

## 2.0 ALTERNATIVES CONSIDERED

This chapter describes the alternatives considered during the Northwest Corridor Major Investment Study (MIS) and the alternatives considered in the Draft and Final Environmental Impact Statements (EIS).

### 2.1 MAJOR INVESTMENT STUDY (MIS) ALTERNATIVES

The Northwest Corridor MIS covered a large study area that included both the Farmers Branch/Carrollton corridor, a long identified and defined candidate travel corridor for transit improvements, and the Irving/DFW corridor, an emerging transit corridor. The MIS alternatives served both travel corridors. As noted previously, a separate EIS will be prepared for the Irving/DFW corridor. Thus, the discussion below focuses on the MIS alternatives developed for the Northwest Corridor LRT Line to Farmers Branch and Carrollton.

#### 2.1.1 Screening and Selection Process

The screening and selection process for the Northwest Corridor MIS consisted of two distinct phases: Conceptual and Detailed Evaluation. The Conceptual phase considered single-mode elements and evaluated their performance. The most promising were carried forward to the Detailed Evaluation phase. The Detailed Evaluation phase refined each element and grouped them into “packages” of strategies to address transportation needs. The packages were analyzed, and from these a single LPIS was selected. The No-Build and Transportation System Management/Transportation Demand Management (TSM/TDM) Alternatives were carried through the entire evaluation process for comparison. LRT and Commuter Rail were carried forward as rail technologies to consider. Many alignment alternatives were considered. High Occupancy Vehicle (HOV) Lane and Highway widening options were also carried forward into the Conceptual and Detailed Evaluation.

#### 2.1.2 Conceptual MIS Alternatives

The conceptual alternatives considered during the Northwest Corridor MIS focused on the range of LRT and Commuter Rail options available to serve corridor travel needs. The No-Build, TSM/TDM, and HOV/Highway options were carried forward to the Detailed Evaluation.

Commuter Rail alignments generally followed the DART-owned UPRR ROW to SH 121. Routing options examined included use of the Burlington Northern Santa Fe railroad north of Belt Line Road to Legacy Park and an option to serve Love Field Airport directly. Commuter rail alternatives emphasized use of existing railroad rights-of-way.

Several LRT alternatives were evaluated. More LRT alternatives were defined given the flexibility of LRT to deviate from railroad rights-of-way, provide a greater number of stations, and provide appropriate vertical separation from streets. As with Commuter Rail, LRT alignments also generally followed the UPRR to SH 121. Routing options included the use of portions of Harry Hines Boulevard in the Medical Center area and potentially to LBJ Freeway, as well as direct access to Love Field.

The full evaluation of conceptual alternatives is documented in the ***Conceptual Definition of Alternatives and Conceptual Evaluation Results Report*** (DART, March 1999). Based on the evaluation results a range of alternatives was defined for the detailed evaluation as described in the following section. The key alignment decisions resulting from the conceptual evaluation are as follows:

- Stay in the UPRR corridor but revise the alignment to reflect a Harry Hines alignment through the Medical Center district based on higher ridership potential, as well as public, Medical Center, and City of Dallas support;

- Continue to study the tunnel option to serve Love Field for LRT only; and
- Continue to examine a potential Griffin LRT alignment through the new Arena development.

### 2.1.3 Detailed MIS Alternatives

The Detailed Evaluation phase considered the alternatives carried forward from the conceptual phase. The No-Build and TSM/TDM Alternatives were carried forward through the Detailed Evaluation for comparison purposes. Several highway widening and HOV Lane Alternatives were also defined. The **Final MIS Report** (DART, October 2000) documents these as well as the rail alternatives in detail.

The evaluation of the detailed alternatives focused on ridership, costs, and cost-effectiveness. Several refinements were made throughout the process to optimize these factors, while minimizing potential social, economic and environmental impacts.

### Commuter Rail Alternatives Considered

The Commuter Rail Alternatives defined for detailed evaluation in the MIS generally followed the UPRR alignment. North of Belt Line Road, two options were considered: to SH 121 on the UPRR, or to Legacy Park on the BNSF RR. The key refinement to the Commuter Rail alternatives was to truncate the UPRR option at Frankford Road to enhance cost-effectiveness and maintain services within the DART Service Area.

### LRT Alternatives Considered

Several LRT alternatives were developed for the detailed evaluation. Alignments generally followed the UPRR Corridor to SH 121, with the Harry Hines alignment through the Medical Center. Routing options were examined near downtown (follow the TRE Corridor west of new Victory development and arena, or use a potential Griffin Street alignment that could be integrated into the Victory development) and to Love Field (stay on the UPRR corridor west of Love Field or access the terminal area via a tunnel alignment). As with Commuter Rail, one alternative tested the use of the BNSF RR north of Belt Line Road. The key refinement during the detailed evaluation was to truncate the UPRR alignment options at Frankford Road.

Based on the detailed evaluation results, the rail element of the LPIS was selected to reflect LRT in the Northwest Corridor as shown in **Figure 2-1**. In addition to the rail element, the LPIS recommended highway and HOV improvements to the IH 35E and SH 114 freeway corridors and LRT in the Irving/DFW corridor. These recommendations are fully documented in the **Final MIS Report** (DART, October 2000).

### 2.1.4 Rationale For Choosing The Locally Preferred Investment Strategy (LPIS)

The Northwest Corridor MIS resulted in the identification of a Locally Preferred Investment Strategy (LPIS) that included TSM/TDM, Highway and HOV lane improvements, and Light Rail Transit. TXDOT, NCTCOG, DART, and/or local jurisdictions will accomplish the TSM/TDM, Highway and HOV lane elements of the LPIS through separate efforts. The LRT element of the LPIS was divided into two projects: The LRT Line to Farmers Branch and Carrollton and the Irving/DFW Line. The Irving/DFW Line will be advanced to the PE/EIS phase in early 2003. The focus of this EIS is solely on the LRT Line to Farmers Branch and Carrollton.

The rationale for selecting the LPIS was based on a comprehensive evaluation and trade-off analysis and an extensive public and agency involvement program as documented in the **Final MIS Report** (DART, October 2000). Key findings that support the selection of the LPIS include:

- LRT alternatives were more cost-effective and had higher system-wide and corridor transit ridership than Commuter Rail;

**Figure 2-1** Locally Preferred Investment Strategy (LPIS) Rail Element

- Public and agency input supported LRT over Commuter Rail, given the ability to have more stations, penetrate key activity centers, and influence land use planning;
- Remaining on the UPRR served the travel pattern better, avoided sensitive neighborhoods and was more cost-effective than the BNSF RR;
- Truncating LRT at Frankford was more cost-effective than extending it to SH 121 and located the project within the DART Service Area boundary; and,
- Public and agency input, at the time of the MIS, supported access to Love Field and the use of Harry Hines through the Medical Center area.

Based on the above findings, the DART Board approved the Northwest Corridor LPIS on February 22, 2000. As shown in **Figure 2-1**, the LPIS recommendation included further consideration of LRT alignments – or design options – in two areas: Love Field and the Victory Development area (American Airlines Center) along Griffin Street.

The Love Field area was considered during the Draft EIS process, and is discussed further in Section 2.3.2. The Griffin alignment, though included as an area for further study as part of the LPIS recommendation, is not being addressed in this EIS. Rather, this alignment option will be examined in the context of the need for additional CBD transit capacity as part of the DART 2030 Transit System Plan effort (currently underway).

## 2.2 SELECTED LRT ALTERNATIVE

The Selected LRT Alternative is shown in **Figure 2-2**. The proposed project reflects decisions made by the DART Board after the Draft EIS circulation period and after the subsequent April 2003 public hearing regarding project changes in the Medical Center area. The first decision, made on August 13, 2002, approved Northwest Rail Operating Facility (NWROF) Site 3 at Lombardy Lane and Denton Drive. Information related to other sites considered is included in Section 2.3.3 and Appendix G. The second decision was made on September 17, 2002, and approved an amendment to the DART Service Plan to select Medical Center Design Option D as the preferred alignment through the Medical Center area. The Base Alignment was retained in the Love Field area due to financial constraints associated with the implementation of the Love Field Design Option as part of the Northwest Corridor build-out.

