Total Station Riders
LRT ALTERNATIVE⁴				
University of Dallas	859	1604	2463	1232
Lake Carolyn	327	1585	1912	956
North Las Colinas	1174	2838	4012	2006
Carpenter Ranch	312	548	860	430
North Lake College	1687	735	2422	1211
Belt Line Road	2081	1955	4036	2018
TOTALS³	6440	9265	15705	7853
¹ Number of trips to and from station where station is the origin of a one-way or round trip. ² Number of trips to and from station where station is the destination of a one-way or round trip. ³ Total Boardings and Alightings are not equal because the entire DART LRT system is not represented in this table; many of those who board within this study corridor have destinations outside of the study corridor. ⁴ YR25MAR05_NWIRV_OPTA_NOSLC_RDWY, 2030 Build model run, DART, Dec. 2005.				

Source: Parsons Transportation Group; DART; December 2005

Most stations in the corridor would serve as origin stations for round trips to downtown or other areas within Dallas, but some stations in the corridor would serve as destinations in their own right. Specifically, the University of Dallas, Lake Carolyn, North Las Colinas and Belt Line stations would be major destination stations within the corridor due to the high-density employment in those areas and the high number of patrons and visitors that use those facilities. North Las Colinas is the largest destination station due to the Urban Center. North Las Colinas, North Lake College and Belt Line Stations are the origin stations with Belt Line being the largest origin station because it is at the end of the line.

As shown in **Table 4-4**, the stations anticipated to have the greatest volumes of passengers are Belt Line and North Las Colinas Stations; both having nearly the same volumes. They serve as major origin and destination stations because Belt Line is at the end of the line and North Las Colinas serves employment and residents in the Urban Center.

Four of the six stations would have park-and-ride lots and all would have substantial feeder bus service. Major destination stations (University of Dallas and Lake Carolyn) would also be served by feeder bus service, but would not have park-and-ride lots. The Belt Line Station (a major origin and destination station) would be the northwestern terminus of the LRT Alternative and is expected to draw riders from a broad area of the corridor and beyond via automobile. This station would have the largest park-and-ride lot with approximately 743 spaces.

4.2 HIGHWAY AND ROADWAY IMPACTS

The existing highway system in the Irving/DFW LRT corridor includes several freeways, a tollway and a network of arterial and local streets (see **Figure 4-1**).