After approval of Option D, DART began more detailed coordination with Parkland Hospital on integrating Option D into their master plan. Significant design and cost issues resulted in re-examination of the DART-owned UPRR right-of-way through the Medical Center area. This alignment change, as well as refinements to the Market Center/Oak Lawn and Inwood Stations and a new grade separation of Maple Avenue was presented at a public meeting on April 3, 2003. A formal public hearing to obtain comments to support the Service Plan amendment and for inclusion in the Final EIS was held on April 10, 2003. Following this public hearing, the DART Board approved the alignment and station changes in the Medical Center area. The Selected LRT Alternative reflects these changes and is described below. More detailed information related to the Medical Center alignment, as well as on other alignments considered in the Draft EIS, is contained in Section 2.3.

The project would include approximately 17.6 miles of double-tracked LRT from downtown Dallas through the cities of Dallas and Farmers Branch to Frankford Road in Carrollton.

Two principal features define the physical aspects of the Selected LRT Alternative. The first is the proposed alignment for the LRT guideway, which includes the tracks, trackbed, overhead electric system (catenary), and ancillary equipment (including Traction Power Substations). The second feature is the stations where patrons will board and alight from LRT vehicles. In addition, the Selected LRT Alternative includes the Northwest Rail Operating Facility (NWROF). The proposed project, including a discussion of the plans for rail and bus operations, is described below.

**Figure 2-2** Selected LRT build Alternative

### 2.2.1 Alignment

Figures 2-3, 2-4, and 2-5 identify the vertical alignment of the project: at-grade, below-grade, and aerial configurations. The proposed project would be an extension of the existing DART LRT system, which operates on two-track, two-way continuously welded steel rails. The line would be served by twelve new stations: Victory, Market Center/Oak Lawn, Parkland, Inwood, Brookhollow, Bachman, Walnut Hill/Denton, Royal Lane, Farmers Branch, Carrollton Square, Trinity Mills, and Frankford.

The alignment would begin in downtown Dallas at the west end of the existing LRT transitway mall near Houston Street and Pacific Avenue. It would extend west and north to join the TRE corridor and continue north to an at-grade station at Victory. The initial segment of the project, from downtown Dallas to the Victory Station at American Airlines Center, is being implemented in advance to meet ridership demands at that location. This initial line section has independent utility as an important link in DART's rail system, connecting to a special events venue and providing a much needed transfer location between TRE and LRT services. This initial segment was found to be a Categorical Exclusion in accordance with 23 CFR 771.117(c)(18) and does not warrant additional environmental analysis beyond that recommended in the environmental study prepared for it on April 30, 2001. FTA issued their finding on this subject in a letter to DART dated May 16, 2001.

An aerial station would be located at Market Center near Wycliff Avenue and Harry Hines Boulevard. North of the Market Center/Oak Lawn Station, the alignment would continue aerial within DART-owned right-of-way (ROW), crossing over Harry Hines Boulevard, Lucas Street and Kendall Drive/Macatee Drive. The alignment would remain aerial over Motor Street, with an aerial station, Parkland, provided over Motor Street with access to both sides of the street.

North of the Parkland Station, the alignment would continue aerial within the DART-owned ROW crossing over Maple Avenue and Butler Street. North of Butler an aerial station (Inwood Station) would be provided in the southwest quadrant of Inwood Road and Denton Drive. The alignment would continue north, descending to grade north of Knight's Branch. It would pass Bomar Avenue, which would be closed, and would cross Manor Way at grade. The alignment would enter a cut-and-cover tunnel portal and cross under several minor streets, freight spurs and Mockingbird Lane to avoid obstructions associated with runways at Dallas Love Field. It would then return to grade at Empire Central and continue north in the DART-owned ROW at grade on the east side of the existing freight track. An at-grade station, Brookhollow, would be provided north of Burbank Street. The alignment would continue north and become elevated to cross over Shorecrest Drive and past DART's Northwest Bus Operating Facility. The line would continue over a freight spur and Webb Chapel Extension, then leave the DART-owned ROW and descend to the west side of Denton Drive to provide an at-grade station south of Community Drive. An at-grade junction with the future Irving/DFW LRT Line would be provided just north of the Bachman Station.

The alignment would continue north at grade from Northwest Highway then rise to pass over Storey Lane and Denton Drive to transition back into the DART-owned ROW on the east side of Denton Drive. The line would continue north on an aerial alignment crossing Lombardy Lane. Adjacent to the Northwest Rail Operating Facility (NWROF) north of Lombardy, the northbound tracks remain aerial. The southbound track and a pocket track descend to grade to provide access to the NWROF site at grade under the northbound track (refer to Section 2.2.5 for further information). It then ascends to the north to re-join the northbound track on the aerial structure crossing several additional minor streets up to Walnut Hill Lane. An aerial station would be provided on the north side of Walnut Hill Lane. The line would continue north on aerial structure to pass over Royal Lane and adjacent streets. An aerial station would be provided on the north side of Royal Lane.

**Figure 2-3** Vertical Alignment of the Proposed Project – South Section

**Figure 2-4** Vertical Alignment of the Proposed Project – Middle Section

**Figure 2-5** Vertical Alignment of the Proposed Project – North Section

The line would continue north on aerial structure until north of Northaven Lane, then descend to grade. At-grade crossings would be provided at Forest Lane and at the eastbound and westbound service roads of LBJ Freeway. With planned IH 35E/IH 635 interchange improvements, Forest Lane will be reconfigured as the eastbound frontage road. The line would stay at grade to pass under the main lanes of the LBJ Freeway. An at-grade station south of Valley View Lane would be provided in the City of Farmers Branch.

The alignment would cross Valley View Lane and Valwood Parkway at grade, continuing to just south of Crosby Road where it would become aerial to cross Crosby Road and the major Belt Line Road / BNSF RR / Cotton Belt RR crossing. An aerial station, Carrollton Square, would be provided just north of Belt Line Road. The alignment would stay aerial to the north and pass over Old Denton Road and Whitlock Road. The alignment would be grade-separated at Jackson Road, and cross Ismaili Center Circle at grade. The Trinity Mills Station would be located at grade just south of SH 190 (President George Bush Turnpike). The Trinity Mills Station would replace the existing North Carrollton Transit Center, which would be closed when the LRT project is opened for service. The line would cross the SH 190 eastbound and westbound service roads at-grade (under the main lanes), and continue north at grade to the last station just south of Frankford Road.

### 2.2.2 LRT Stations

Station platforms would be at-grade or aerial depending on the vertical alignment of the LRT guideway. Aerial stations would have 400-foot long platforms. At-grade stations would be 300 feet long with the capability of being expanded to 400 feet in the future. Weather protection for patrons would be provided by canopies covering the width of the platform for a minimum of one-third of its length. All platforms as well as LRT vehicles would be fully accessible for elderly and handicapped patrons during all hours of operation. Typical patron amenities at each station include bench seating, leaning rails, windscreens, trash receptacles, newspaper racks, and artwork.

Bus access would be provided at each station for various local, crosstown, express, and circulator/shuttle routes, depending on the station (refer to Section 2.2.3 for further information). Bus pullout bays would typically be adjacent to the rail platform to provide convenient transfers for passengers. Parking would be provided at some stations, depending on modes of access used by the riders to be served in the area. Kiss-and-Ride drop-off spaces and handicapped parking would also be provided. LRT station characteristics are summarized in **Table 2-1**.

**TABLE 2-1  
STATION CHARACTERISTICS  
SELECTED LRT ALTERNATIVE**

<b>Station</b>	<b>Station Type</b> At-grade, aerial, or below grade; and center or side platform	<b>Station Location and Description</b>	<b>Estimated Parking Spaces</b>
Victory	At Grade – Side TRE - Center	Platform and pedestrian plaza east side of TRE ROW	None
Market Center/ Oak Lawn	Aerial - Center	East side of TRE tracks; pedestrian connection to parking east of Harry Hines Boulevard and west to Market Center	230
Parkland	Aerial - Center	Platform over Motor Street; bus transfer east of platform and north of Motor Street. Site layout to be coordinated with Parkland Master Plan.	None
Inwood	Aerial - Center	Bus transfer east of platform along Denton; parking west of ROW	386

**TABLE 2-1 (continued)  
STATION CHARACTERISTICS  
SELECTED LRT ALTERNATIVE**

<b>Station</b>	<b>Station Type</b> At-grade, aerial, or below grade; and center or side platform	<b>Station Location and Description</b>	<b>Estimated Parking Spaces</b>
Brookhollow	At Grade - Side	West of Denton Drive (to be coordinated with Southwest Airlines Master Plan)	None
Bachman	At-Grade - Side/ Bus Transfer Center	West of Denton Drive	443
Walnut Hill/Denton	Aerial - Center	North of Walnut Hill, east of rail ROW.	361
Royal Lane	Aerial - Center	North of Royal Lane, east of rail ROW.	235
Farmers Branch	At Grade - Side	South of Valley View Lane; to be coordinated with Farmers Branch Station Development Plan	179
Carrollton Square	Aerial - Center	North of Belt Line with aerial pedestrian bridge to downtown south of Belt Line	253
Trinity Mills	At Grade - Side	North of Dickerson Parkway extension	495
Frankford	At Grade - Center Terminal station	South of Frankford	887

Source: DART; Chiang, Patel & Yerby, Inc.; Wallace, Roberts & Todd, 2002

Summary descriptions of the station facilities are provided below. Most changes identified in this section of the Final EIS reflect station site plan adjustments and result in minor adjustments to the number of parking spaces to be provided.

**Victory Station** – (Figure 2-6) This station, cleared by FTA for early implementation because it has independent utility, will be located at the American Airlines Center arena and is part of the initial segment that is being constructed in advance of the rest of the project. The LRT shares ROW with the TRE at this point, and a new commuter rail platform is being constructed to serve the arena and related development. The LRT station will be adjacent to and share platforms with the TRE commuter rail station, and will permit cross-platform transfers between modes. The station is primarily a destination. Surrounding land uses are the arena and proposed multi-family housing, commercial and office. Direct pedestrian access will be provided from the station to the arena entrance, and on sidewalks in the station vicinity. An on-street bus stop will be located adjacent to the station on southbound Griffin Street. No Kiss-and-Ride or long-term parking is anticipated at this station.

**Market Center/Oak Lawn Station (South)** – (Figure 2-7) This would be an aerial station adjacent to the existing TRE tracks. Approximately 230 long-term parking spaces would be provided across Harry Hines Boulevard. An aerial walkway would connect the platform to the parking and areas to the east. One paratransit and five DART fixed-route bus bays would be provided, along with five Kiss-and-Ride and seven handicapped spaces. This is both a destination and neighborhood access station, with the Dallas Market Center to the west and the Oak Lawn residential and commercial areas to the east. There are also some local retail and hotel uses on Harry Hines across from the station. Access would be from Harry Hines, and from Wycliff Avenue and Vagas Street from the east. A pedestrian connection north of the station and under the TRE would provide access to the Market Center.

**FIGURE 2-6 VICTORY STATION**

**Figure 2-7** Market Center/Oak Lawn (South)

**Parkland Station (UPRR)** – (Figure 2-8) This station would be an aerial station straddling over Motor Street within the DART-owned ROW. Several new Parkland facilities including a Women and Infants Hospital, Ambulatory Surgery Center and Trauma Center are planned to be built immediately near the station. Thus, patrons will be within walking distance to these new facilities as well within ¼ mile of existing facilities west of Harry Hines Boulevard. A bus transfer facility with 12 bus bays will be provided immediately east of the station north of Motor Street. Space for up to six circulator shuttles could be provided west of the station. These bus and shuttle routes will provide service to the larger Medical Center complex. The plan could also include a plaza area to visually link the station to the Medical Center facilities. As coordination with the Parkland Hospital Master Plan continues during final design, some modifications may occur to the station design and bus transfer area in order to best meet both DART and Parkland objectives.

**Inwood Station (South)** – (Figure 2-9) This station would be located at the southwest corner of the intersection of Inwood Road and Denton Drive diagonally across from Rusk Middle School and close to the Cedar Springs residential neighborhood. The station would be an aerial station with the guideway grade separated over Inwood Road. There would be five bus bays (one paratransit/shuttle, and four fixed-route), and approximately 386 parking spaces including eight handicap spaces.

**Brookhollow Station** – (Figure 2-10) This would be an at-grade side platform station located just north of Burbank Street, west of Denton Drive, and within walking distance of Southwest Airlines headquarters and future expansion area, and other aviation-related employment. This would be a neighborhood and destination station, serving the nearby Love Field West neighborhood and Southwest Airlines employees. Access would be provided from Denton Drive via Burbank Street on the south. Burbank Street would serve as a primary arterial access point connecting the station to Stemmons Freeway via Regal Row. One paratransit and seven fixed-route bus bays, and three Kiss and Ride spaces would be located west of the station platform. No parking would be provided.

**Bachman Station** – (Figure 2-11) The Bachman Station would be at-grade, just south of Northwest Highway on the west side of Denton Drive, and the DART rail ROW. There would be one paratransit and nine fixed-route bus bays, an estimated 443 long-term parking spaces, including five Kiss-and-Ride spaces provided. Access would be from Denton Drive, Harry Hines Boulevard and Community Drive. This would be a commuter and neighborhood station with industrial, retail, and commercial uses north, south and west of the station, and multi-family residential to the east. Due to the high bus volumes expected at this station, a continuous canopy would be provided to accommodate bus patrons. The proposed Irving/DFW LRT Line would branch off to the northwest just north of this station.

**Walnut Hill/Denton Station** – (Figure 2-12) This would be an aerial center platform station, located on the north side of Walnut Hill Lane. One paratransit and four fixed-route bus bays, and about 361 long-term parking spaces including seven handicapped spaces would be provided, along with three Kiss-and-Ride spaces. This is a commuter station for residential areas to the east, but it would also provide access to employment and retail uses in the area. Access would be from Walnut Hill Lane and Denton Drive, and a pedestrian connection would be provided to United Parcel Service on the north side of the station. An area for future joint development or parking expansion (about 3.7 acres) would be available on the site fronting Walnut Hill Lane.

**FIGURE 2-8** PARKLAND STATION (Motor Street)

**FIGURE 2-9** INWOOD STATION - South

**FIGURE 2-10** BROOKHOLLOW STATION

**FIGURE 2-11 BACHMAN STATION**

**FIGURE 2-12 WALNUT HILL/DENTON STATION**

**Royal Lane Station** – (Figure 2-13) This would be an aerial center platform station located on the north side of Royal Lane. One paratransit and four fixed-route bus bays, three Kiss-and-Ride, as well as about 354 long-term parking spaces including five handicapped spaces would be provided. This would be a commuter station for residential areas to the east, as well as a destination for the industrial, retail and commercial uses near the station. There is an emerging Asian trade district in the area, with merchants and businesses accessible to the station. Access to the station would be from Royal Lane, Denton Drive, and Grissom Lane.

**Farmers Branch Station** – (Figure 2-14) The Farmers Branch Station would be an at-grade side platform station, located just south of Valley View Lane. The City of Farmers Branch has been developing a Transit Oriented Development (TOD) plan for the old downtown area for several years, with the DART station an integral part of it. The City Hall and a park are located east of the station. Other retail, residential, and office uses are projected for the surrounding area, with parking shared for the station with these uses. There would be approximately 237 long-term including four handicapped parking spaces, four Kiss-and-Ride spaces, one paratransit and six fixed-route off-street bus bays provided. Parking would be accommodated in the area of the existing Farmers Branch Park-and-Ride with the possible future development of a parking structure depending on future TOD plans. Access to the station would be from Valley View Lane via Denton Drive.

**Carrollton Square Station** – (Figure 2-15) This would be an aerial center platform station located just north of Belt Line Road. The alignment would be aerial in order to cross over the Cotton Belt, UPRR and BNSF RR tracks, and Belt Line Road. The station would serve commuters in Carrollton, and the Old Downtown Carrollton area. The surrounding downtown has a mixture of retail, commercial, and office uses. One paratransit and four fixed-route bus bays, three Kiss-and-Ride, and an estimated 253 long-term parking spaces including six handicapped spaces would be provided. Access to the station would be from Belt Line Road, Main Street, Denton Drive, and Broadway Street. Part of the station site (about 50,000 SF) could be used for future joint development or additional parking. The station would be adjacent to a site for a possible rail station on the Cotton Belt corridor.

**Trinity Mills Station** – (Figure 2-16) This station would be at-grade, located just south of the President George Bush Turnpike (PGBT) and close to the existing 1,021-space North Carrollton Transit Center. Land uses and ownership are changing in the area, and the City of Carrollton is developing a revised thoroughfare plan for the area around the station. The thoroughfare modifications would provide additional access for future development and the parking area adjacent to the rail line. The station would have about 494 long-term parking, including ten handicapped spaces, five Kiss-and-Ride, one paratransit and six fixed-route bus bays. Access would be from Broadway Street (parallel to the LRT line on the west); the PGBT frontage roads (Trinity Mills Road), and from a new street to the east of the station.

**Frankford Station** – (Figure 2-17) The Frankford Station would be at-grade, located on the south side of Frankford Road. There are industrial uses to the south and east of the station as part of the Frankford Trade Center. The station would have one paratransit and four fixed-route bus bays, and about 887 long-term parking spaces including twenty handicapped, and five Kiss-and-Ride spaces. Access would be from Frankford Road via Trade Center Boulevard east of the rail ROW.

**FIGURE 2-13 ROYAL LANE STATION**

**FIGURE 2-14 FARMERS BRANCH STATION**

**FIGURE 2-15 CARROLLTON SQUARE STATION**

**FIGURE 2-16 TRINITY MILLS STATION**

**FIGURE 2-17 FRANKFORD STATION**

### 2.2.3 Bus Operating Plan

The LRT Bus Operating Plan would be based on the No-Build operating plan (created during the MIS process) with routes being restructured or realigned to feed LRT stations. Some bus routes would serve the role of feeder buses, while others would perform the dual role of feeder bus plus local or Dallas CBD service. Two express routes (204 and 247), paralleling the LRT service would be eliminated to avoid duplicative service.

Feeder bus service would consist of a network of approximately 30 bus routes and two On-Call zones providing direct service to the LRT stations. Service would be designed to meet the anticipated demand in 2025 and provide for as many connections as possible between buses and the proposed LRT service (see **Figure 2-18**).

The two On-Call zones would serve the Trinity Mills and Frankford Stations. DART On-Call is a van-based demand responsive feeder service that replaces traditional fixed route feeder service in lower density residential areas which are proximate to the rail corridor. The concept requires that customers directly contact a van operator via cellular phone to arrange pick-ups and drop-offs. A six to nine square mile residential zone can be accommodated with one van, making connections to a rail station or transit center. With On-Call service, one trip end of all peak period trips must be at the rail station or transit center. In addition, the service is partially scheduled in that the van is required to be at the rail station or transit center twice an hour, at specified train meet times, during the peak periods and at least once per hour during base periods.

Other factors taken into consideration in the development of the plan include:

- Add routes to areas with gaps in service coverage;
- Adjust bus route headways to match needs associated with rail service schedule;
- Minimize bus-to-rail access time through the use of appropriate alignment diversions; and
- Extend routes that end within one mile of a rail station to have a new terminus at the rail station.

Details of the bus-operating plan are provided in **Table 2-2**. The table lists the bus routes serving each station and each route's peak and off-peak headway.

### 2.2.4 Rail Operating Plan

The proposed project is planned to operate from its northern terminus at Frankford Road in Carrollton, through downtown Dallas along the CBD transitway mall, and connect to the proposed Southeast LRT project that would extend to Buckner Boulevard. Additionally, the DART LRT System is planned to extend an LRT branch line to Irving and DFW Airport that would merge with the proposed project just north of the Bachman Station. The focus in this EIS is the LRT project that extends from downtown Dallas to Frankford Road in Carrollton.

The proposed project is planned to accommodate two LRT routes operating during the peak period and one or two routes that would operate in the off-peak periods. During peak periods, the primary LRT route would operate from Frankford to the Dallas CBD (interlined with Southeast Corridor) on ten minute headways. A secondary route would operate between the Bachman Station and the Dallas CBD (interlined with the North Central line), also on ten minute headways. Each route is estimated to operate with two-car trains. During the off-peak operating period (mid-day, evening, and weekend), each route is planned to operate on 20-minute headways with two-car trains. Depending on passenger demand, some trips during the peak periods may operate with three-car trains. Weekend service would operate on either the weekday base or evening service, depending on observed demand. The proposed project's operating plan complies with existing agreements for LRT operations in the Dallas CBD.

**FIGURE 2-18** BUS OPERATING PLAN – SELECTED LRT BUILD ALTERNATIVE

**TABLE 2-2  
BUS OPERATING PLAN  
SELECTED LRT ALTERNATIVE**

Station	Route	Minutes	
		Peak	Off-Peak
Victory	49A	10	30
	401 Crosstown	10	30
Market Center/Oak Lawn	44 Thru	10	20
	49A	10	30
	Scottish Rite Shuttle	25	25
	Market Center Shuttle	20	20
Parkland Route	26A	15	30
	29	20	40
	44 Thru	10	20
	49B	10	30
	49D	10	30
	63B	10	30
	405	30	30
	409	15	30
	409 Shortline	10	20
	453	15	30
	UTSW Shuttle - Red	15	15
UTSW Shuttle - Blue	15	15	
Inwood	49D	10	30
	39	15	30
	49C	10	30
	539	30	30
Brookhollow	26B	10	30
	63B	10	30
	44 Thru	10	30
Bachman	44 Thru	10	30
	44 to Farmers Branch	15	30
	44/59	10	30
	51A	10	30
	51B	10	20
	428	15	30
	63B	10	20
N Irving via Mañana	10	30	
Walnut Hill/Denton	Old 43	20	40
	44/59	10	30
	Walnut Hill Crosstown	20	40
Royal Lane	44/59	10	30
	Western Circulator	10	30
Farmers Branch	44 to Farmers Branch	15	30
	Old 59	15	30
	Old 331	20	40
	321	20	40
	322	20	40
	486	20	40
	West Circulator	20	40
Carrollton Square	Old 59	15	30
	Old 331	20	40
	400	30	40
	Luna Circulator	20	40
Trinity Mills	333	20	40
	344	20	40
	Texas Instruments Express	30	60
	On Call	n/a	n/a
	On Call	n/a	n/a
Frankford	On Call	n/a	n/a

Source: DART, LKC; March 2003

LRT service on the line would have a maximum operating speed of 65 mph. Average train speed would be about 28 mph. The average train speed is influenced by civil engineering design conditions, alignment location conditions, and time spent at each passenger station (dwell time). Station dwell times average 20 seconds for each station stop.

### **Technology**

The vehicles and systems technologies to be utilized for this project would be identical to the light rail services currently operating in the DART Service Area. The electrically powered vehicles collect primary electrical power [845 Volts-Direct Current (Vdc)] via a pantograph from an overhead contact system that distributes the power from wayside traction power substations. Vehicle control is primarily the responsibility of the light rail vehicle operator with guidance from a wayside signal system, grade crossing protection, and operating rules.

### **Fare Collection**

Fare collection for the line would continue to use DART's current self-service, barrier-free concept. Fares and fare collection policies would be consistent with current operations. In accordance with current DART policy, LRT fares would be integrated and equal to the fares of local bus service.

### **Electric Power Substations and Special Trackwork**

Approximately fourteen traction power substations (TPSS) would be located along the proposed project to supply sufficient power to meet the operating plan. The substations would be 2.5 megawatt prefabricated units. The actual number and location of substations would be refined and confirmed during detailed final design. TPSS locations are typically spaced one mile apart and have a typical 80 feet by 40 feet dimension. To the extent possible, TPSS locations would be accommodated within DART right-of-way.

The track layout would incorporate special trackwork (switches) to permit service under track outage conditions and to facilitate LRT operating moves to reverse train direction. Special trackwork would be located where trains can most conveniently switch from one track to the other based on LRT operating requirements. Features associated with the LRT operating plan are depicted in **Figure 2-19**.

### **2.2.5 Rail Operating Facility**

DART's current light rail operating facility is located at the Central Rail Operations division immediately southeast of the Dallas CBD. The facility performs major maintenance functions on light rail vehicles, as well as cleaning, washing, and sanding. DART also has an associated facility, the Facilities Rail Operating Building (FROB) that is responsible for wayside maintenance—signals, traction electrification, track, and station.

The current DART fleet of 95 LRT vehicles (for existing LRT service, and expansion into the North Central and Northeast lines in 2002-2003) will expand to 160 with the addition of the Southeast Corridor and Northwest Corridor lines in 2007-2008 (dates subject to change). Phase III expansion into Irving, Rowlett and South Oak Cliff will increase the light rail fleet size to approximately 205 vehicles.

The existing light rail operating facility will be expanded to maintain 125 vehicles. This leaves 80 or more vehicles to be maintained and stored at a second facility, with the trigger for this new facility being the expansion of light rail into the Northwest Corridor. The Southeast Corridor LRT vehicles would be accommodated within the expanded Central Rail Operations Facility.

**Figure 2-19 – LRT ALTERNATIVE RAIL OPERATING PLAN**

After a preliminary assessment of potential environmental impacts, size, and access, three sites were found to meet the requirements for a second facility and were considered in the Draft EIS. The site selection process and options considered are discussed in detail in Section 2.3.3. DART held a Public Hearing on April 29, 2002 to receive public comment on the three Northwest Rail Operating Facility (NWROF) site options. The public hearing period was held open until the end of the Draft EIS public comment period. Based on an evaluation of the sites and public input, the DART Board approved a Service Plan Amendment on August 13, 2002 selecting Site 3, at the northeast corner of Lombardy Lane and Denton Drive. The conceptual layout for the facility is shown in **Figure 2-20**. This layout takes into consideration public comments received during circulation of the Draft EIS by leaving some existing businesses in place at the northeast corner of the site and allowing for visual mitigation around the site.

## 2.3 OTHER ALTERNATIVES CONSIDERED

Several alternatives were considered in the Draft EIS, but were not selected for implementation. Another alternative, Medical Center Design Option D, was developed during the DEIS comment period. These alternatives and LRT alignment options are presented in this section.

### 2.3.1 No-Build Alternative

The No-Build Alternative is used to determine the environmental impacts of not making major transit improvements in the project corridor. Evaluating this alternative also helps determine whether the benefits to be realized by implementation of the Build Alternative are acceptable, considering environmental, economic, and social impacts and their mitigation costs. The No-Build Alternative must be given full consideration and a thorough evaluation in order to compare it adequately to the proposed project.

The No-Build Alternative includes all improvements contained in the **2000 TIP**, Congestion Management System (CMS) improvements mandated to address regional air quality, and DART's planned transit system improvements as shown in **Figure 2-21**. The bus service improvements are intended to keep pace with population and employment growth, consistent with trends in the Northwest Corridor Study Area. The bus operating plan for the corridor is the level of service expected to be provided in 2025 (**Figure 2-22**). Reassignments of vehicles among routes are made to balance service with demand, with no major changes beyond those in the DART **Five Year Action Plan**.

This level of service assumes the service standard policies adopted by the DART Board of Directors as follows:

- Continue to provide service to all areas currently receiving bus service;
- Expand service consistent with DART's existing policy of servicing new demand;
- Maintain existing service standards and provide more frequent service to the extent warranted by increased ridership; and
- Add direct bus service to corridor and non-corridor major employment areas, with service originating from the transit centers.

Planned transit facility improvements include a new SH 114 Park-and-Ride near the north end of DFW Airport and a new Northwest Plano Park-and-Ride near Parker Road and the Tollway. Other programmed rail transit improvements outside the Northwest Corridor Study Area are included in the No-Build Alternative. Transit improvements include extensions of the North Central LRT line to Plano and Northeast LRT Line to Garland, both of which are now complete.

**Figure 2-20** Northwest Rail Operating Facility Site

**FIGURE 2-21** NO-BUILD ALTERNATIVE

**FIGURE 2-22** 2025 NO-BUILD BUS OPERATING PLAN

Planned and programmed roadway improvements are also included in the No-Build Alternative. Highway improvements based on recently completed TxDOT MIS's are included in the network assumptions of the regional travel demand model. These projects are Loop 12 /IH 35E, SH 183 / West Fork, President George Bush Turnpike (SH 190), IH 35E North, and SH 114 / 121. The most probable level of improvement for each of these projects is included in the No-Build Alternative.

### 2.3.2 Other LRT Alignments Considered

The Draft EIS also considered four LRT alignment options in the Medical Center area and one in the Love Field area. A fifth Medical Center design option (Design Option D) was developed during the DEIS comment period. These design options and the decisions that led to the Selected LRT Alternative are described below for each.

#### Medical Center Design Options

##### Background

The Northwest Corridor LPIS reflected an LRT alignment in the vicinity of the Medical Center that would have deviated from the existing rail corridor north of the Market Center/Oak Lawn Station to continue north elevated in the median of Harry Hines Boulevard. An aerial station would have been provided for the Medical Center in the median north of Lofland Street at Parkland Hospital. The alignment would have continued elevated in the median of Harry Hines Boulevard, then transitioned to the east side of Harry Hines south of Inwood Road. A station would have been provided north of the entrance to the University of Texas Southwestern (UTSW) Medical Center North Campus just south of Exchange Park Boulevard. The LPIS alignment continued east along Bomar Avenue to return to the UPRR corridor and was mostly elevated with some at-grade sections.

In summer 2000, prior to the EIS scoping process and issuance of the Notice of Intent to prepare an EIS, DART initiated meetings with representatives of the Medical Center district hospital facilities to discuss potential refinements of the LPIS alignment. Through a series of meetings from November 2000 to February 2001, the alignment in this area was refined to remove at-grade sections and provide a mostly elevated alignment, and to use Treadway Street rather than Bomar Avenue to return to the UPRR corridor. Use of Treadway Street would avoid possible conflicts with future buildings on the UTSW North Campus. Therefore, the route was modified to turn east and descend to grade along Treadway Street to cross Forest Park Road. A reverse curve north would take the alignment to the south side of Mockingbird Lane, and further east at-grade to Maple Avenue. After crossing Maple, the alignment would descend into a short tunnel to cross under Mockingbird Lane and avoid flight zone restrictions at Love Field Airport. It would curve to the north to rejoin the UPRR ROW and return to grade between Hawes Avenue and Empire Central Drive in the median of Harry Hines Boulevard. This alignment provided the foundation for the Base Alignment in the Medical Center area that was assessed in the Draft EIS and also discussed in this Final EIS.

During the coordination meetings, Medical Center representatives also indicated a desire to examine the feasibility and costs of a tunnel alignment along Harry Hines. In February 2001, DART presented an option with a short tunnel section from an area south of Motor Street to approximately Inwood Road with an open-cut station near Parkland Hospital. At that meeting, Medical Center representatives indicated their desire for a tunnel along the length of Harry Hines to address visual and construction issues associated with the elevated alignment in the UTSW North Campus area north of Inwood Road. This desire was restated in a consensus letter to DART from the Medical Center leadership in March 2001.

In response, DART held a meeting in April 2001 to discuss cost issues associated with the tunnel alignment and positive attributes of the aerial Base Alignment. A tunnel alignment from south of Motor Street to an area north of the UTSW Medical Center North Campus was estimated to cost an additional \$250 million and was found to be cost-prohibitive by both DART and the Medical Center.

It was after this meeting that the Medical Center requested that DART develop other routing options to address their concerns with the Base Alignment.

Six different alternative routing options through the Medical Center area were developed during Summer 2001 and presented at three public meetings on August 27, September 13, and September 20, 2001. Following an evaluation of the alignments and consideration of public and Medical Center comments received, the DART Board approved Alternative 3A as the Medical Center Design Option on September 25, 2001.

#### Design Options Explored During the Draft EIS

The Draft EIS examined the Base Alignment (described above) along Harry Hines Boulevard, Medical Center Design Option A (the original 3A alignment referenced above), as well as two additional Medical Center Design Options B and C that were developed so that more than one option could be explored given the number of acquisitions and displacements required. The Design Options are further described below.

The Medical Center Design Options (see **Figure 2-23**) differ only in the area in which they transition between the Market Center/Oak Lawn Station and the Inwood Station. All options would begin just north of the Market Center/Oak Lawn Station and transition to become aerial, crossing over Market Center Boulevard and continuing in the median of Harry Hines Boulevard. While the Base Alignment would have remained aerial within the median of Harry Hines, the Design Option alignments would descend to grade and enter a tunnel portal in the median of Harry Hines Boulevard at a point south of Motor Street. The alignment would remain in a tunnel under Motor Street, turning north and northeast to leave Harry Hines Boulevard.

All three options would have crossed Harry Hines north of Lofland Street opposite the main entrance to Parkland Hospital. An open-cut station would have been provided north of Lofland and east of Harry Hines Boulevard. North of the station, the options would have continued in open cut, crossing under Redfield Street in a cut and cover double box. Options A and C would have risen to cross Butler Street and Maple Avenue at-grade. Option B would have continued in an open cut but would have turned to the east sooner and remained parallel to and south of Butler Street, joining the right-of-way about 500 feet south of the Maple Avenue at-grade crossing. Tex Oak Street would have been closed under all three options, and a cul-de-sac and street connector from Redfield would have been created. Option C would have joined the right-of-way near Butler Street, and Option A would not join the right-of-way until just south of Inwood. South of Inwood Road, all options would then have transitioned into an aerial section to cross over Inwood Road and Knight's Branch. An aerial station would have been provided in the northwest quadrant of Inwood Road and Denton Drive. The alignment would then have descended to grade and entered a tunnel portal to cross under Mockingbird Lane. Between Harry Hines Boulevard and the UPRR right-of-way, the Medical Center Design Option alignments would not have been located in either railroad or roadway right-of-way, thus requiring the acquisition of private property for the project.

#### Design Option Refinements Made as a Result of Public Comments on the Draft EIS (Medical Center Design Option D)

After preparation of the Draft EIS (June 2002) and during the 45-day circulation period, DART staff continued to explore ways to further reduce property acquisitions and relocations, in response to public comments regarding the additional cost and displacements associated with Design Options A, B and C. Through refinements to Medical Center Design Option B, the staff developed Medical Center Design Option D (see **Figure 2-23**), which directly addresses concerns about property acquisitions, relocations and costs. As previously noted, this was the option selected by the DART Board for implementation as part of the LRT Alternative. This alignment is located about 500 feet south of, and parallel to, Design Option B. Instead of crossing under Harry Hines Boulevard north of Lofland Street, Option D would cross under Harry Hines at Motor Street, with an open-cut station located on the east side of Harry Hines Boulevard north of Motor Street and south of Lofland.

**FIGURE 2-23** MEDICAL CENTER DESIGN OPTIONS

This option would cross in a double box under a potential extension of Redfield, then re-join the DART owned right-of-way about 1,000 feet south of the Maple Avenue at-grade crossing. South of Inwood Road, Option D would then make the same transition and continue as previously described for Options A, B, and C.

Option D was developed through discussions with Parkland Hospital, which has long-term plans to expand its facilities on the east side of Harry Hines Boulevard. Medical Center Design Option D resulted in a smaller number of property acquisitions, fewer displacements, and cost savings as compared to the other options considered in the Medical Center area.

Medical Center Design Option D was presented to the public at the Draft EIS public hearings on July 11, 15 and 16, 2002. DART also briefed the stakeholders and property owners in the Medical Center area. Many of the verbal comments at the public hearings and written comments on the Draft EIS addressed the alignment options in the Medical Center area. As a result of the public input received, the DART Board selected Option D because it provided the best opportunity to address concerns of both the Medical Center as well as local property owners.

#### Subsequent Refinements in Medical Center Area

During preparation of this Final EIS, Parkland Hospital and DART continued coordination on the Option D alignment and station in conjunction with more detailed planning and facility concepts for the Parkland Master Plan. One of the key complicating factors that has arisen is the issue of service tunnels and basement-level connections between proposed Parkland facilities, which would be separated by the below-grade, open-cut LRT alignment. The initial design of Option D and the station focused on providing a fairly shallow tunnel and station over which Parkland could use air rights for development. Automobile and pedestrian connections across the alignment would generally take place over the station and in the vicinity of the potential Redfield Street extension. Given the early stage of their planning process, Parkland wishes to maintain maximum flexibility for these service connections depending on the ultimate placement of buildings. This desire translates into a need to lower the LRT profile approximately 10-15 feet and provide a covered area of between 200-800 feet that could be used for these service connections. These project changes are estimated to add up to \$20 million to the project due to increased excavation, a longer tunnel section, and potentially increased ventilation requirements.

This issue, coupled with the planned expansion of Medical Center facilities eastward towards Maple Avenue, led the Medical Center representatives to request that DART re-examine the feasibility of using the DART-owned UPRR right-of-way for the alignment through the Medical Center area.

While a compromise solution has been pursued, the additional cost required and the availability of DART-owned UPRR right-of-way immediately east of planned Parkland development supports the use the UPRR right-of-way. While this right-of-way appeared too far removed from the Medical Center district during the Major Investment Study (MIS) and early PE/EIS efforts, Parkland's recent announcements of property acquisition east of the alignment towards Maple Avenue and recent discussions of a private transit-oriented development south of Motor Street on vacant property adjacent to the alignment, make the UPRR alignment a more attractive alternative since a cost-effective solution to Option D is not available.

In addition to the issues and changed conditions in the vicinity of Parkland Hospital, DART has received rights-of-entry from and has initiated discussions with several property owners along the alignment and at proposed station sites. The Federal Transit Administration (FTA) provided approval for these early real estate activities by letter to DART on August 15, 2002. The results of these efforts as well as other environmental and alignment issues, have led to refinements to the Inwood and Market/Center Oak Lawn Stations (see discussion below for DEIS options and Section 2.2.2 for station refinements).

Prior to seeking DART Board approval of using the UPRR right-of-way rather than Option D through the Medical Center area, DART held an informational public meeting on April 3, 2003 and a formal public hearing on April 10, 2003 to take comments on the proposed alignment and station refinements. A summary of the changes was available at the meetings. Verbal and written comments postmarked by April 12, 2003 are included in Chapter 6 with responses to each comment. The DART Board approved the changes on May 13, 2003. These changes are reflected in this Final EIS as the Selected LRT Alternative.

### Love Field Design Option

The MIS included a recommendation that direct LRT access to Love Field be studied further during the PE/EIS effort. During the PE/DEIS phase, DART initiated coordination with the City of Dallas Aviation Department to develop an alignment compatible with the recently completed Love Field Master Plan. Consideration was also given to the airfield (taxiways and runways) area and the runway protection zones (RPZ's) at the airport. DART coordinated with the FAA and Southwest Airlines on the development and evaluation of alignments to directly serve Love Field. Other airport tenants were indirectly involved through their participation in the Love Field Master Plan. Airport tenants also had the opportunity to comment on the Draft EIS.

Several alternatives were developed and evaluated with the objective of providing convenient and direct access to the terminal area in a cost-effective manner. A detailed description of the Love Field alternatives, including the option carried through the Draft EIS, is included in Appendix E.

The Love Field Design Option (see **Figure 2-24**) would have consisted of a deep bore tunnel alignment starting near Maple Avenue on the south side of Mockingbird Lane with the Harry Hines Base Alignment or near Manor Way south of Mockingbird under any of the Medical Center Design Options.

At the intersection of Mockingbird Lane and Denton Drive (parallel to the former UPRR right-of-way), the tunnel alignment would have headed northeast. The alignment would have remained in a tunnel below Dallas Love Field property, passing below the southern edge of primary runway 13R/31L. The alignment would have continued in a northeastern direction, crossing below Cedar Springs Road, the airport access road. A below-grade, open-cut station was proposed on the southeast side of the terminal building, in the vicinity of a possible future ticketing and baggage wing included in the airport facilities Master Plan. (The Dallas Love Field Master Plan improvements are not the subject of this EIS.) The tunnel alignment would have continued north then turn west to cross under the airfield and Denton Drive, rejoining the Base Alignment on the UPRR ROW and returning to grade just south of Burbank Street and the Brookhollow Station.

The Federal Aviation Administration (FAA) was requested to be a cooperating agency with FTA for purposes of this EIS. An Aeronautical Study (Form 7460-1) for the Love Field Design Option was submitted to the City of Dallas Aviation Department and FAA on November 13, 2001. The form was also submitted for the Base Alignment and Medical Center Design Options on December 5, 2001 to determine any air space issues. Based on letters received June 4, 2002 (regarding stations on the Base Alignment or Medical Center Design Options) and on September 23, 2002 (regarding the Love Field Design Option), the FAA had no objections to the project as proposed. The Love Field Design Option is not included in the Selected LRT Alternative based on the Service Plan Amendment approved by the DART Board on September 17, 2002.

### Stations Considered During the Draft EIS Comment Period

One station was proposed for the Medical Center Area Design Options (Parkland and UTSW/Exchange Park), and two for the Love Field Design Option. None of these station locations are part of the Selected LRT Alternative since all are associated with alignments that were not approved by the DART Board. Three locations for the Parkland Station were considered. The station characteristics are summarized in **Table 2-3** and described below.

**FIGURE 2-24** LOVE FIELD DESIGN OPTION

<b>TABLE 2-3 STATION CHARACTERISTICS OTHER ALTERNATIVES CONSIDERED</b>			
<b>Station</b>	<b>Station Type</b> At-grade, aerial, or below grade; and center or side platform	<b>Station Location and Description</b>	<b>Estimated Parking Spaces</b>
<b>Medical Center Design Options (A, B, C, D and Harry Hines Base Alignment)</b>			
Parkland (Base Alignment)	Aerial w/ Mezzanine - Center	Harry Hines median; connection to existing pedestrian bridge; buses on Harry Hines	None
Parkland (Design Options A, B, C)	Below grade, open-cut Center	North of Lofland Street; bus transfer plaza north of Lofland Street	None
Parkland (Design Option D)	Below grade, open-cut Center	South of Lofland Street; bus transfer on Lofland Street	None
UTSW/Exchange Park (Base Alignment)	Aerial - Center	Bus transfer on east side of Harry Hines Boulevard	None
<b>Love Field Design Option</b>			
Love Field	Below grade, open cut- Center	Adjacent to possible new Love Field ticket/baggage claim building based on tunnel approach on east side of Cedar Springs Road	None

Source: DART; Chiang, Patel & Yerby, Inc.; Wallace, Roberts & Todd, 2002

*Parkland Station (Harry Hines Base Alignment)* – (Figure 2-25) This station would have been aerial with a center platform, located in the median of Harry Hines Boulevard. It would have been directly in front of the main entrance to Parkland Hospital, in the very heart of the medical institutions it would serve: Children’s Medical Center, Zale Lipshy University Hospital, and UT Southwestern Medical Center’s South Campus. A mezzanine level below the station platform would have given direct access to the existing pedestrian bridge over Harry Hines to connect with the hospitals on the west side of the street. Bus access would have been provided at on-street bus stops, four each direction on Harry Hines Boulevard. Pedestrian access between the bus stops on southbound Harry Hines and the LRT platform would have used existing signalized crosswalks. There would have been no long-term parking at this destination station.

*Parkland Station (Design Options A, B, C)* – (Figure 2-26) The station would have been located in an open cut just east of Harry Hines Boulevard, north of Lofland Street, across from the Parkland Hospital front entrance. The below grade station location would allow for optimal joint development potential by retaining property on both sides of the station. The station would have had an open-air platform with terraced planters stepped back up to the ground level. The platform would have been accessed at the ends as well as from a central mezzanine spanning the tracks below. A bus transfer facility with six bus bays would have been located along Lofland Street. The overall plan would have also featured a landscaped plaza space that would visually connect with Parkland’s front entrance.

**FIGURE 2-25** PARKLAND STATION (HARRY HINES BASE ALIGNMENT)

**Figure 2-26** – Parkland Station (Design Options A, B, C)

*Parkland Station (Design Option D)*– (Figure 2-27) This station was developed during the DEIS comment period for Medical Center Design Option D. It would have been located in an open cut just east of Harry Hines Boulevard, north of Motor Street, across Harry Hines from Parkland Hospital. The below grade station location would allow for optimal joint development potential by retaining property on both sides of the station. The station would have an open-air platform with terraced planters stepped back up to the ground level. The platform would be accessed at the ends as well as from a central mezzanine spanning the tracks below. A bus transfer facility with 13 bus bays (11 fixed-route, one paratransit, and one shuttle) would be located along Lofland Street. The overall plan could also feature a landscaped plaza space that would visually connect with Parkland's front entrance.

*UTSW/Exchange Park Station (Harry Hines Base Alignment)* – (Figure 2-28) This would have been an aerial center platform station located along the east side of Harry Hines Boulevard and just south of Exchange Park. This would have been a destination station, serving UTSW's North Campus to the south, St. Paul University Hospital on the west side of Harry Hines, and the Exchange Park office development to the north. The station would also have functioned as a hub for bus service in the Stemmons Business Corridor. One paratransit and 10 fixed-route bus bays would have been provided, along with six Kiss-and-Ride spaces. These would have been located off-street on the east side of Harry Hines Boulevard adjacent to the station platform. No long-term parking would have been provided.

*Love Field Station (Design Option)* – (Figure 2-29) This station would have been located underground in an open-cut configuration on the east side of Cedar Springs Road in the vicinity of a possible future ticketing and baggage wing included in the airport facilities Master Plan. It would have had vertical pedestrian circulation to the existing terminal building. This pedestrian circulation would have been modified should the proposed ticket wing be built. There would have been no parking or Kiss-and-Ride. Limited bus access would have been provided along Cedar Springs Road, the airport access road. It would have been intended to serve airport employees and passengers at Love Field airport.

### **Station Locations Affected By Subsequent Project Changes**

The April 10, 2003 public hearing also addressed refinements to the Market Center/Oak Lawn and Inwood Stations. The Market Center/Oak Lawn Station refinement is a direct result of the alignment change to the UPRR. The Inwood Station refinement was based on DEIS comments and recent property owner interviews as well as other environmental issues. Section 2.2.2 describes the refined stations that are reflected in the Selected LRT Alternative. Stations examined in the DEIS, but not selected, are described below.

*Market Center/Oak Lawn Station (North)* – (Figure 2-30) This would be an at-grade station on retained fill adjacent to the existing TRE tracks. Approximately 308 long-term parking spaces including seven handicapped spaces would be provided across Harry Hines Boulevard. Because the elevation of both the station and the parking area is higher than Harry Hines Boulevard, an aerial walkway would connect the platform to the parking and areas to the east. One paratransit and five DART fixed-route bus bays would be provided, along with five Kiss-and-Ride and six handicapped spaces. This is both a destination and neighborhood access station, with the Dallas Market Center to the west and the Oak Lawn residential and commercial areas to the east. There are also some local retail and hotel uses on Harry Hines across from the station. Access would be from Harry Hines, and from Wycliff Avenue and Hondo Street from the east. A pedestrian walkway connection under the TRE would provide access to the Market Center.

**Figure 2-27** – Parkland Station (Design Option D)

**Figure 2-28** – UTSW/Exchange Park Station (Harry Lines Base Alignment)

**Figure 2-29** – Love Field Station (Design Option)

**Figure 2-30** Market Center/Oak Lawn Station (North)

*Inwood Station (North)* – (**Figure 2-31**) This station would be located at the northwest corner of the intersection of Inwood Road and Denton Drive across from Rusk Middle School and close to the Cedar Springs residential neighborhood. The station would be an aerial station with the guideway grade separated over Inwood Road. There would be seven bus bays (one paratransit, one shuttle, and five fixed-route), and approximately 264 parking spaces including six handicapped spaces.

### 2.3.3 Other Rail Operating Facility Sites Considered

DART determined that for maximum operational efficiency, the new rail operating facility should be located along the Northwest Corridor near the future junction with the Irving/DFW Line and be approximately 30 acres in size. The FTA determined that the EIS needed to address this facility, although site selection was conducted as a separate effort. Based on preliminary site requirements, eight areas along the alignment were examined as to their suitability for the new facility. After a preliminary assessment of potential environmental impacts, size, and access, three sites were found to meet the requirements and were considered in the Draft EIS. Appendix G contains the Executive Summary of the report documenting the development and evaluation of the eight sites, titled ***DART LRT Rail Operating Facility – Phase 1 Site Selection Study***.

**Figure 2-32** shows the location of the sites considered in the Draft EIS: Site 1 (Webb Chapel), Site 2 (Northwest Highway), and Site 3 (Lombardy). Site 3 was selected for the facility (see Section 2.2.5).

The Webb Chapel site (Site 1) is approximately 36 acres, and is located between Denton Drive and Harry Hines Boulevard south of Webb Chapel Extension. The site encompasses the City of Dallas Solid Waste Transfer Facility and the DART Northwest Bus Operating Facility. Both facilities are about 18 acres each in size, and would have been relocated to accommodate the new rail operating facility.

The Northwest Highway site (Site 2) is an active commercial area of about 23 acres, located just north of Northwest Highway between Denton Drive and Harry Hines. The site is zoned IR (industrial/research). There is a historic structure (Bingo Theater) on the property. This site was not large enough to accommodate the facility and has higher redevelopment potential.

## 2.4 CAPITAL COSTS

Capital cost estimates reflect preliminary engineering and understanding of the principal structural and system elements. The estimated cost to construct the required facilities, acquire necessary system control and operating equipment and vehicles for the Selected LRT Alternative is \$938 million in 2002 dollars. This estimate includes expenses for the development of civil/structural elements, accommodation of known site conditions, purchase and installation of system control components, and vehicle acquisition. The cost to develop transit passenger stations is included in the total capital cost estimate.

As compared to the Selected LRT Alternative, the costs of other Medical Center Design Options considered ranged from approximately \$40 million more (for Harry Hines Base Alignment and Medical Center Design Option D), to approximately \$60 to \$65 million more (for Medical Center Design Option A, B, or C). The Love Field Design Option would have added approximately \$160 million to the project cost.

The conceptual composite unit prices were developed by using unit prices recently experienced by DART. Various major elements of the estimates include: right-of-way, utilities, special construction, grade preparation, trackwork, structures, grade crossings, stations, ticket vending machines, park and ride lots, traction electrification, communications, signals, maintenance facility and vehicles. Cost estimates for right-of-way acquisition are also included.

**Figure 2-31 – Inwood Station (North)**

**Figure 2-32** Rail Operating Facility Sties Considered

Cost estimates have been developed based upon the current 10% level of preliminary engineering design. The cost estimate for the Selected LRT Alternative is provided in **Table 2-4**.

<b>TABLE 2-4 CAPITAL COST ESTIMATES</b>	
	<b>Estimated Cost (millions)</b>
<b>Selected LRT Alternative</b> (Base LRT + UPRR Medical Center alignment)	\$ 938

Source: Sunland Engineering, Inc., March 2003

## 2.5 OPERATIONS AND MAINTENANCE COSTS

### 2.5.1 Bus System

A spreadsheet-based cost model was developed to estimate the annual operating budget required for DART to provide service according to the alternative bus operating plans. The operating and maintenance (O&M) model is based on DART's FY 2001 costs to operate, maintain, and administer bus services.

O&M cost variable information (cost/mile, cost/hour, cost/peak vehicle) for directly-operated fixed-route services was provided by the DART Office of Management and Budget. Directly-operated fixed-route cost variables reflect a cost allocation model that includes all costs within the bus services area. O&M cost variables (cost/hour) for purchased fixed-route services and On Call services were drawn from current contract rates for similar services.

The DART Service Area is not expected to increase or decrease in size as a result of the implementation of the proposed project. Thus, DART Paratransit expenses are presumed to remain unchanged and are, therefore, not included in the cost estimation analysis.

Additional model input was drawn from several sources. Those sources included:

- Route alignments and headways for routes serving rail stations – from the *Northwest LRT Corridor Station by Station Bus Feeder Plan* created by DART Service Planning;
- Route speed – extracted from DART and NCTCOG TNET modeling output;
- Route length – measured in ArcView GIS (Geographic Information Systems) software; and,
- Northwest Corridor Major Investment Study (MIS) – provided model input for the No-Build Alternative.

Using the above data, estimates were made of the annual number of weekday hours, miles, and peak vehicles which would be required to operate bus service according to the alternative bus operating plans. Two hundred and sixty (260) weekdays of operation were assumed.

**Table 2-5** presents the calculated estimates of hours, miles, and peak vehicles for the bus operating alternatives.

<b>TABLE 2-5 ANNUAL HOURS, MILES, AND PEAK VEHICLE ESTIMATE SUMMARY</b>			
<b>Alternative</b>	<b>Hours (millions)</b>	<b>Miles (millions)</b>	<b>Peak Vehicles</b>
<b>Selected LRT Alternative (Base Alignment Center with UPRR alignment)</b>	2.22	30.93	850
<b>Other Alternatives Considered</b>			
No-Build	2.08	29.38	809
Harry Hines Base Alignment	2.28	31.10	857
Harry Hines Base Alignment with Love Field Design Option	2.28	31.10	857
Base Alignment with Love Field and Medical Center Design Options A, B, C, or D	2.22	30.93	850

Source: LKC, Inc. January 2002; DART, March 2003

The appropriate O&M cost variables were then applied to the mile, hour, and peak vehicle estimates to calculate an estimation of annual operating costs. **Table 2-6** presents annual O&M cost estimates of the bus operating alternatives and the corresponding incremental cost over No-Build.

TABLE 2-6 BUS OPERATIONS AND MAINTENANCE COSTS		
Alternative	Annual O&M Cost (millions) 2001 \$	Increase Over No Build (millions) 2001 \$
<b>Selected LRT Alternative (Base Alignment with UPRR Medical Center alignment)</b>	\$122.46	\$6.85
<b>Other Alternatives Considered</b>		
No-Build	\$115.61	n/a
Harry Hines Base Alignment	\$124.43	\$8.82
Harry Hines Base Alignment with Medical Center Design Options A, B, C, or D	\$122.43	\$6.82
Harry Hines Base Alignment with Love Field Design Option	\$124.43	\$8.82
Base Alignment with Love Field and Medical Center Design Options A, B, C, or D	\$122.43	\$6.82

Source: LKC, Inc. January 2002; DART, March 2003

### 2.5.2 LRT System

The proposed LRT service is estimated to add 114,400 annual vehicle operating hours and 2,828,800 annual vehicle operating miles to the No-Build Alternative LRT system. The No-Build Alternative, which includes the existing 43-mile LRT system, is expected to be in full operation in 2004. The proposed project, which adds 17.6 miles to the LRT system, is estimated to add \$23.5 million (2001 dollars) to the LRT operating costs for a total of \$82.3 million in annual LRT operating and maintenance costs.

### 2.5.3 Systemwide Operations and Maintenance Costs

Implementation of the proposed project, and associated changes to the bus system, will result in increased systemwide operating and maintenance (O&M) costs. Costs for other alternatives considered are also shown. **Table 2-7** summarizes these systemwide O&M costs.

TABLE 2-7 ANNUAL SYSTEMWIDE OPERATING AND MAINTENANCE COSTS						
MODE	ALTERNATIVES CONSIDERED (millions 2001 \$)					
	SELECTED LRT ALTERNATIVE	NO BUILD	BASE	BASE + MEDICAL (A, B, C, or D)	BASE + LOVE	BASE + MEDICAL + LOVE
Bus <sup>1</sup>	\$122.46	\$115.61	\$124.43	\$122.43	\$124.43	\$122.43
Light Rail <sup>2</sup>	\$82.20	\$58.80	\$82.50	\$82.50	\$82.80	\$82.50
TRE <sup>3</sup>	\$20.40	\$20.40	\$20.40	\$20.40	\$20.40	\$20.40
Paratransit <sup>3</sup>	\$22.00	\$22.00	\$22.00	\$22.00	\$22.00	\$22.00
HOV Transitways <sup>3</sup>	\$5.70	\$5.70	\$5.70	\$5.70	\$5.70	\$5.70
General Mobility-TDM <sup>3</sup>	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00	\$1.00
Total	\$253.73	\$223.51	\$256.03	\$256.03	\$256.33	\$254.03

<sup>1</sup> Calculated by LKC Consulting Services, Inc. based on FY02 bus operations costs

<sup>2</sup> Calculated by Parsons Transportation Group

<sup>3</sup> DART FY 2002 Business Plan (Exhibit 4.2: FY 2002 through FY 2006 Sources and Uses of Cash, 2002 column)

Source: LKC Consulting Services, Inc.; Parsons Transportation Group; DART, 2002